

Dalradian Gold Limited

**Curraghinalt Gold Project
County Tyrone, Northern Ireland**

**Road Restraint System
Risk Assessment**

February 2020

Document Information and History

Project: Curraghinalt Gold Project, County Tyrone, Northern Ireland
Client: Dalradian Gold Limited
Client Representative:
Hoy Dorman Job Number: 2016021
Filename: 200214_Proposed_New_Road_RRSRA
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This document has been issued and amended as follows:

Version	Date	Description	Created by:	Verified by:	Approved by:
	14/02/2020	Road Restraint System Risk Assessment	MG	MH	MH

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1 Introduction

Hoy Dorman have been commissioned by Dalradian Gold Limited to carry out a Road Restraint System Risk Assessment (RRSRA) for a proposed new road associated with the Curraghinalt Gold Project, County Tyrone, which has been submitted for planning; reference LA10/2017/1249/F.

The RRSRA has been undertaken at request of DfI Roads to assess the potential hazards associated with the proposed new road and determine if / where vehicle restraints are to be located as part of the Scheme Design Overview (SDO) process.

The proposed new road is 1.38km long, 3m wide, with inter-visible passing bays, it joins the U1244 to the east and west. The proposed new road has one junction that occurs along its length in the form of a site road access crossroad junction, this site access road is private.

In order to carry out the RRSRA, the relevant design information was assessed along with site visits. As principle designers of the proposed new road, Hoy Dorman have access to the relevant design information. Numerous site visits have been carried out since 2015 during which the path of the proposed road alignment was walked noting the existing watercourse, adjoining roads and topography of the site.

The scope of the RRSRA is defined as the proposed new road corridor. The previously submitted Private Street Determination Drawing No. 2016021-P-CIV-130 Rev0 is contained within Appendix A.

Details of the hazards identified, their location and set back, geometric features, junctions and other features considered pertinent to the assessment were recorded and are discussed in Section 2.0.

2 Site & Design Conditions

The proposed new road is an alternative route of a section of the existing road (known as the U1244 ref: schedule of public roads) that is proposed to be abandoned as part of this proposed development. The section of the U1244 that is proposed to be abandoned is a single-track road, constructed of unbound material with several passing bays and is on average approximately 3m wide.

The proposed new road is 1,380m long, 3m wide with inter-visible passing bays and to be surfaced with asphalt. Design factors of the proposed new road were as follows:

- Retain the existing character and distinctiveness of the route;
- Utilise the engineering parameters of the existing track and adjacent routes;
- Usage of the existing route and;
- Environmental impact.

The horizontal alignment of the proposed new road consists of relatively straight sections. There are three low radius bends located along the alignment, which are as follows:

- 50m radius: ch518 to ch571
- 90m radius: ch597 to ch641
- 50m radius: ch841 to ch879

The alignment crosses the Pollanroe Burn watercourse, the watercourse is to be culverted under the proposed road with headwalls located at both upstream and downstream ends.

The vertical alignment generally follows the natural topography of the land, consequently there are two relatively steep sections occurring from ch620 to ch860 and from ch1200 to ch1310. The alignment on approach to the junctions at either end of the proposed new road is relatively flat <4% for over 20m. Street lighting is not proposed along the road reflecting the surrounding area / road network. Give-way road markings in accordance with the Traffic Signs Manual have been proposed at both junctions either end of the proposed new road. The crossroad junction with the site access road has the following design features;

- The site access road is private and will have security gates suitably positioned and controlled to prevent straight through movements on both sides of the proposed new road.
- A level crossing on the site access road is provided on the approaches to the proposed new road.
- Site access road traffic is not permitted to access the proposed new road at this junction, as a result, junction radii has not been provided.

Sections where the proximity of the proposed new road is within 20-25m to the proposed site road are as follows;

- ch350 to ch680: Site access road located to the north
- ch780 to ch1380: Site access road located to the west

Hoy Dorman undertook a manual traffic survey of the existing track (U1244) over six days, on two separate three-day periods to inform us of the current traffic use and speed of the existing track. These survey dates were as follows:

- 8th-10th January 2016
- 17th-19th January 2016

Traditionally, survey results of this type are broken down into 15-minute intervals for each day the survey was undertaken. In this case, due to the lack of traffic/activity in the area, this method has not been used. Rather an overview observation provided to inform of existing track use.

The vast majority of road traffic that was recorded during the survey was attributed to either:

- Site traffic relating to the Dalradian Project Site or
- Farmers accessing their fields / sheds.

The only remaining activity as recorded over the 6 days included a few individuals running and several individuals walking.

We would expect the above findings to translate into predicted use of the proposed new road.

The observed speed of the existing road resulted in an 85th percentile of 20mph.

Based on an assessment of the proposed road design an estimated 85th percentile speed of 32mph has been used to assist in determining the likelihood of an errant vehicle reaching a particular hazard identified (discussed in section 3.0).

A summary of identified hazards is provided below in table 1.

Table 1: Hazards within close proximity of the proposed new road

Hazard Feature	Location	Comments
Fencing	Boundary treatment of the proposed new road	Boundary fencing located along the length of the alignment.

Hazard Feature	Location	Comments
Earthworks	Along proposed new road corridor	Embankments and cutting earthworks located along length of proposed road corridor (varying heights). Several sections of earthworks have level differences greater than 1.5m. Low radius bend at ch560 is on embankments. At ch435 (right hand side) the embankment height is 6m, leading to a grouping of bushes and trees.
Water	Proposed road crosses Pollanroe Burn at ch562-ch579	Pollanroe Burn watercourse, will be culverted under proposed road. Pollanroe has steep banks.
	Cut off ditch runs parallel with proposed road from ch720-ch1380	New constructed ditch 1m wide and 1m deep, which purpose is to collect any overland flow entering the site from the western boundary, during prolonged rainfall events.
Culvert Headwalls	Headwall at downstream end of culvert ch562-ch579	Precast concrete headwall located on embankment. Culverting the Pollanroe watercourse.
Roads	Proposed site roads. Located, north of proposed road at ch350 to ch680 and located west of proposed road at ch780 to ch1380	Proposed internal site roads located nearby the proposed new road.
Junction	Crossroad junction at ch683	Crossroad junction between the proposed new road and the site access road.

Table 2 below identifies the level differences of embankment earthworks greater than 1.5m, sections marked '*' also contain low radius bends.

Table 2: Embankments with a level difference greater than 1.5m

Right Hand Side of Alignment	Left Hand Side of Alignment
Ch414-Ch462	Ch419-Ch438
Ch531-Ch654 *	Ch549-Ch578 *
Ch1346-Ch1363	Ch617-Ch669
	Ch930-Ch979
	Ch1170-Ch1194
	Ch1335-Ch1380

Based on the hazards identified in Table 1 and the sections of earthworks detailed in Table 2, an RRSRA will be carried out to determine the need for provision of a road restraint system within the scope of the works area of the proposed site. This RRSRA is contained within Section 3.0.

3 Road Restraint System Risk Assessment

DEM 163/17 Provision of Road Restraint Systems dated 10 October 2017, published 31 January 2019 is the document used for guidance in carrying out this RRSRA.

As defined within paragraph 4.9 of DEM 163/17, The UKRLG Guidance appraisal process will be used to develop a prioritised list within each Division. Several appraisal methods are available, the method utilised within this report is Method C: Risk Scoring.

The UKRLG Guidance Document has been prepared for use by highway authorities and their designers when considering the introduction or replacement of road restraint systems on roads with low traffic flows and/or low traffic speeds.

The hazards identified in Table 1 and embankments with a level difference greater than 1.5 noted in Table 2 have indicated that a risk assessment should be carried out using Method C: Risk Scoring. This risk assessment is shown in Table 3.

Table 3: Method C Risk Assessment

Factor	Risk Scoring	Comments
Location	1	Rural U road
Layout – Part One	5	Low speed bends along alignment
Layout – Part Two	2	Some potential for positioning manoeuvres
Collision – Longitudinal Features	2	Longitudinal Hazard that is likely to be reached resulting in harm or a spot hazard downstream of a feature which may guide the vehicle towards the hazard.
Collision – Severity of Outcomes	1	Percentage of KSI for primary hazard 20-30%
Consequential – Part One	0	No secondary events likely
Consequential – Part Two	0	No impact on network availability
Consequential – Part Three	0	No significant cost implications
Overall Risk Ranking	9	Medium Priority Site

The overall risk ranking score is based on the addition of the 4 different factors (F)

F_{LOCATION} (Range 0-6) +

F_{LAYOUT} (Largest of two scores in part 1 and part 2 of Layout, Range 0-5 or 0-3) +

F_{COLLISION} (Sum of two separate scores, Range 0-4) +

F_{CONSEQUENTIAL} (Sum of three separate scores, Range 0-3)

The risk assessment has demonstrated that the overall risk scoring falls within the medium category therefore the installation of a road restraint system may reduce the risk.

Intervention may be required to introduce control measures to drive residual risk towards the Lower Priority Site category. The residual risk can be tolerated only if further risk reduction is impracticable or requires action that is grossly disproportionate to the reduction in risk achieved.

Based on this result the proposed new road warrants additional appraisal and investigation into the possible options for reducing risk.

4 Road Restraint System Results

The RRSRA has been carried out based on the proposed design information from Hoy Dorman, site observations and an assessment of hazards within the scope of works area (as defined in Section 1).

The risk assessment has shown that the overall risk scoring falls within the medium risk category and therefore the installation of a road restraint system may further reduce the risk. Based on this result, the designer has elected to provide a road restraint system in order to mitigate risk.

In this instance it would be beneficial to provide a vehicle restraint system to minimise risk at the three higher risk areas which are as follows:

- The embankment on the RHS at ch430-ch440, the level difference is >6m, with the ground sloping away from the road towards trees. There is also a passing bay on the RHS in advance of earthwork (increasing potential for vehicle manoeuvres occurring close to hazard).
- The headwall for the culverting of the Pollanroe Burn watercourse occurring at ch562-ch579
- Outside of 90m radius bend with a level difference greater than 1.5m occurring at ch590-ch620. Errant vehicles are at risk from entering the Pollanroe Burn watercourse.

Given the nature of the proposed road a non-compliant vehicle restraint system (VRS) would not be suitable therefore, the designers have elected for a DMRB compliant VRS with a containment class of N2 and a working width class of W4 at the above listed locations. The narrow width of the proposed road creates equal risk for vehicles travelling in both directions therefore, the minimum full height length of the safety barrier will extend 30m before and after the hazard. The proposed design has been updated to show VRS locations and adjust verge widths in accordance with the DMRB documents TD19/06 & CD127.

The length of need of the VRS has been determined from an analysis of the proposed design layout and topography features of the existing land. While other hazards are present, they do not have the same level of risk associated with them. The updated proposed new road design showing the VRS locations is contained within drawing '2016021-P-CIV-130 Proposed Private Streets Determination Plan Layout' in Appendix A of this document.

5 Designer Statement


Declaration and Signature

We certify that we have examined the proposals as presented on the design drawings and considered their impact on the adjacent road network and surrounding lands within the scope of this RRSRA. The examination has been carried out with the sole purpose of identifying the need for a road restraint system. Where a road restraint system design has been provided, it remains the responsibility of the Client to ensure the proposed is implemented as per the design drawings.

Designer

Martin Hoy
CEng, FIEI, FICE, MCIHT, MCPA

Signed:

A handwritten signature in black ink, reading "Martin Hoy", is enclosed within a red rectangular box.

Date: 14 February 2020

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Appendix 1: Private Street Determination Drawing

Appendix 2: Site Photographs

North section of the existing road to be abandoned (1)



North section of the existing road to be abandoned (2)



North section of the existing road to be abandoned (3)



Western section of existing adopted road at western junction of the New Proposed Road

