Dalradian Gold Limited

Curraghinalt Project
County Tyrone
Northern Ireland

STATEMENT OF CASE:

WATER ABSTRACTION

PAC Ref:
2024/WHR01

DAERA Refs:
AIL/2024/0008 &
AIL/2024/0009

CONTENTS

Executive Summary

This Statement of Case sets out the legislative framework for abstraction and the background to the two applications that are now under consideration.

As appears in the Statement of Case, there is significant overlap between disciplines and areas of expertise. In particular, ecology, groundwater and surface water and those issues are referenced and where appropriate, cross-referenced. The relevant documents that are referenced are not appended to avoid duplication and repetition.

The locations of the proposed abstractions are identified and the potential impacts are assessed, and there is a discussion of the mitigation that is proposed.

In carrying out the assessment, regard is had to the relevant United Kingdom guidance.

The impacts to surface water flows and groundwater levels from the Project were assessed as not significant.

Archaeological impacts have been specifically considered following discussion with NIEA and are not significant.

In response to the 2020 Applications, two areas of concern were raised by the authorities in respect of the water balance test and final abstraction volumes, and wetland/peatland archaeology. The responses are provided in Section 5.

Representations were also received from non-statutory stakeholders and have been considered. In addition to the representations received in relation to the July 2024 applications which are before the Commission, 153 responses were received in respect of the 2020 Applications. Representations consisted of a standardised set of 25 statements that comprised template letters. The April 2024 application process had 365 responses, of which 49 were unique responses and the balance were in the form of templates.

In addition to objections linked to the overall planning application and the potential impacts of the mine on sensitive habitats including peat, the objections more specifically related to the abstraction of water fell under the following topics:

- Impacts on groundwater levels and flows;
- Potential for changes to river morphology;
- Cumulative and transboundary impacts;
- The design of the surface water infrastructure; and
- Pond safety.

In reviewing the various representations, the authors of the Statement of Case consider that the concerns raised have been assessed as part of the specialist studies that make up the abstraction application and mine planning application. Responses to the key issues have been provided in Section 6 and cross referenced to the relevant specialists' reports.

1. Introduction

This Statement of Case (SoC) is prepared on behalf of Dalradian Gold Limited (DGL) in support of its application for two Abstraction Licences from the proposed Curraghinalt Mine, adjacent to 80 Mullydoo Road, Greencastle, County Tyrone, BT79 7QP (Irish Grid Co-ordinates E258418, N383902) (the Site).

The abstraction licence applications and this Statement of Case are informed by the Groundwater Impact Assessment (Appendix C6 (2020) of the Second Addendum) and the Surface Water Impact Assessment (App C4 of the Second Addendum). Technical Reports on these topics have been prepared by Dr James Bellin and Dr Michael Stewart and are attached to the Statement of Case in support of the main planning application and the reader is referred to those for more detail. This Statement of Case also draws information from other Technical Reports which are cross referenced where relevant.

The abstraction licences are required under the Water Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006 (2006 No 482) as amended (hereafter the Regulations). Two applications to the Department for Agriculture Environment and Rural Affairs (DAERA), the 2020 Applications were originally made as follows:

- Application AIL/2020/0105 for the abstraction of surface water and storage in the Clean Water Pond – the water would be used for industrial process water, as well as maintaining a minimum flow in the Pollanroe Burn; and
- Application AIL/2020/0106 for the abstraction of mine water through dewatering of the underground mine and storage within the West Pond – the removal of water from the underground workings is necessary to create a safe working environment with the abstracted water potentially used for industrial process water, if required. Excess water will be treated and discharged in line with the requested discharge permit.

On 24 April 2024, the Water Appeals Commission determined that the 2020 Applications could no longer form part of the conjoined public inquiries, as they were deemed refused.

Two further applications for the abstraction of mine water and the abstraction of surface water were submitted on 24 April 2024 (the April 2024 Applications). Those applications were subsequently withdrawn in July 2024.

Two further applications for the abstraction of mine water and the abstraction of surface water were submitted on 26 July 2024 (the July 2024 Applications). Each application comprised the following:-

- Application Form
- SRK Supporting Document (November 2020) (the Application Reports)

- Kaya Letter dated 17 December 2021
- Kaya Letter dated 28 January 2022
- Gahan and Long letter dated 28 January 2022
- DAERA spreadsheet of responses to 2020 application (ref. AIL 2020/0105 & AIL 2020/0106)

On 4 September 2024 DAERA directed the Water Appeals Commission to hold a public inquiry to consider the representations received.

DGL's solicitor submitted copies of representations received by DAERA from third parties in respect of the 2020 Applications and the April 2024 Applications as a representation to the July 2024 applications ensuring that the issues raised in the representations are before the Commission. Representations are addressed in Section 6 below.

2. Site Context

The Curraghinalt Project is located in County Tyrone, approximately 15 km northeast of the town of Omagh, 7 km east of the village of Gortin, and between the settlements of Rouskey and Greencastle. Access to the project is via a number of highways and local roads, including the B48 from Omagh to Gortin, and the B46 from Gortin to Greencastle.

The Project comprises five project areas: the proposed infrastructure site (Area A), the proposed mineral extraction area (Area B), the existing surface infrastructure site (Area C), the passing bays on the Camcosy Road (Area D) and the proposed mineral exploration area (Area E). These areas combine to create the application site as shown on Figure 1. A detailed description of the proposed Project activities can be found in Chapter 4 of the ES (updated as Appendix E9, Second Addendum to the ES, October 2020).

The setting of the Site is summarised in the Application Reports, with further details provided in Chapters 6 and 7 of the ES 2017, as amended. With respect to the abstraction permits, potential sensitive features of the environment include:

- The surface water catchments of the Owenkillew and Owenreagh Rivers, which are within Special Areas of Conservation and Areas of Special Scientific Interest;
- Peat habitat that is recognised as a priority habitat in Northern Ireland and listed under Annex 1 of the EU Habitats Directive.

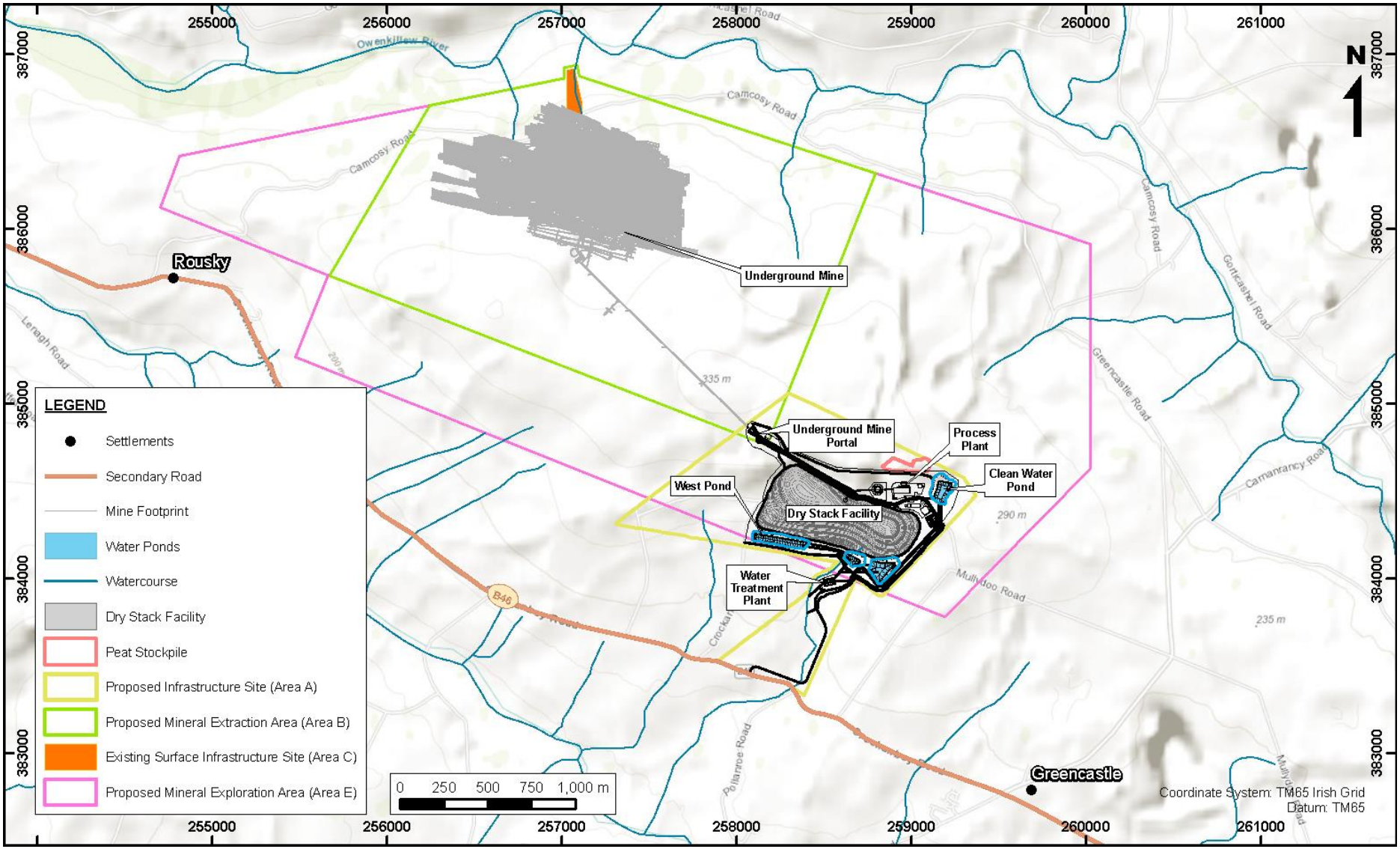

Figure 1: Project location and overview of Project Areas (Source: Figure 3-1 of Application Reports)

3. Legislative and Policy Context

Legislative Context

The Regulations set out a control regime for regulating the abstraction of water from underground strata or waterways and other controlled activities. The Regulations provide a single and consistent environmental risk-based approach that covers all abstractions and impoundment operations.

The Regulations meet the requirements of Article 11 of the Water Framework Directive ("the WFD"), which requires controls over water abstractions and impoundments to ensure the environmental sustainability of the affected water systems. They also address the Habitats Directive requirements, which are applicable in Northern Ireland via the Conservation (Natural Habitats, etc)(Amendment)(NI)(EU Exit) Regulations 2019. They require assessment of the potential impacts of abstraction and impoundments on protected and sensitive sites.

Policy Context

The Project sits within the North Western River Basin Management Plan area, with the most recent report plan dated 2015 (covering the six years to 2021). A draft plan for 2021 – 2027 was out for consultation in 2021, but a final version has not yet issued. The draft plan clearly states that the objective of the 2015 plan to have 70% of its water bodies at 'good or better' status by the end of the plan period was not met. The draft plan proposes to maintain the previous objective as a working target for 2027.

Two significant sources of pressure preventing achievement of the target remain. These are diffuse pressures from agricultural sources and discharges related to sewage. Taking too much water from rivers, lakes and groundwater has been identified amongst other pressures contributing to the challenge in meeting the objectives.

The project also sits in the Owenkillew Special Area of Conservation, and the associated Conservation Management Plan is relevant. As a result of identified pressures and risks, the conservation value is considered to be in an unfavourable condition. The discussion of that issue is contained in the Ecology Technical Report and the reader is referred to that document.

Consideration was also given to the Water Balance Test as outlined in 'River Basin Management Plans (2015 – 2021): Groundwater Classification Methodology Water Balance, December 2015' published by the Northern Ireland Environment Agency (the 2015 NIEA Methodology).

As outlined in the UKTAG guidance (UKTAG Paper 11b(ii) on Groundwater Quantitative Classification), assessments should be undertaken at the scale of the groundwater body. Section 4 of the UKTAG paper provides detail on the Water Balance test and paragraph 4.4. of the guidance states that 'Abstracted groundwater that has been locally returned to the aquifer

or to a river should be discounted (for example, this may occur at a quarry/mine dewatering operation)'. The specific reference to mine dewatering is noted. This guidance is reinforced in the 2015 NIEA Methodology where abstracted water that is returned (e.g., quarry dewatering) is not included.

A guidance document entitled "Policy & Practice for the Protection of Groundwater in Northern Ireland" (July 2001) describes the Department of Environment (DOE), Northern Ireland (now DAERA) responsibilities for the protection and conservation of groundwater resources in Northern Ireland. Through the consultation process for this project, the Northern Ireland Environmental Agency (NIEA) stated that this document had not been updated and that the applicant should consider relevant groundwater protection policy statements from other parts of the UK. It now appears that this document is withdrawn. Consistent with the advice provided by NIEA, the approach to the groundwater impact assessment therefore was informed by other UK guidance as outlined in the Groundwater Technical Report with detail provided in Section 2, Box 1 of the Groundwater Impact Assessment at Appendix C6 (2020) of the Second Addendum to the ES.

4. The Case for the Applicant

The requirement for the two abstractions, a summary of potential impacts linked to the abstraction and how the abstractions are proposed to be managed are summarised below. Further detail on the surface and groundwater impact assessment process and outcome is given in Appendices C4 and C6 respectively of the Second Addendum to the project Environmental Statement and the TRs which support the planning application.

Surface water abstraction and its potential impact (Application AIL/2024/0009)

Raw water is required for processing of ore. To obtain this water it is proposed to collect surface water run-off from the north of the proposed infrastructure site behind the North Diversion Berm and direct it to a Clean Water Pond with a maximum capacity of 19,180 m^3. Overflow from the pond will also be used to maintain a minimum flow in the Pollanroe Burn (compensation flow), as required. Details of the proposed management of the natural flow and pond are given in Section 3.3.2, 5.2 and Table 11-2 of the Surface Water Impact Assessment Report included as Appendix C4 to the Second Addendum to the Environmental Statement. Further detail is included in the Site Water Balance at Annex A to Appendix C4. Design details for the management ponds are included in the Technical Note: Water Management Ponds and Ancillary Water Infrastructure in the Proposed Infrastructure site included as an appendix to the Surface Water Technical Report.

The application is for a maximum of 2,250 m^3/day (Section 5.0 of the Abstraction Application Reports), with the calculations required to support this value given in Section 2.2 of the Abstraction Application Reports. The actual volume abstracted are significantly lower on average and will vary in response to both the stage of the project and climatic factors, as captured in a dynamic water balance model.

The impact that is of relevance to the surface water abstraction licence application is Impact SW01 in the 2017 ES (Section 8.3.3), which remains unchanged in the 2020 ES Second Addendum (Section 3.2.2): *Potential impact on surface water flow in the Pollanroe Burn, Unnamed watercourse and Owenreagh River due to construction, operation and closure of proposed infrastructure site*.

The Surface Water Impact Assessment (included as Appendix C4 (2020) of the ES) considered changes to hydrological parameters under different rainfall conditions, including low flow and flood conditions. The method for calculating changes in flow conditions from the proposed infrastructure site was based on a water balance model based on GoldSim software. The impact assessment also used predictions from the project groundwater model to assess impacts of underground mining on baseflows to the watercourses around the mine site.

Impacts from the change in flows associated with the project are summarised below (refer to Section 3.5.1 of the Abstraction Application Report, as updated by Section 3.2.2 of the Surface Water Impact Assessment (2020) at Appendix C4 to the Second Addendum to the ES):

- Construction will involve activities that will disturb the natural ground surface, cover the headwaters of minor tributaries to the Pollanroe Burn and increase runoff rates in the proposed infrastructure site. Mitigation is embedded in the Construction Environmental Management Plan. The residual impact on flows in the Pollanroe Burn, Owenreagh River and downstream reaches of the Owenkillew and Lough Foyle tributaries is negligible with mitigation measures in place.
- During operations at the proposed infrastructure site (Owenreagh catchment), calculations indicate that even with the abstraction, the project will increase average annual flows and monthly flows (particularly during summer months and low flow conditions) and reduce flood peaks in the Pollanroe Burn. The increased flows are not expected to result in out of bank flows, bank erosion or deterioration of ecological habitats. The modified flow regime is therefore considered neutral.
- At closure, surface water flows will return close to baseline conditions at both infrastructure sites. Slightly increased runoff rates from reclaimed land are expected in the Owenreagh catchment. The predicted changes in flow will not be significant compared to baseline conditions.

The ES concluded the impact on surface waters (SW01) was neutral (neither positive nor negative) and not significant.

Abstracted water will be returned to watercourses within the surface water catchment of the Gortin groundwater body with the discharge volume exceeding the extracted volume. Therefore, following UKTAG and NIEA guidance the proposed abstractions are excluded from the Water Balance Test. As a result, there will be no impact on the status of the Gortin groundwater body.

Groundwater abstraction and its potential impact (Application AIL/2024/0008)

To safely operate the underground mine workings, water will be pumped from the mine to the mine portal via pipes. From the portal, it will be directed to the West Drainage Ditch located to the west of the DSF and stored in the West Pond (Figure 1), which has a capacity of 39,010 m^3. Details of the proposed management of the dewatering is given in Section 2 of the Abstraction Application Reports.

A groundwater model, as presented in the groundwater impact assessment (Appendix C6 (2020) to the Second Addendum to the ES) and summarised in Section 3.2 of the Application Report, provided a numerical assessment of the risks of mine dewatering to surface water baseflows, groundwater-related abstractions and peatland. It considered a range of climatic

conditions and other model parameters, producing a range of predictions for water entering the mine workings. Figure 2 illustrates how inflow rates would vary throughout each year of mine life, with higher rates in winter compared to those in summer. The value used for the abstraction licence application is illustrated with a red circle. The total maximum volume of abstracted mine water is predicted to be 1,700m^3/day (Section 2.2 of the Application Report).

Schematics showing how water is used in the mine were provided within the project Site Water Balance Report (Annex A of Appendix C4 (2020) of the Second Addendum to the ES). This model considered all water flows within the mine site and used the time varying input from the underground mine. The highest abstraction is predicted to occur in Year 12 and the model output in Figure 3 shows annual average flow rates for this year. The underground mine component is highlighted in the red circle.

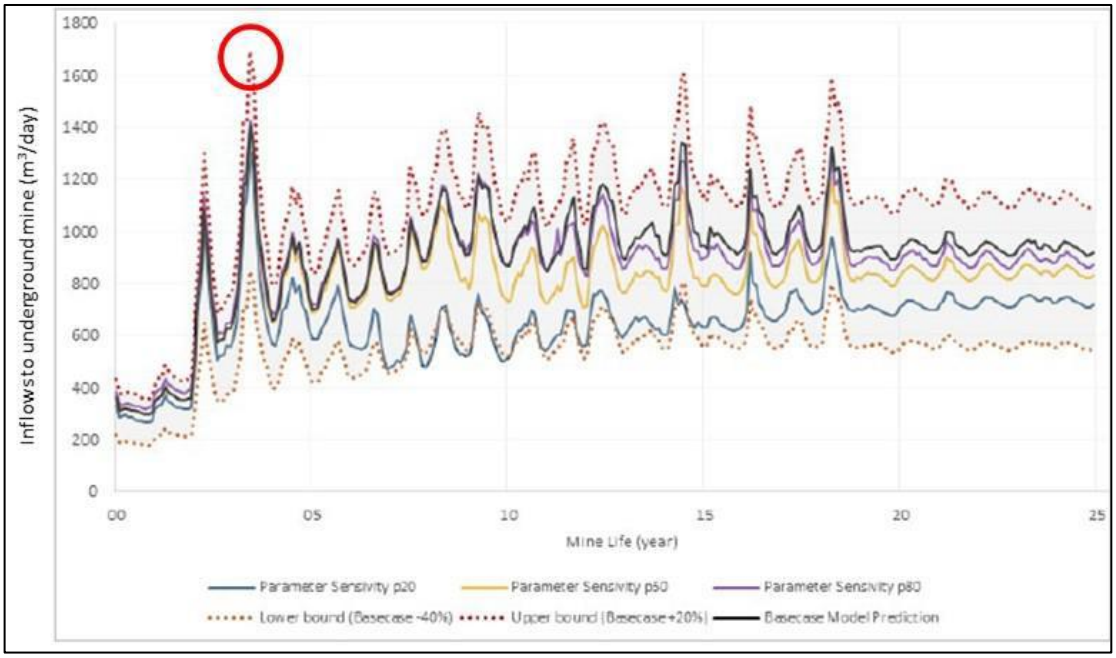

Figure 2: Inflows to Underground Mine from abstraction licence application and July 2020 water balance – groundwater model predictions, with highest total (used in abstraction licence application) highlighted by red circle

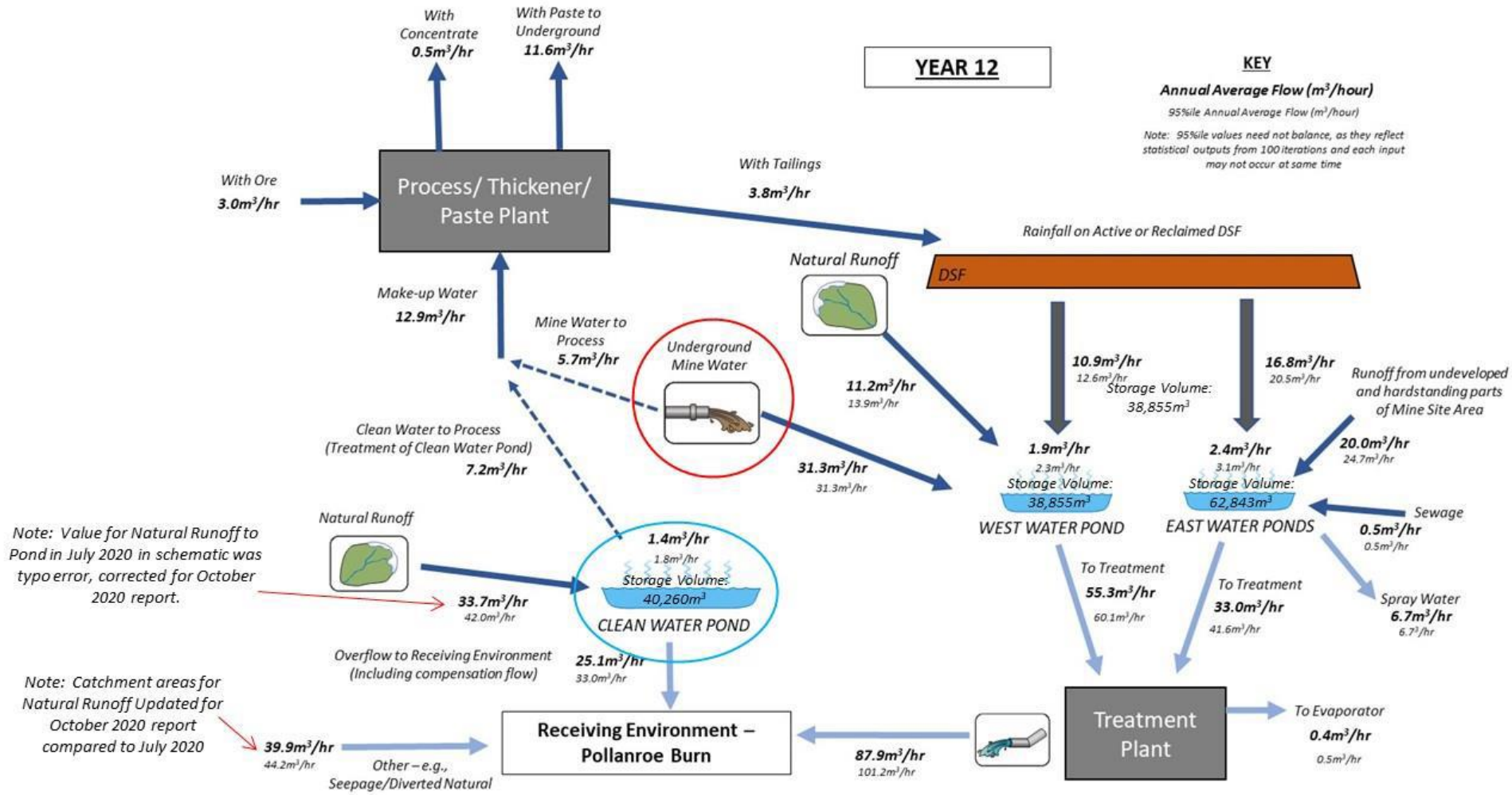

Figure 3: **Water Balance Schematic for Year 12 and annual average flows, from updated October 2020 water balance. Figure includes comments highlighting selected differences from July 2020 water balance and provides pond storage volumes (as requested by NIEA)**

The impact that is of relevance to the abstraction licence application identified in the ES is Impact GW02 in the Environmental Statement (2017) (Section 8.4.4) and remains unchanged in the 2020 ES Second Addendum (Section 3.2.3): Potential impact of changes to groundwater levels from dewatering of the mine on groundwater abstractions, surface water and peat.

The approach for the groundwater impact assessment is based on guidance for impact assessment for mining applications internationally and on standard methodologies applied for groundwater risk assessment based on guidance relevant to the United Kingdom. The approach is explained in detail in Section 2, Box 1 of the Groundwater Impact Assessment at Appendix C6 (2020) of the Second Addendum to the ES. In terms of assessing mine dewatering effects, the threshold for a change in groundwater level beyond which a receptor is considered as impacted is 0.1 m in peatland areas and 5% level change in well water level at groundwater abstractions.

In summary (refer to Section 3.4.1 of the Abstraction Application Reports, and Section 3.2.3 of the Second Addendum to the ES), dewatering will occur to a greater extent at depth than in shallow aquifer layers. This is due to mining occurring largely at depth, and to the effects of high rainfall recharge and higher permeably in the uppermost bedrock layer. When dewatering activities cease at the end of operations, the groundwater impacts will reverse, and groundwater levels will return to near natural conditions around 15 years post-closure.

The potential impacts associated with this drawdown are predicted to include (taken from 2020 ES Second Addendum, Section 3.2.3):

- For private abstractions, two shallow abstractions near the underground mine development could be impacted by drawdown and may go dry. These abstractions will be monitored and, should losses occur due to mining activity DGL will offer replacement if requested by the landholder. Six other abstractions listed as “used” (i.e. active) are predicted to have water level drawdown but not go dry. Two of these are on DGL land and will be removed as part of the development. The remaining abstractions will be monitored during mine operation and replacement supplies will be offered if required.
- When the mine is at its maximum depth, groundwater contributions to baseflow in the Curraghinalt Burn and Attagh Burn will reduce. As these contributions are small, the impact on flows in these burns is predicted to be negligible (Curraghinalt Burn) or minor (Attagh Burn) by the surface water assessment. At closure, reductions in low flows in the Attagh Burn and Glenealy Burn will be lower than during operations, and will continue into the closure period.
- As most of the peatland comprises blanket bog habitat, which is supported by high rainfall as opposed to groundwater flow, no impacts are expected on peatland from mine dewatering.

The Groundwater Impact Assessment (GW02) concluded the impact was negative and not significant.

5. DAERA comments

In response to the 2020 Applications, two areas of concern were raised by the authorities. These are summarised below along with the responses provided.

Water Balance Test and Final Abstraction Volumes

DAERA, in its letter dated 18th November 2018, requested further information as follows:

1) The Water Balance Classification Test determines the available groundwater resource that can be abstracted for the groundwater body. Due to the volume of the proposed abstraction feasibility should be considered against the available groundwater resource within the groundwater body. NIEA therefore seek further supporting information to verify whether the proposed abstraction will impact the status of the groundwater body based on the water balance test.

2) Confirm the volumes to be abstracted at all proposed abstraction points. A response was prepared by Kaya Consulting Limited ("Kaya") and submitted on the 17th December 2021. This confirms the abstraction volumes were as presented in the 2020 Abstraction Licence Application forms and the volumes in the abstraction licences [forms] had not changed. The July 2024 Applications are in identical terms.

In its letter dated 20th December 2021, DAERA updated its request for further information stating: *Please confirm the actual volumes proposed for abstraction for both applications AI/2020/0105 and AIL/2020/016. Please provide a detailed schematic drawing of the full proposal setting out clearly the volumes for abstraction, storage volumes and finally discharge. NIEA recognise that these details may have been submitted previously however a range of figures have been provided, as such the information provided in response to this information request will be considered the final volumes proposed for abstraction.*

A further response was prepared by Kaya (dated 28th January 2022) indicating an update to the Water Balance Report (October 2020) was included in the Second Addendum to the ES, with minor changes to the water balance calculations that did not impact on the conclusions of its report. Updated information was provided in the response letter. This response was acknowledged on 3rd February 2022, with no further requests received. Copies of both letters were included with the July 2024 Applications.

Wetland/peatland archaeology

DAERA raised a further information request in its letter dated 20th December 2021 in response to comments provided by Historic Environment Division ("HED") on 25th November 2021. The request states: *Please provide an archaeological impact assessment for the proposed development that should consist of a full peatland survey carried out by an appropriately qualified and experienced wetland archaeologist(s).*

Gahan and Long Archaeological Services provided an opinion to DGL dated 28th January 2022 (received by the HED on 31st January 2022) which stated that as the proposed groundwater abstraction is not resulting in dewatering of the peatland, the abstraction does not have any impact upon potential archaeological deposits within or beneath the peat. A copy of the letter is included with the July 2024 Applications.

The HED responded to this on 22nd March 2022 stating its concerns had not been addressed and requesting that: *the applicant engage an appropriately qualified and experienced wetland archaeologist(s) to reassure us that the matter of peatland archaeology and potential dewatering has been appropriately assessed. Gahan and Long do not indicate any such qualifications or experience in their response and we are unaware of any such qualifications or experience that they possess.*

Professor Plunkett of the School of Natural and Built Environment at Queen's University Belfast was asked to provide an evaluation on the possible impact of dewatering activities on potential sub-surface archaeology and her response is at Appendix B.

6. Third Party Representations

In addition to the representations received in relation to the July 2024 applications which are before the Commission, 153 responses were received in respect of the 2020 Applications. Representations consisted of a standardised set of 25 statements that comprised template letters. The April 2024 application process had 365 responses, of which 49 were unique responses and the rest templates.

In addition to objections linked to the overall planning application and the potential impacts of the mine on sensitive habitats including peat, the objections more specifically related to the abstraction of water fell under the following topics:

Impacts on groundwater levels and flows

Queries relating to how impacts were assessed, including age of data used, catchment sizing, rainfall figures used, appropriateness of the water balance (and design decisions made in response to this) and consideration of climate change predictions (particularly with respect to extreme events);

Response:

- The surface water and groundwater impact assessment processes are clearly described in Appendices C4 (2020) and C6 (2020) respectively of the Environmental Statement. The surface water and groundwater baselines have been updated as part of the responses to requests for further environmental information and there is annual water monitoring carried out by DGL as part of its ongoing environmental management programme. Baseline updates and addenda were submitted in 2019 and 2020 and the baselines checked against the conclusions of the impact assessments to determine whether this would have any influence on the assessed impacts. More recent baseline information is also included in the Surface and Groundwater Technical Reports appended to the mine application Statement of Case.
- The project water balance and the basis for the calculations are clearly described in the Site Water Balance Report found as Annex A to the Surface Water Impact Assessment (Appendix C4 to the Second Addendum to the Environmental Statement). The models used in the development of the site water balance were independently reviewed by Golder Associates under contract to DAERA and DfI. Golder was satisfied with the modelling approaches used and the conclusions of the assessments. Minor points raised in their report are discussed in the Surface Water Technical Report. Weather data used in the assessment is described in Appendix C2 (2017) to the ES. This discusses the variability associated with the project weather station and the justification for the use of the data from Lough Fea. The meteorological inputs to the models was included in the Golder review and considered acceptable.

Drawdown and flows

Questions have been asked about the drawdown affecting surrounding groundwater resources (and people using these), ground subsidence, surface water flows (and associated water quality), Ramsar site (Black Bog) and the peatlands;

Response:

- *A comprehensive groundwater impact assessment (Appendix C6 (2020) to the Second Addendum to the ES) was carried out to inform the potential impacts of the project (specifically including the dewatering of the mine workings) on groundwater quality and quantities. A comprehensive geochemical characterisation study informed the assessment of impacts to water quality. The assessment report shows the maximum modelled extent of the drawdown and proposes mitigation measures for local groundwater users where appropriate. The main impacts are noted above in section 4.2 of this SoC. It is quite clear the Black Bog Ramsar site is some distance from any possible impacts and this is addressed in the Ecology Technical Report.*
- *The results of the groundwater modelling work were used within the surface water impact assessment (Appendix C4 (2020) to the Second Addendum to the ES) to predict changes to surface water flows in watercourses impacted by the lowered groundwater table.*
- *Potential for subsidence is dealt with in Appendix C21 (2019). The geology of the Curraghinalt Project is not comparable to some regions where changes in groundwater levels in karstic systems can result in subsidence and sinkholes.*

River morphology

Impacts on river morphology linked to flood events and impacts on downstream aquatic ecosystems;

Response:

- *The assessment of potential impacts to river morphology are covered in the Surface Water Impact Assessment (Appendix C4 to the Second Addendum to the Environmental Statement). Specific mention of potential impacts to river morphology are included in Section 6.1.2 and 9.2.2. Impacts to aquatic ecosystems are considered in table 11 of the Ecological Impact Assessment at Appendix C8 (2017) of the Environmental Statement. This table considers a diverse range of habitats including those associated with stream morphology.*
- *Flood flows will be reduced in the Pollanroe Burn during operations due to management of storm water within the water management ponds on site. As a result, the risk of events causing erosion in the burn will be reduced. As a precaution, geomorphological surveys of the channel (to check for any erosion or bank instability) will be part of the project SGEMAP.*

Cumulative and Transboundary Impacts

Questions were raised about the lack of a cumulative assessment of different impacts and questions were asked about the lack of consideration of transboundary effects;

Response

- *Cumulative impacts are covered in Chapter 9 of the Environmental Statement (2017) The only conceivable pathway for any transboundary environmental affect from the project could be as a result of surface water. The Surface Water Impact Assessment (Appendix C4 to the Second Addendum to the Environmental Statement) clearly demonstrates there is negligible impact in terms of flow and water quality downstream of the study area (confluence of Owenreagh and Owenkillew River) and therefore there is no credible potential for transboundary impacts from the project.*

Water Infrastructure Design

Questions have been raised about the lack of detail/confidence around the water infrastructure designs, management of water during construction and in the event of an emergency incident (e.g. high rainfall);

Response

- *Details associated with the ponds, culverts and pond design elements are presented in the Technical Note: Water Management Ponds and Ancillary Water Infrastructure in the Proposed Infrastructure site included as an appendix to the Surface Water Technical Report.*

  The surface water impact assessment (Appendix C4 to the Second Addendum to the Environmental Statement) describes how the water management ponds have the capacity to deal with storm water up to and potentially exceeding the 1:1000 year storm event (Section 3.3.2). Water retentions ponds used to capture run-off during construction have been designed to a 1:75 year return event despite the relatively short construction period (see section 3.3.1 of the Assessment). Further surface water management measures to be applied during the construction period are described in Appendices A-E of the Outline Construction Environmental Management Plan included as Appendix B2 (2019) to the Environmental Statement.

Pond safety

Questions have been asked with respect to the safety of the water management ponds and whether their design and management fall under the regulations associated with the Reservoirs Act;

Response

- *The Reservoirs Act (Northern Ireland) 2015 does not apply to at "A pond within an extractive waste site or waste facility" as it is not a Controlled Reservoir as defined under the Reservoir Act (Northern Ireland), 2015, (see Section 5 (2) (f) of the Act).*
- *In addition, the water management ponds are all excavated into the ground, all retained water will be below original ground level and there are no engineered water retaining structures that would trigger the Reservoirs Act in respect of any non-extractive waste structure. This is also explained in Section 3.1 of the Flood Risk and Drainage Assessment included as Appendix B10 (2017) to the Environmental Statement.*
- *The safety of the ponds in relation to water flows and storm water return events is covered in multiple areas in the Surface Water Impact Assessment and the Flood Risk and Drainage Assessment. In addition, further information on the basis of design of the ponds is included in the Technical Note: Water Management Ponds and Ancillary Water Infrastructure in the Proposed Infrastructure site included as an appendix to the Surface Water Technical Report.*

7. Conclusion

Predictions on the volume of water to be abstracted from the surface water and groundwater systems have been determined based on several technical studies looking at hydrology, hydrogeology, water balance, surface water modelling and groundwater modelling (a list of the key technical reports and where they can be found as part of the overall ES package are given in Appendix A). Impacts to surface water flows (under different rainfall conditions), groundwater levels and the surface water/groundwater interaction (particularly with respect to river base flow and peatland habitats) has been evaluated and documented in the ES. The impacts to surface water flow (SW01) and groundwater levels (GW02) from the Project were assessed as not significant.

The abstraction volumes applied for reflect the maximum volume to be abstracted.

APPENDIX

A LIST OF OTHER SUPPORTING REPORTS IN ALPHABETICAL ORDER LANDSCAPE PLAN

1. Climate Baseline Report, SRK Consulting UK Ltd, 2017, Appendix C2 of the ES
2. Construction Environmental Management Plan, SRK Consulting UK Ltd, 2019, Appendix B2 of the Second Addendum to the ES
3. Environmental Statement, SRK Consulting UK Ltd, 2017 (as amended with ES addenda submitted in 2019 and 2020)
4. Flood Risk and Drainage Assessment, Kaya Consulting Ltd, 2017, Appendix B10 of the ES
5. Groundwater Baseline Report, SRK Consulting UK Ltd, 2017 and Addendum, 2019, Appendix C5 of the ES
6. Groundwater Impact Assessment, SRK Consulting UK Ltd, 2020, Appendix C6 of the Second Addendum to the ES
7. Peat Management Plan, SLR Consulting Ltd, 2019, Appendix B8 of the First Addendum to the ES
8. Surface Water and Groundwater Environmental Monitoring and Action Plan, SRK Consulting UK Ltd, October 2020 Draft, Appendix D2 of the Second Addendum to the ES
9. Surface Water Baseline Report, SRK Consulting UK Ltd, 2020, Appendix C3 of the Second Addendum to the ES
10. Surface Water Impact Assessment, SRK Consulting UK Ltd, 2020, Appendix C4 of the Second Addendum to the ES
11. Site Water Balance Report, Kaya Consulting Ltd, 2020, Annex A of Appendix C4 of the Second Addendum to the ES

APPENDIX

B DALRADIAN LETTER

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7 October 2024

Evaluation of impact of dewatering activities on potential peatland archaeology

1.0 I have been asked by Gahan & Long Ltd to provide an evaluation on the possible impact of dewatering activities on potential sub-surface archaeology in the Curraghinalt area, Co. Tyrone, by Dalradian Gold Ltd. The Historic Environment Division (HED) requests that an appropriately qualified and experienced wetland archaeologist confirm that potential impacts on peatland sites have been adequately considered. My credentials in this field include more than 30 years of working in peatlands as both an archaeologist with the Irish Archaeological Wetland Unit (1993, 1994, 1999-2001), and as a palaeoecologist. I also conducted an evaluation Northern Ireland peatland archaeology on behalf of Built Heritage: Environment and Heritage Service (Plunkett & Foley 2006, J. *Wetland Archaeo*.), and have consulted on peatland archaeological discoveries for both the National Museum of Ireland and the Ulster Museum.

2.0 I have reviewed the following information:

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3.0 I have also spoken with Dalradian personnel who addressed my queries relating to the planned works.

4.0 To evaluate potential risks to archaeological sites in the area of development, I have considered the following factors.

i. Likelihood of archaeological remains in the Curraghinalt peatland
ii. Potential impact of the peatland hydrological changes on sub-peat archaeology
iii. Impact of the proposed dewatering on peatland water-levels
iv. Evaluation of potential impact of the proposed activities to prospective sub-peat archaeological sites

5.0 <u>Likelihood of archaeological remains in the Curraghinalt peatland</u>

5.1 The potential for archaeological sites to be present below the surface of the area to be dewatered is moderate, given the frequency of sites in the wider region of the western Sperrins. Any such sites would most likely comprise sub-peat stone monuments, such as circles, alignments, cairns, field walls and, in deeper peat, megalithic tombs. The full extent and the density of such sites in the Sperrins is

poorly understood, and there are insufficient studies of known sites available upon which to predict their occurrence (e.g., elevation, aspect, relationship to other sites or geographical features). Wooden sites such as trackways and platforms are rare in upland sites in Northern Ireland and Ireland, and other organic remains (e.g., leather artefacts, bog bodies) are generally sparsely distributed and their locations unpredictable. There is therefore low potential for such sites to be present in the upland blanket peat zone, although wooden structures may be found in the deeper valley mire. The only valley mire will be removed during construction and those construction activities will be subject to the archaeological monitoring conditions. Consideration of potential risks of dewatering is here limited to stone monuments that might be found beneath the blanket peat, specifically igneous and metamorphic rock types, reflecting the local geology.

6.0 Potential impact of peatland hydrological changes on sub-peat archaeology

6.1 Warke et al. (2010, *Geoarchaeology: Int. J.*) investigated the weathering of exposed stones at the Copney stone circle and considered the vulnerabilities of the specific stone types (quartz porphyry, porphyritic andesite), including their exposure before, during and after burial in peat. They found burial in acid peat to be one of several factors contributing to the stones' degradation but concluded that the peat provided a stabilising medium for several millennia until historic peat cutting impacted water levels within the peat. They proposed that lateral movement of acid water within the peat may have been an aggravating factor in the stones' chemical weathering, but the greatest impacts were due to processes of repeated wetting/drying, heating/cooling and free/thaw in subaerial conditions following the stones' exposure. Curran et al. (2001, *Catena*) found that the peat cover over remaining stones at Copney was aerobic as a result the nearby peat cutting that increased lateral drainage. In summary, removal of peat at or near areas of archaeology poses a direct threat to stone monuments as it increases lateral water movement within the peat.

6.2 Vertical water-table fluctuations in blanket peat occur on inter-annual (seasonal) and multi-annual (climate) timescales, although the effects are most pronounced in the acrotelm. There has been much scientific debate about the occurrence of vertical water movement in peat (excepting natural large cavities or "pipes"), but Reeve et al. (2020, *J. Hydrology*) concluded on the basis of model results that vertical flow in the catotelm above low permeability substrates was negligible relative to lateral flow.

7.0 Impact of the abstraction activities on the peatland hydrology

7.1 The proposed abstraction activities involved dewatering of the groundrock at depth below the glacial till underlying the peatland. Having reviewed the aforementioned documents and discussed the impacts with SRK Consulting, my understanding is that this activity is not expected to impact the water-levels in the peat[1], except in the immediate area of the portal during its construction[2], with a return to baseline levels within 15 years following cessation of the mining[3]. Areas of peat that are groundwater-fed (e.g., near streams) are more susceptible to water-level changes, but such areas will already be prone to inter-annual water-level fluctuations.

7.2 There is potential for vertical flow into the underlying bedrock as it is dewatered in locations where the groundrock is near to or higher than the base of the peat. SRK's models anticipate, however, that precipitation will maintain the water-levels within the peat, and that the net impact will be a reduction in run-off of excess water from the peatland in some areas. The Golder Report raises no

[1] SRK 2020b, Section 7.3.3. *Forecast changes to groundwater levels*, p. 80. 'No phreatic drawdown is predicted in the area of the underground mine, which is overlain by blanket bog peatland. No drawdown is predicted any area of peatland or alluvium'.

[2] SRK 2020b, Section 7.5.4 *Forecast changes to peatland and bog-land water levels*, p. 106. The report acknowledges the local potential for drawdown in the peat around the portal whilst the portal is being excavated.

[3] SRK 2020b, Section 7.4.5, subsection *Groundwater rebound and cessation of hydraulic containment*, p. 92. The base-case model predicts near full recovery of groundwater level in the central area of the mine in "approximately 10 years following cessation of dewatering, with steady state levels and inflows achieved within approximately 15 years".

concerns about the modelling, or the conclusions drawn from it[4]. Dalradian Gold Ltd plans to continue monitoring water-levels in the peatland, which will serve as a check on peatland impact. I understand that a commitment for validation monitoring, incorporating multiple locations and loggers of peat water levels, is covered in Sections 5.2 and 5.3 for relevant phases of the mine development in the submitted SRK Consulting (2019) *Groundwater and Surface Water Monitoring and Action Plan*.

7.3 The Golder Report also considers matters relating to peat extraction, storage and re-use arising from construction activities. Such activities could have a direct bearing on any archaeology present, and archaeological monitoring during peat extraction is strongly advised. Dalradian Gold assures me that the company is committed to supporting the recommendations by Gahan & Long regarding the archaeological watching brief during the construction phase.

8.0 Evaluation of potential impact of the proposed activities to prospective sub-peat archaeological sites

8.1 The proposed activity expects to have limited direct impact on the blanket peat hydrology in the area, with the exception of the portal location. According to the 2020 *Groundwater Impact Assessment*, potential impacts on water-levels and on water flow within the peatlands exist in localised areas in which reduced underground water-pressures may result in water transferring from the peat to the bedrock. This flow is expected to be offset by rainfall, with the peatlands capable of absorbing more water and reducing run-off downstream. This prospect is reasonable under current climate conditions. With peatland wetness maintained in this way, the impact of the bedrock dewatering process on peatland hydrology is therefore likely to be substantially less than the drainage resulting from historic and ongoing peat-cutting in the area.

8.2 The potential for vertical flow of water from the peat to the bedrock in selected areas is a mechanism by which water movement within the peat could be increased. Warke et al. (2010) hypothesised the potentially corrosive effects of lateral water flow caused by slope run-off and drainage through peat-cutting but did not discuss vertical movement, nor could they entirely differentiate pre-burial from sub-peat weathering impacts on the Copney stones. The impact of water flow on rocks within a saturated peat is therefore poorly understood. Overall, however, any impact on buried stone monuments will be minimised if the water table is maintained to prevent the peat becoming aerobic and degraded.

9.0 Conclusion

9.1 On balance, I conclude that dewatering of bedrock is unlikely to pose a threat to any buried archaeological structures in the activity zone, provided water levels are maintained within the peat as expected. Any such sites are at greater risk from direct peatland drainage or exposure through peat removal.

Kind regards,

Gill Plunkett

[4] Golder (2021) Section 27.3.13, sub-section *Peatland Water Levels*, pp. 125–6.

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7 October 2024

Evaluation of impact of dewatering activities on potential peatland archaeology

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