



REPORT

SUPPLEMENT TO THE HEAP LEACH FACILITY SITE ALTERNATIVES ANALYSIS

Amulsar Gold Project, Republic of Armenia

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Figure 1 Potential HLF Sites and Process Facility Exclusion Zones

Please Note:

The purpose of the HLF SAA was to “to summarize the evaluation process conducted for the 28 potentially viable sites for the location of an HLF for the Amulsar gold project in central Armenia” and to comply with international best practices with regard to assessment of alternative locations for major Project infrastructure components, including the impacts of the amendment to resolution N 143-N adopted by the Government of the Republic of Armenia on the selection process, which was done in the last version provided in August 2014. As you are aware, each potential site in the May 2013 version was ranked in accordance with the following five selection criteria considerations by Golder with input from select technical specialists:

- Biodiversity and Environmental Factors
- General Location
- Infrastructure
- Social and Cultural Factors
- Technical Factors

The results of the SAA was used by Lydian for determination of the optimal HLF site to advance. The selection criteria identified areas where potential concerns or mitigation was identified for each of the sites, with the intent that the identified considerations can be mitigated by additional engineering (e.g., liners and underdrains), environmental (e.g., design for closure) and/or social considerations during the ESIA, design or development aspects of the project.





1.0 INTRODUCTION AND IMPACT OF AMENDMENT TO RESOLUTION N 143-N

A Heap Leach Facility (HLF) Site Alternatives Analysis (SAA) report, dated May 15, 2013, was prepared by Golder Associates Inc. (Golder) for Lydian International Ltd. (Lydian) to summarize the evaluation process conducted for 26 potentially viable sites for the location of an HLF for the Amulsar gold project in central Armenia. This intent of this supplementary report is to incorporate an analysis of the Site 28 HLF option and this supplementary report should be read in conjunction with the original HLF SAA prepared by Golder dated May 15, 2013.

The HLF SAA was coordinated by Golder with collaboration from various discipline specialists (e.g., geotechnical, geology, environmental, water, and HLF design engineers). External technical input and support were provided by various technical specialists, which included biodiversity review and input from Jo Treweek (Treweek Environmental Consultants), cultural heritage input from Emlen Myers (ERM), landscape and visual impact review by Sam Oxley and Dan Walker (LUC), social and environmental review by specialist consultants Judy Kreps (Gone Native) and Liz Wall (Shared Resources), and input from Lydian in-house specialists. The HLF SAA was prepared to comply with international best practices with regard to assessment of alternative locations for major Project infrastructure components.

This supplementary report has been prepared to address the impacts of the amendment to resolution N 143-N adopted by the Government of the Republic of Armenia (RA) on July 18, 2013. That amendment changed the definition of the immediate impact zone defined as the “Catchment Basin” of Lake Sevan and applied a restricted zone of 3,000 meters on each side of the Vorotan-Sevan tunnel.

The HLF SAA included the involvement of stakeholders following the International Finance Corporation (IFC) requirements and consisted of a multi-step assessment process. This included an initial high-level desktop-based screening assessment that included field reconnaissance and a fatal flaw analysis; an initial screening assessment; a semi-quantitative rating of sites that advanced beyond the first selection process; followed by a more detailed evaluation based on design layouts prepared by Golder. The details of this process are presented in the SAA (Golder 2013).

The fatal flaw analysis described in the HLF SAA (Golder 2013) resulted in elimination of 16 of the 26 sites considered. The subsequent July 18, 2013, amendment to resolution N 143-N resulted in the elimination of the remaining 10 sites. Figure 1 presents an overview of all sites considered, including the added Site 28, and the 3,000-meter buffer zone on either side of the Vorotan-Sevan tunnel.



2.0 HLF SITE SEARCH AND SELECTION

To continue advancement and potential development of the Amulsar project, Lydian began a search in August 2013 for a technically feasible site for the HLF located outside of the restricted areas compliant with the Lake Sevan laws, the IFC, and local stakeholder requirements. A potentially viable site, designated as Site 28, was located approximately 1.25 kilometers (km) south of Gndevaz.

2.1 Site 28 Description

Site 28 is located in a valley approximately 7 km west of the pit area. Current vehicular access to Site 28 is primarily by a dirt road extending east from the main road between the highway and Jermuk, running between the village of Gndevaz and the village of Saravan. Site 28 is also accessible by an unimproved road running northwest to southeast between Gndevaz and Saravan, and from an unimproved road running southwest from the former Site 14 area.

Portions of the land, most notably the shallower sloping land present at the lower elevations, are presently used for agriculture. As a result, there is a network of unimproved access roads and irrigation pipes within the site. Site 28 is located outside of the 3-km buffer zone, within the Arpa River valley. The northern portion of the HLF abuts the 1-km Gndevaz settlement sanitary buffer.

2.2 Geotechnical Investigation and Conceptual Design

A site investigation was conducted from late September through early November 2013 by Golder personnel. The investigation included site reconnaissance, general field mapping, excavation of test pits, and drilling of boreholes and coreholes. Soil samples were collected from the test pits and boreholes and shipped to the Golder laboratory in Lakewood, Colorado, USA, for specialized testing as part of the planned feasibility study. Hydrogeological testing, consisting of down-hole falling head tests or packer tests, was completed on all coreholes and some boreholes that encountered water.

A conceptual design was prepared by Golder that indicated capacity of the site to provide potential storage for the 94 Mt of potential ore reserves as estimated by Lydian.



3.0 CONFORMANCE WITH HLF SAA SCREENING CRITERIA

The change in regulations eliminated the 10 sites assessed in the HLF SAA. The other 16 sites were eliminated for other reasons, which have not changed with the introduction of the new regulation. As such, an update to the HLF SAA was not necessary.

However, to verify general conformance with the same initial screening criteria, and to ensure that Site 28 did not have any fatal flaws, Site 28 was subjected to a similar review of the five main criteria used in the HLF SAA initial screening assessment. These five criteria consisted of the following:

- Biodiversity and Environmental Factors
- General Location
- Infrastructure
- Social and Cultural Factors
- Technical Factors

An assessment was performed by Golder with input from select technical specialists, as required, and is presented on Tables 1a through 1e, in similar format to that included in the 2013 report.



Table 1a Initial Screening Criteria – Biodiversity/Environmental

Site	Outside Lake Sevan Non-Immediate Impact Zone?	Beyond 3,000 m of the Spandaryan Kechut Tunnel? [Note 4]	Beyond 1km Sanitary Protection Zone for Communities?	Outside IBA Area Boundary?	Outside Area of Supporting Habitat for IBA? [Note 1]	Outside Natural Habitat? [Note2]	Outside Potential Critical Habitat? [Note 3]
28	YES	YES	YES (>1km SE of Gndevaz)	YES	YES	YES	YES

GENERAL NOTE to TABLES 1a – 1e: Red shading indicates a fatal flaw while orange shading indicates a potential significant adverse condition.

Note 1: Supporting habitat for the IBA. Goryk IBA was designated based on certain criteria, notably Egyptian Vulture (EV) and lesser kestrel, but it was entirely designed as a buffer round the lesser kestrel breeding colony and doesn't reflect the area important for EV and other species (see below). All species use Vorotan Valley but surveys not carried out for western side of the Concession Area. EV, Golden Eagle and Long-legged buzzard are relatively adaptable in terms of feeding if areas around the nest site are not disturbed. Nest sites not confirmed.

Species	Season	Population Estimate	IBA Criteria	IUCN Status	Note
Lesser Kestrel <i>Falco naumanni</i>	breeding	10-20 breeding pairs	A1, B2	Least Concern	Hunts actively Site 6, entire hunting area not established
Egyptian Vulture <i>Neophron percnopterus</i>	breeding	1-2 breeding pairs	A1	Endangered	Breeding sites within or near IBA not known. Feeds widely but concentrations of feeding activity around sites 6 and 13
Long-legged Buzzard <i>Buteo rufinus</i>	breeding	5-6 breeding pairs	B2	Least Concern	Breeding sites previously on Amulsar. Relatively adaptable, feeds widely
Golden Eagle <i>Aquila chrysaetos</i>	breeding	2-3 breeding pairs	B2	Least Concern	Breeding sites not confirmed. Shortage of suitable sites likely; may be possible to create artificially.

Note 2: Need to show there were no alternatives on habitat that is not natural (this exercise) and achieve>NNL of natural habitat if possible. Map needed of natural/modified habitat. Criteria for screening out "modified": cultivated land, intensively grazed areas (including round large herder camps) roads, tracks, paths, buildings. All other land likely to be "natural." Criteria for "natural": retaining high proportion of species that would be expected to occur in a relatively undisturbed or un-managed example of the vegetation type (e.g., steppe grassland).

Note 3: Critical Habitat – The entire area of search is within the migration corridor for raptors including Egyptian Vulture. It is not possible to confirm whether trigger densities of population for Critical Habitat will be met until proposed spring survey carried out. Until that point, the entire concession has to be considered potential CH for migratory raptors/EV at this stage. "NO" is indicated where existing information suggests suitability for feeding/settling likely to be lower due to land use, disturbance etc. (not definitive). NB critical habitat areas differ for different species.

Note 4: Spandaryan – Kechut Tunnel – The new July 18, 2013 legislation requires a 3,000 m restricted zone on either side of the tunnel alignment.

Table 1b Initial Screening Criteria – General Location

Site	Within Rock Allocation Area (RAA)?	Within Exploration License Area?
28	NO	YES

Table 1c Initial Screening Criteria – Infrastructure

Site	Radial Distance from the Crusher	Avoids River Crossing by Conveyor?	Avoids Road Crossing by Conveyor?	Avoids Gas Pipeline Crossing or Impact?	Avoids Spandaryan-Kechut Tunnel Crossing by Conveyor?	Source of Production and Project Water Supply?	Heavy Equipment Access?
28	<10 km	YES	YES	YES	NO	Arpa	MODERATE

Note 1: Significant adverse conditions (orange shading) were considered where a river crossing was required by the conveyor or where the terrain would make access to heavy equipment very difficult.

**Table 1d Initial Screening Criteria – Social/Cultural**

Site	Site is Not Highly or Widely Visible from Key Settlements (by Day, and Nighttime Lighting) – For Gndevaz, Jermuk, Kechut, Saravan	Presence of Community Water Supply Point/Source	Outside of Area with Known Immovable Cultural/ Archaeological Sites (i.e., Is the site free of archaeological resources?)	Avoids Physical Resettlement of Local Human Inhabitants	Avoids Economic Displacement?
28	NO – Portions of Infrastructure visible from parts of Gndevaz or along the highway, but not from Key Areas of the other Settlements.	Community agricultural water pipelines	NO - Sites identified within the area will be subject to further evaluation and potential data recovery in the case of medium or higher importance.	YES	NO: Orchards

Note 1: Significant adverse conditions (orange shading) for visual impacts of the social and cultural screening criteria were considered with respect to visibility from the local effected communities.

Table 1e Initial Screening Criteria – Technical

Site	Does Site Include Suitable Space for Ponds, ADR Plant?	No Apparent Significant Geotechnical Flaws (e.g., Foundation Conditions, General Site Gradient, and/or Avalanche Zones)	Constructability	Acceptable Conveyor Route Topography	Is Site Topography Suitable for Conventional HLF or Valley LF?	Does Site Have Capacity for 95Mt with Potential Increase to 120 Mt?	Does Site Have Capacity for 60Mt Assuming a Multiple HLF Site Development Scenario?	Avoids Management of Shallow Groundwater or Significant (Perennial) Seeps and Springs?	Avoids Potentially Difficult Closure Constraints (i.e., Upgradient Surface-Water Conditions and Long-Term Groundwater Issues)?
28	YES	YES	Moderate	YES	Conventional or Valley	YES	YES	NO	NO

Note 1: Significant adverse conditions (orange shading) were considered where the site conditions would result in difficult construction conditions typically defined as a site where extensive earthworks and/or steep slopes required a considerable degree of site grading and preparation.

Note 2: Significant adverse conditions (orange shading) were considered for sites where shallow groundwater, significant seeps and springs, and difficult closure constraints were noted.



4.0 SITE SELECTION AND ADVANCEMENT OF FEASIBILITY STUDY AND ESIA

In December 2013, after consultation with the RA government officials and with community involvement with the local communities, Lydian made a determination to advance the project to the next phase and began additional studies to evaluate the site including preparation of an Environmental and Social Impacts Assessment (ESIA) and a Feasibility Study, both of which, are currently in progress.



5.0 USE OF THIS REPORT

Golder has prepared this report with input from others as noted in Section 1.0, exclusively for the use of Lydian for the specific application to siting of the HLF for the Amulsar project. The analyses reported herein were performed in accordance with accepted standard of care practices, based on the information available at the time the study was completed. No third-party entity shall be entitled to rely on any of the information, conclusions, or opinions contained in this report without the written approval of Lydian and Golder.

Golder appreciates the opportunity to support Lydian on this task. Please contact the undersigned with any questions or comments on the information contained in this report.

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At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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