LYDIAN ARMENIA

Amulsar Gold Project

Environmental and Social Management Plan (ESMP)

Biodiversity Management Plan

Version 1
March 2018

Revision History

Revision	Date	Details	Prepared
V0	June 2016	Appended to v10 ESIA	Treweek Environmental Consultants
V1	March 2018	Re-formatted. Actions related to Ecosystem Services removed (to separate EcSMP)	AJB

Approvals

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Glossary

AQNVMP	Air Quality, Noise and Vibration Monitoring Plan
ASPB	Armenian Society for the Protection of Birds
BAP	Biodiversity Action Plan
BMP	Biodiversity Management Plan
BOMP	Biodiversity Offset Management Plan
BOS	Biodiversity Offset Strategy
BRSF	Barren Rock Storage Facility
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
FMP	Footprint Management Plan
HLF	Heap Leach Facility
IBA	Important Bird Area
IFC	International Finance Corporation
IUCN	International Union for the Conservation of Nature
IWMP	Integrated Waste Management Plan
LALRP	Land Access and Livelihood Restoration Plan
Lydian	Lydian Armenia CJSC
NNL	No Net Loss (of biodiversity)
NPI	Net Positive Impact
MRCRP	Mine Reclamation, Closure and Rehabilitation Plan
RA	Republic of Armenia

SAP	Species Action Plan
SEP	Stakeholder Engagement Plan
SWMP	Surface Water Management Plan
TEC	Treweek Environmental Consultants
WWF	World Wide Fund for Nature

1 INTRODUCTION

This Biodiversity Management Plan (BMP) is a component of the Environmental and Social Management Plan (ESMP) of the Amulsar Gold Project (the Project) being developed by Lydian Armenia CJSC (hereafter Lydian Armenia), a subsidiary of Lydian International Ltd. The ESMP is being implemented via the Project Environmental and Social Management System (ESMS) which has been put in place to manage the environmental and social (E&S) aspects of the Project.

For an introduction to the Project, the E&S standards it is committed to, and the background to, and operation of, the ESMS, please refer to the **0-00-MAN-ENV-82043 ESMS Manual**.

1.1 OBJECTIVES

The BMP details the practical, biodiversity-related actions to be undertaken during the implementation of the Project, along with responsibilities, timeframes and monitoring requirements and associated procedures. Although largely site-focused, the BMP also includes actions that need to be taken during the detailed Project design phase (i.e. pre-construction). It addresses management procedures and application of relevant mitigation measures identified in both the Project Environmental Impact Assessment (EIA) undertaken for Republic of Armenia state approvals, and the Environmental and Social Impact Assessment (ESIA) undertaken to comply with good international industry practice.

1.2 ROLES AND RESPONSIBILTIES

All Project workers have a responsibility to protect biodiversity. For details of specific roles and responsibilities please refer to the **0-00-MAN-ENV-82043 ESMS Manual**.

2 SCOPE, BACKGROUND AND CONTEXT

Responsible mining is a commitment of Lydian, in order to reduce risks and minimise negative impacts resulting from development of the Project. Lydian aims to achieve "no net loss" (NNL) of biodiversity and to ensure that biodiversity and ecosystem functions are not systematically degraded or lost from the landscape as a result of the Amulsar Project. This means that species occurring in the Project's area of influence should have the same chances of long-term survival with the Project in place as without it; and have access to similar amounts of suitable habitat as in the baseline situation.

The Project is also committed to comply with the International Finance Corporation's Performance Standards on Environmental and Social Sustainability (IFC PS) and the European Bank for Reconstruction and Development's Performance Requirements (EBRD PR). IFC PS6 and EBRD PR6, both titled "Biodiversity Conservation and Sustainable Management of Living Natural Resources", require not only NNL in natural habitat, but also a net gain (or net positive impact) in "critical habitat" (as defined by IFC and EBRD).

This BMP applies to management of biodiversity during Project implementation. The core of the document, presented in Chapter 4, is a tabulated list of mitigation and management measures, arising from the ESIA, which have been agreed to by Lydian and which are included in the Project's Commitment Register.

The BMP excludes those biodiversity-related actions which are necessary outcomes of the ESIA but which are to be carried out away from the Project site. These include further surveys, research work and conservation actions in adjacent areas, and are addressed in the Project Biodiversity Action Plan (BAP). Some of this other work will result in amendments and enhancements to the BMP, which will be made by Lydian as necessary.

There is overlap between the BMP and other management plans, since some mitigation measures developed for other disciplines (e.g. soil erosion control; surface water management) will also assist with protection of biodiversity. The table in Chapter 4 includes these and cross-references to other management plans as appropriate.

Version 0 of the BMP included considerations for ecosystem services. These are now addressed in a separate Ecosystem Services Management Plan (0-00-PLN-ENV-82127).

3 LEGISLATIVE, REGULATORY AND POLICY FRAMEWORK

The Amulsar Project must comply with several laws, regulations, and policies and standards relating to biodiversity. These include the national Laws of the Republic of Armenia; the requirements and policies of stakeholders to the Project, including IFC and EBRD; and Lydian's own internal policies.

3.1 ARMENIAN LAW

The main legislation relating to biodiversity and ecosystems in Armenia is (see the ESIA for further information):

- Law on Conservation and Use of Fauna, 1981;
- Law on Protected Areas, 1991;
- The Forest Statute, 1994;
- Law on Environmental Impact Assessment, 1995;
- Law on Nature Protection and Payments for Use of Natural Resources, 1998;
- The Law of the RA “On specially protected natural areas”, 2006;
- The Law of the RA "On flora”, 1999;
- The Law of the RA "On fauna”, 2000;
- The RA Mining Code, enacted 2012; and
- The Decree № 781-N “On Establishing the Procedure for Conservation of Facilities of Flora of the Republic of Armenia and Their Use for Reproduction Under Natural Conditions", August 2014.

3.2 STAKEHOLDER POLICIES, REQUIREMENTS AND STANDARDS

Financial lenders to the Project have policies relating to environmental and social management, together with associated performance standards (PS) in the case of IFC, and performance requirements (PR) in the case of EBRD. The implications of the Project under IFC PS6 and EBRD PR6 are assessed in the Natural and Critical Habitat Assessment (Appendix 4.10.3 to the ESIA) and summarised in Chapter 6 of the ESIA, which concludes that the Amulsar mine will affect both natural and critical habitat. To comply with the requirements of IFC PS6 and EBRD PR6, a NNL

outcome should be achieved if feasible for natural habitats, and a net gain outcome must be achieved for any impacts that might remain on critical habitat despite mitigation (as defined in IFC PS6 and EBRD PR6).

3.3 LYDIAN POLICY

Lydian aims to achieve NNL of biodiversity and to ensure that biodiversity and ecosystem functions are not systematically degraded or lost from the landscape as a result of the Amulsar Project. This means that species occurring in the Project's area of influence should have the same chances of long-term survival with the Project in place as without it and have access to similar amounts of suitable habitat as in the baseline situation.

4 BIODIVERSITY MANAGEMENT PLAN

The BMP is an instructional document that sets out the mitigation and management requirements and responsibilities to be implemented on site to fulfil the Project's biodiversity objectives, as identified in Chapter 6 of the ESIA. The protocols, procedures, forms and documentation required to implement the BMP (many of which are specifically identified in the BMP tables) need to be included in the Project ESMP.

Ultimate responsibility for the successful implementation of the BMP lies with Lydian, although it is expected that the BMP will be provided to site contractors to inform them of Lydian's expectations as to how their work is conducted.

The BMP is a "live" document, to be adapted and enhanced as the Project progresses. In the event that impacts not anticipated by the ESIA arise during the Project, and are evaluated to require mitigation, then they will be added to the BMP. Mitigation should always be devised in line with the mitigation hierarchy: avoid, reduce/minimise, restore, offset.

It should be noted that a fundamental assumption of the BMP is that suitably qualified and trained staff will be present on site and constantly engaged in checking and verifying that the various mitigation measures are being implemented correctly.

The BMP is tabulated in the following pages. A key to the content of the tables is provided below.

Column heading	Description
ID	The commitment's unique reference number. All commitments from the ESIA are included. Grey-shaded rows are commitments that are not applicable to the BMP but are addressed as part of the BAP; they are included for information purposes.
Commitment/Action	Description of the commitment or action as it appears in the ESIA.
Detail	Additional description of the commitment or action, if required.

Column heading	Description
Project Phase	P - Pre-Construction (Detailed Design); Const - Construction; Ops - Operations; Clo - Closure (reclamation, rehabilitation and aftercare).
Documentation	Identifies documentation that will guide implementation and/or indicate compliance.
Cross-reference to other MPs	In some cases, commitments apply to one or more other subjects (e.g. a commitment designed to safeguard surface water quality might also benefit biodiversity). See glossary at the front of this document for abbreviations.
Frequency of action	An indication of the appropriate frequency of action and/or monitoring, as appropriate.
Responsibility	An initial appraisal of whether primary responsibility for the action will fall to Lydian or its contractor(s).
Verification indicator	An indication of how successful implementation of the commitment might be demonstrated. As noted in the table, it is the responsibility of Lydian to verify and monitor implementation of the commitments

Progress towards fulfilling the commitments listed in the table overleaf is recorded in the **0-00-OTH-ENV-82158 ESIA Commitments Register Tracker**.

Biodiversity Management Plan								
ID	**Commitment/Action**	**Detail**	**Project Phase**	**Documentation**	**Cross-reference to other MPs**	**Frequency of action**	**Responsibility**	**Verification* indicator**
BIO1	The Project mitigation strategy for biodiversity is based on the objective of achieving "no net loss" for biodiversity as reflected in Lydian's Biodiversity Policy, and net gain for critical habitat as per the IFC PS and EBRD PR.				BAP			
BIO2	The precise boundary of a set-aside designed to safeguard a viable population of *Potentilla porphyrantha*, as well as Brown Bear habitat, Sub-Alpine Meadows with Alpine Elements and breeding habitat for alpine birds, will be finalised following further consultation with communities and the Ministry of Nature Protection (which has approved the set-aside in principle as a measure to meet the requirements of the Flora Decree). An indicative boundary has been established and no Project activities will take place in the set-aside. A wider area than this is appropriate to maintain Brown Bear habitat, due to the importance of the woodlands north of Saravan on the western flank of Amulsar Mountain. Discussions are needed to confirm whether this can be incorporated and included in a zone of controlled access.				BAP			
BIO3	Awareness training on the set-aside and other areas to be avoided will be provided to all relevant personnel and access to these areas will be prohibited.	To be part of site induction before any individual is allowed on site. Provide overview of sensitivities and constraints, including purpose of set-aside and restoration trials and prohibitions on access. Explain meaning of signs. Also include awareness of sensitive species and risks associated with any dangerous animals.	P, Const, Ops	Awareness training materials Site induction record		1. Before access to site. 2. Refreshers as needed afterwards.	1. Lydian 2. Contractor(s)	Fencing and signs in place Set-aside and restoration areas remains undisturbed
BIO4	An ecological risk assessment to evaluate the consequences of accidental spills during transport or storage of hazardous chemicals will be undertaken once transport routes are confirmed. This will focus particularly where routes run adjacent to sensitive water courses or water bodies.	International Cyanide Management Code requirements should partially fulfil this, but other hazardous substances should be considered – fuel, explosives, etc.	P, Const, Ops		Cyanide MP TMP			
BIO5	Pre-construction checks (surveys) will be carried out immediately prior to ground disturbance in order to confirm that the biodiversity baseline as reported in this ESIA has not changed significantly, and that there are no additional features that should be avoided.	See 0-00-PRO-ENV-82134 SOP for Biodiversity Pre-Construction Check. Part of Land Clearance Authorisation Process. See also BIO68, BIO69 and BIO73 for specific species of concern.	Const	Land Clearance Authorisation / Environmental Controlled Access Authorisation		Prior to disturbance of a new area	Lydian	Signed Land Clearance Authorisation / Environmental Controlled Access Authorisation

Biodiversity Management Plan								
ID	**Commitment/Action**	**Detail**	**Project Phase**	**Documentation**	**Cross-reference to other MPs**	**Frequency of action**	**Responsibility**	**Verification* indicator**
BIO6	Small mammals, reptiles and amphibians will be excluded from working areas. Any individuals that become trapped within working areas will be removed by a suitably qualified ecologist.	Include in site induction: all staff are expected to notify a member of the environmental team upon discovery of trapped animals. Rescue must be undertaken by trained staff in line with the Decree on Fauna. Suitable habitat for translocation to be identified.	P, Const, Ops	Rescue / translocation procedure 0-00-OTH-ENV-82157 Wildlife Encounter Register		As needed	Lydian	Aim for zero animal mortality incidents in working areas
BIO7	Fauna, including birds, will be prevented from accessing settling ponds. Monitoring will determine whether measures additional to standard practices (fencing, use of bird scarers, etc.) are required.	Practical solutions should be considered during the Project detailed design process.	P, Const, Ops	0-00-OTH-ENV-82157 Wildlife Encounter Register		As needed	Lydian	Aim for zero animal mortality incidents in working areas
BIO8	As a fundamental design principle, the footprint of Project infrastructure and the areas of land to be cleared will be minimised.	This is a pre-construction (Project design) commitment that must be checked and verified during site works.	P	Design documents		As needed	Lydian	As-built footprint verified against design
BIO9	Any new access roads required will be designed to minimise habitat fragmentation, barrier effects and induced access to previously undisturbed areas.	It is possible that access routes may need to be modified (or new ones constructed) during Project implementation.	P, Const, Ops	To be confirmed depending on scope - may need EIA for local permitting and/or ESIA addendum; or Land Clearance Authorisation for minor works		As needed	Lydian	Local permit, financial lender and any other requirements fulfilled; as-built footprint verified against design
BIO10	As far as possible, construction activities will be scheduled to avoid disturbance of Brown Bear breeding habitat in early spring, between March and June.	This requires close liaison between the Construction Manager and Biodiversity Specialist. It is the Biodiversity Specialist's responsibility to monitor activities and planning, and to advise the Construction Manager on any concerns over timing. See also BIO59 and BIO62.	P, Const			As needed	Lydian	
BIO11	Vehicular access to the Project-affected area will be minimised. The majority of workers will arrive on site via bus and limited car parking will be available for employees (see also landscape and visual impacts).	This commitment is related specifically to mitigation of landscape and visual impacts, but should assist with minimisation of habitat disturbance.	P, Const, Ops	Project transportation policy	FMP	Continuous	Lydian Contractor(s)	No vehicular disturbance outside designated areas

Biodiversity Management Plan								
ID	**Commitment/Action**	**Detail**	**Project Phase**	**Documentation**	**Cross-reference to other MPs**	**Frequency of action**	**Responsibility**	**Verification* indicator**
BIO12	All site workers will have awareness training on biodiversity issues and particularly the provisions that have been made to minimise impacts on biodiversity, both prior to initial access to site and on an as-needed basis throughout the project (via tool-box talks etc.).	In addition to awareness training as part of the site induction process, periodic "refresher" training should be provided to workers in the form of "tool-box talks" on site. See also BIO3.	Const, Ops	Awareness training materials Site induction record		1. Before access to site. 2. Refreshers as needed afterwards.	1. Lydian 2. Contractor(s)	No encroachment outside designated areas; no incidents of injury to fauna
BIO13	Hunting and gathering by Project staff will be prohibited.	Hunting by Project staff should be viewed as a serious violation.	Const, Ops	Site induction record		Before access to site	Lydian Contractor(s)	No recorded incidents
BIO14	The Project site will be maintained in a clean and uncluttered state: the pMRCRP, FMP and ESMP will include landscape and habitat management requirements (see landscape and visual impacts).	This commitment is related specifically to mitigation of landscape and visual impacts, but should assist with minimisation of habitat disturbance and injury/nuisance to fauna. See also BIO16.	Const, Ops		FMP WMP	Continuous	Contractor(s)	As-built footprint verified against design
BIO15	Litter will be removed from water bodies and areas within the restricted access zone.	This measure is designed to protect waterbirds.	Const, Ops			As needed	Contractor(s)	
BIO16	A waste management plan will be implemented. Waste disposal facilities will be operated in a manner that includes the regular covering of exposed refuse with soil or gravel (see also air quality impacts). This will reduce risk of exposure of birds such as Egyptian Vulture that regularly forage in waste dumps to potentially damaging waste products.	This general good-practice measures is also related to mitigation of landscape & visual and air quality impacts. All site personnel are expected to continuously implement and monitor this measure.	Const, Ops	Waste management (storage, transfer, audit) records	WMP	Continuous	Contractor(s)	No incidents of injury to fauna related to waste management
BIO17	Areas to be disturbed during construction and operation will be clearly delineated and marked out in advance, and encroachment outside these areas will not be permitted. In particular, off-road/track driving will be prohibited.	This is probably the key rule for day-to-day site operations in terms of protection of biodiversity, and it should therefore be monitored continuously by all managerial staff. See also BIO51.	P, Const, Ops	Land Clearance Authorisation	FMP	Continuous	Lydian Contractor(s)	No encroachment outside designated areas
BIO18	Vehicle speeds on access and haul roads will be controlled to minimise dust emissions and the risk of mortality of animals (see also air quality impacts).	It will be important to ensure that productivity incentives (e.g. rewards for number of truck journeys between pit and stockpile) do not encourage or even necessitate speeding.	Const, Ops	Project transportation policy	AQNVMP	Continuous	Contractor(s)	Signs in place
BIO19	Instruction on driving safety and observation of speed limits will be included in the new employee orientation and annual refresher training and in task training for specific job assignment (see also air quality impacts).	The biodiversity-related benefits should be explained to employees.	Const, Ops	Site induction record Project transportation policy	AQNVMP	Before access to site and annual refresher	Lydian Contractor(s)	

Biodiversity Management Plan								
ID	**Commitment/Action**	**Detail**	**Project Phase**	**Documentation**	**Cross-reference to other MPs**	**Frequency of action**	**Responsibility**	**Verification* indicator**
BIO20	Vehicles considered to have the potential to introduce invasive plant species or to spread existing invasive plants to areas where they do not currently occur will be washed before entering site or current weed-free locations (wash water to be contained).	The origin of vehicles arriving on site needs to be considered. General on-site observations should include presence of invasive species.	Const, Ops	Invasive species control procedure		Continuous	Contractor(s)	No spread of invasive species
BIO21	Topsoil storage piles will be stabilized as necessary to reduce wind-blown dust emissions. All mounds will be sown with a grass seed mixture appropriate to the location and will be maintained for the duration of the operational phase (see soil and land cover impacts; FMP; pMRCRP).	This commitment should reduce dust deposition on vegetation, and prevent erosion and deposition of soil into water courses.	Const, Ops		FMP pMRCRP	Weekly inspection	Contractor(s)	Visual confirmation of stockpile integrity
BIO22	Crushing and screening facilities will be enclosed in a purpose-constructed building with dust extraction and filtration systems (see also air quality impacts).	This commitment should reduce dust deposition on vegetation.	P, Ops		AQNVMP	Monthly inspection	Lydian	As-built footprint verified against design
BIO23	Transfer of crushed ore between the crushing and screening plant and truck loadout facility will be via covered conveyor, thereby significantly reducing the potential for both dust emissions and noise compared with use of dump trucks and haul roads (see air quality impacts and noise & vibration impacts).		P, Ops		AQNVMP	Monthly inspection	Lydian	As-built footprint verified against design
BIO24	Water sprays will be used at conveyor discharge points and other identified dust emission points (see air quality impacts).	This commitment should reduce dust deposition on vegetation.	Ops		AQNVMP	As needed	Contractor(s)	No visual indication of excessive dust on vegetation; dust monitoring results within Project targets
BIO25	The HLF will be operated such that the active leaching surface retains sufficient humidity to inhibit dust generation (see also air quality impacts).	This commitment should reduce dust deposition on vegetation.	Ops		AQNVMP	As needed	Contractor(s)	No visual indication of excessive dust on vegetation; dust monitoring results within Project targets
BIO26	Water spraying will be employed on roads to suppress dust (see air quality impacts).	This commitment should reduce dust deposition on vegetation.	Const, Ops		AQNVMP	As needed	Contractor(s)	No visual indication of excessive dust on vegetation; dust monitoring results within Project targets

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ID	**Commitment/Action**	**Detail**	**Project Phase**	**Documentation**	**Cross-reference to other MPs**	**Frequency of action**	**Responsibility**	**Verification* indicator**
BIO27	To the extent practical, haul and dump truck loads prone to dust will be sprayed with water as appropriate to decrease the potential for fugitive dust emissions during transport (see air quality impacts).	This commitment should reduce dust deposition on vegetation.	Ops		AQNVMP	As needed	Contractor(s)	No visual indication of excessive dust on vegetation; dust monitoring results within Project targets
BIO28	Control measures, including for material storage and handling and for erosion and sedimentation prevention, will be in place to prevent release of contaminants into the environment via leakage, spills and run-off. The Project design is for zero discharge of contact water during operations (see groundwater impacts; surface water impacts; Spill Prevention and Response Plan).	These general good-practice measures will reduce the risk of secondary impacts on biodiversity. All site personnel are expected to continuously implement and monitor these measures.	P, Const, Ops		SWMP SPRP	Continuous	Contractor(s)	No pollution incidents
BIO29	Sites will be graded to channel surface flows into ditches to decrease the potential for erosion (see soil and land cover impacts).	General on-site observations should include any run-off impacts outside working areas.	Const, Ops		FMP	Continuous	Contractor(s)	Visual confirmation of site integrity
BIO30	Roadside berms will be installed and surface water run-off managed to reduce footprint of gravel wash-out, particularly where natural vegetation could be affected.	This is a pre-construction (Project design) commitment that must be verified during site works.	P, Const	Road design drawings		Continuous	Contractor(s)	As-built roads verified against design No wash-outs
BIO31	Culverts will be installed at all road/track stream-crossings to minimise sedimentation downstream.	This is a pre-construction (Project design) commitment that must be verified during site works. It should reduce the risk of secondary impacts on biodiversity, e.g. at downstream wetlands.	P, Const	Project drawing indicating all culvert locations		Weekly inspection	Contractor(s)	Visual confirmation of integrity of crossings
BIO32	Geotextile silt fencing, silt traps, and/or straw bales will be used to reduce sediment transport within the construction site (see soil and land cover impacts).	Note that straw bales should not be used in critical habitat areas (risk of introducing invasive species).	Const		FMP	Continuous	Contractor(s)	Visual confirmation of site integrity
BIO33	All Project vehicles and equipment will be maintained in good condition. During detailed construction design, use of noise barriers, baffles, or enclosures to provide abatement for noisy equipment such as generators, compressor, pumps, gearboxes will be considered (see noise & vibration impacts).	These general good-practice measures will reduce the risk of secondary impacts on biodiversity. All site personnel are expected to continuously implement and monitor these measures.	Const, Ops		AQNVMP	Weekly inspection	Contractor(s)	As-built noise abatement measures verified against design

Biodiversity Management Plan								
ID	**Commitment/Action**	**Detail**	**Project Phase**	**Documentation**	**Cross-reference to other MPs**	**Frequency of action**	**Responsibility**	**Verification* indicator**
BIO34	Where practical, noisy construction-related activity will be avoided at dawn and dusk and during the night (see also noise & vibration impacts).	This requires close liaison between the Construction Manager and Environmental Manager. It is the Environmental Manager's responsibility to monitor activities and planning, and to advise the Construction Manager on any concerns over timing.	Const, Ops		AQNVMP	Continuous	Contractor(s)	
BIO35	Workers will be trained in noise abatement best practices, including avoiding unnecessary revving of engines and switching off equipment when it is not required. Haul routes will be well maintained and where steep gradients are required operatives will be trained to minimize engine noise through avoiding unnecessary revving etc. (see also noise & vibration impacts).	In addition to awareness training as part of the site induction process, periodic "refresher" training should be provided to workers in the form of "tool-box talks" on site.	Const, Ops	Site induction record	AQNVMP	Before access to site and refreshers as needed afterwards	Contractor(s)	
BIO36	Lydian will investigate the optimal technology to be used for reversing alarms on haul trucks, to balance the requirement of occupational health and safety for workers deployed on the HLF and to minimise/remove the audibility of alarms within the nearest community of Gndevaz.	This is a pre-construction (Project design) commitment, to be verified during site works.	P	Design specifications			Lydian	Specifications verified against design
BIO37	Only the minimum artificial lighting necessary to ensure safety will be employed. Downward-directed lighting will be employed to minimise light pollution for nocturnal species.	Site environmental staff will monitor lighting to identify any instances of over-use or where it may not be necessary. See also BIO38 - BIO42 inclusive.	P, Const, Ops			Continuous	Construction Manager	As-built lighting verified against design
BIO38	Low visibility spectrum lights and appliances (full cut-off fixtures that emit no light above the light's horizontal line) will be preferred, with lighting mounted at the minimum necessary safe height and shrouded where appropriate (see landscape and visual impacts).	As for BIO37.	P, Const, Ops		FMP	Continuous	Contractor(s)	As-built lighting verified against design
BIO39	Lighting will be carefully enclosed within buildings so as not to contribute to light pollution/ light spillage off site/ glare to the sky. Shutters will be used during darkness (see landscape and visual impacts).	As for BIO37.	P, Const, Ops		FMP	Continuous	Contractor(s)	As-built lighting verified against design
BIO40	There will be minimal security lighting in external areas (sensors will be used to ensure it does not get left on) (see landscape and visual impacts).	As for BIO37.	P, Const, Ops		FMP	Continuous	Contractor(s)	As-built lighting verified against design

Biodiversity Management Plan								
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BIO41	Lighting of work sites will be restricted to agreed working hours and that which is necessary for security. Light sources for night-time construction and operation activities will be pointed downward and away from sensitive receptors (see landscape and visual impacts).	As for BIO37.	Const, Ops		FMP	Continuous	Contractor(s)	As-built lighting verified against design
BIO42	Vehicle and mobile plant machinery operators and drivers will be instructed in the appropriate use of headlights (high and low beams) to reduce impacts (see landscape and visual impacts).	In addition to awareness training as part of the site induction process, periodic "refresher" training should be provided to workers in the form of "tool-box talks" on site.	Const, Ops	Site induction record	FMP	Before access to site and refreshers as needed afterwards	Contractor(s)	
BIO43	A comprehensive soil and vegetation restoration programme will be employed to reinstate appropriate vegetation types post-impact. Ecologists have worked closely with landscape specialists to identify suitable native species, and field trials will be undertaken in conjunction with the national herbarium and NAS RA Institute of Botany to investigate restoration techniques. Restored areas will be monitored for a period of five years post-mine closure. (See also landscape and visual impacts and soil and land cover impacts.)	Site environmental staff to facilitate research work where required, and will be engaged in implementation and monitoring as progressive restoration proceeds.	Const, Ops, Clo	Annual progress report	BAP	As needed	Lydian	Trial areas undisturbed Successful restoration demonstrated
BIO44	As a general practice and where it is technically feasible, the top 10cm of topsoil will be stripped and stored separately from other soil that is removed. However, there are areas where the abundance of rocks will make soil-stripping impossible. A detailed map will be created in association with engineers to illustrate the areas that can be stripped of soil and those that cannot. Because many alpine plants rarely produce seed and spread vegetatively, turves of species-rich vegetation will be removed prior to excavation and stored for use as 'plugs' in amongst seeded areas during restoration. A seed collection programme has been initiated for native plant species and three plant nurseries have been established in local villages to provide stocks for re-vegetation. These have been used initially to produce trees for visual screening purposes, but will be expanded to cater for restoration requirements, in partnership with the local communities in which they are located.	Stored topsoil should be checked regularly to ensure viability of seed bank.	P, Const, Ops, Clo	Annual progress report	BAP	As needed	Lydian Contractor(s)	Successful restoration demonstrated
BIO45	All re-vegetation carried out for the Project will be carefully reviewed and monitored to avoid accidental introduction of invasive alien species.	A vegetation restoration programme is being developed and will be included in the MRCRP.	Const, Ops, Clo	Site restoration report	pMRCRP	As needed	Lydian	Successful re-vegetation and no occurrence of invasive species

Biodiversity Management Plan								
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BIO46	Topsoil storage locations will be chosen to avoid "good" examples of natural vegetation types as well as rocks supporting *Potentilla porphyrantha*.		Const	Land Clearance Authorisation		As needed	Lydian	Sign-off of "Permit to Dig"
BIO47	An offset will be established for natural habitat that will be lost or degraded by the Project. This offset will provisionally be located within the proposed Jermuk National Park. Lydian will engage with national and local government and NGOs on the set-up of the National Park via a stakeholder engagement process The Project BOS provides consideration of potential costs and funding mechanisms and outlines Lydian's proposed approach to provision of support during National Park establishment and ongoing management.				BAP			
BIO48	Based on the results of loss/gain calculations, an offset of 836.5 "habitat impact units" is required for the Project to achieve no net loss of natural habitat.				BAP			
BIO49	*Potentilla porphyrantha* plants within the mine pits have been translocated to suitable research and propagation facilities. These plants will be maintained in controlled conditions and used to research the ecological requirements of the species and to produce plants for re-introduction to restored mine pits in future, if suitable conditions can be created. Rockeries have been constructed at the Sevan Botanic Garden and on North Erato to act as experimental nurseries.				*Potentilla* SAP			
BIO50	Locations of *Potentilla porphyrantha* plants are recorded and fencing and markings used to safeguard them. Measures are being taken to avoid incidental damage. Regular inspection and monitoring will be undertaken to ensure that the markings remain visible, that personnel are aware of the need to safeguard marked rocks and that detailed design changes are compatible with the need to avoid impacts. Monitoring will also be undertaken to observe the potential effects of dust deposition on the species. These measures will be consolidated and maintained throughout construction and operation.	This measure is covered by BIO17 but is included as a separate commitment due to the particular importance of the species. Locations of plants must be monitored regularly to check for damage and ensure that markings, signs and fencing are in place.	P. Const, Ops	Monitoring protocol (see *Potentilla* SAP) Register (map) of locations	*Potentilla* SAP	Continuous	Lydian	Signs & markings maintained No encroachment outside designated areas and no damage to *Potentilla* plants or habitat

Biodiversity Management Plan								
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BIO51	A research programme has been established to test techniques for propagating *Potentilla porphyrantha* plants and to improve knowledge of requirements. This will provide the basis for restoring plants to suitable habitat on mine closure if suitable conditions can be created.				BAP			
BIO52	If research, monitoring and modelling suggest that pre-mining population size and the extent of the *Potentilla porphyrantha* population cannot be restored, a comprehensive review of offset options will be undertaken.				BAP			
BIO53	The Endangered Egyptian Vulture will be monitored throughout the Project and additional mitigation implemented if necessary.				BAP			
BIO54	The Endangered Saker Falcon will be monitored throughout the Project and additional mitigation implemented if necessary.				BAP			
BIO55	The Lesser Kestrel breeding colony will be monitored throughout the Project and additional mitigation implemented if necessary. Another colony associated with Gorayk IBA, which has established itself in the military tower between Ughedzor and Gorayk, will also be monitored in partnership with ASPB, as these birds hunt on the southern slopes of Amulsar. The extended colony at Sisian will also be monitored.				BAP			
BIO56	Construction of an earth bank where the conveyor and access road(s) are closest to the gulley east of Gndevaz that is important for breeding birds will be considered for reducing visual and noise disturbance.	This is a pre-construction (Project design) commitment. Any biodiversity-related mitigations must be verified during site works. See also BIO58.	P	Design drawings		As needed	Lydian	As-built verified against design
BIO57	Migrating raptors and other birds, particularly those flying at night, early dawn or dusk, are at risk from collision with above-ground electricity cables. New above-ground power lines will therefore be insulated and fitted with bird flight diverters to reduce collision risk.	This is a pre-construction (Project design) commitment. Any biodiversity-related mitigations must be verified during site works.	P	Design drawings		As needed	Lydian	As-built verified against design

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BIO58	Distribution of breeding birds and signs of breeding activity will be monitored. If breeding success is adversely affected, targeted conservation measures will be identified for these species to be implemented in the adjacent proposed Jermuk National Park in addition to planned measures to offset impacts on natural habitat, which are expected to have some benefit for birds in the long term due to protection conferred by the new National Park.				BAP			
BIO59	When possible, and particularly if impacts on breeding birds are observed, import of materials and construction activities will avoid the early spring breeding season for birds (April – June).	This requires close liaison between the Construction Manager and Biodiversity Specialist. It is the Biodiversity Specialist's responsibility to monitor activities and planning, and to advise the Construction Manager on any concerns over timing. See also BIO62.	Const, Ops			Continuous	Contractor(s)	
BIO60	Consideration will be given to planting woodland with native species in suitable locations to benefit breeding birds, particularly if monitoring suggests impacts are occurring.	Planting for screening purposes may be undertaken; if so, opportunities for enhancing biodiversity should be taken.	Const, Ops		FMP, pMRCRP (screening purposes)	Continuous	Lydian	
BIO62	If possible, significant activity (including import of materials) will be avoided along the Vorotan valley in spring and autumn, to reduce risk of disturbance to migratory raptors.	This requires close liaison between the Construction Manager and Biodiversity Specialist. It is the Biodiversity Specialist's responsibility to monitor activities and planning, and to advise the Construction Manager on any concerns over timing. See also BIO59.	Const, Ops			Continuous	Contractor(s)	
BIO63	The project will aim to support and promote, where possible, traditional grazing management practices (e.g. by minimising access restrictions for herders), because of their role in maintaining natural habitat and associated species.	This measure overlaps with social initiatives. The main role of the E&S team on site is to observe and monitor herder activities, in particular noting where their activities appear to be limited or disrupted by the Project. Amulsar Mountain is used for other activities by local people (e.g. harvesting wild mushrooms and herbs), and site staff must be aware of and implement policies and procedures for engagement with other land users.	Const, Ops		SEP	Continuous	Lydian	

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BIO64	Presence and behaviour of migratory birds including raptors will be monitored throughout the Project and additional mitigation implemented if necessary.		Const, Ops	0-00-OTH-ENV-82157 Wildlife Encounter Register	BAP	1. All sightings to be recorded 2. Annual bird survey (BAP)	1. Lydian 2. External consultant	Annual bird survey report (BAP)
BIO65	Residual impacts on Brown Bear are considered to be likely due to scale of the Project and the level of associated noise, disturbance and habitat fragmentation. Therefore, some form of offset is likely to be necessary. Brown Bear is associated with natural habitat and therefore the proposed natural habitat offset will also include measures to offset impacts on Brown Bear.				BAP			
BIO66	The conveyor, fencing and other linear infrastructure will be designed to maintain mobility for Brown Bear (and other mammals such as Eurasian Lynx and Wolf), including installation of crossings where necessary.	This is a pre-construction (Project design) commitment that must be checked and verified during site works. Observations regarding use of crossings by animals should be recorded.	P	Site incident log		As needed	Lydian	As-built footprint verified against design
BIO67	Measures to enhance food supply for Brown Bear might be needed due to loss of feeding habitat, and will be developed if monitoring suggests a decline in population.				BAP			
BIO69	Reptile diversity is greatest on the stony slopes and rocky outcrops to the north and west edge of the proposed HLF. This habitat will be safeguarded as much as possible by controlling incidental damage outside the footprint. Residual impacts are likely and will be offset through protection of reptiles and their habitats within the proposed Jermuk National Park, together with local awareness-raising about conservation importance to reduce levels of deliberate killing of snakes. Monitoring will be undertaken due to Red List status. Successful offset measures will require locating and surveying suitable habitats in the Jermuk NP first, since the status and distribution of reptiles (particularly Red Data Book species) are currently unknown there.	See also BIO5. To be undertaken by a suitably qualified specialist.	Const, Ops	Land Clearance Authorisation / Environmental Controlled Access Authorisation		Prior to disturbance of a new area	Lydian	Land Clearance Authorisation / Environmental Controlled Access Authorisation
BIO70	Monitoring programmes for specific bird species will be extended to include other representative species in order to determine whether there are any unforeseen impacts on birds, particularly in the long term.				BAP			
BIO71	Annual monitoring of surface water quality using aquatic invertebrate indicators will be continued.		P, Const, Ops	Annual survey report		Annual survey	External consultant	Annual survey report

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BIO72	If deterioration in surface water quality is detected by the surface water monitoring programme, or if there is a pollution incident to surface water, then surveys for aquatic invertebrates, fish and amphibians will be undertaken if deemed necessary to investigate potential impacts.	The ESIA did not predict significant impacts on aquatic species. However, in the event of a pollution incident the potential impacts must be considered.	Const, Ops			As needed	Lydian	
BIO73	Caucasian endemic plant species including *Fritillaria armena, Phelypaea tournefortii* and *Juniperus polycarpu*, will be translocated if to be affected by earthworks.	See BIO5. Success of translocation should be monitored.	Const	Land Clearance Authorisation		Prior to disturbance of a new area	Lydian	Land Clearance Authorisation
BIO74	Establishment of an independent biodiversity advisory group will be considered and Lydian will work with lenders to develop possible terms of reference.				BAP			
BIO75	Bezoar Goat will be monitored in the set aside during Project execution.				BAP			
BIO76	Eurasian Lynx will be monitored in the set aside during Project execution. Specific conservation measures may be developed in the proposed Jermuk National Park as part of the Natural Habitat Offset if it is displaced from the set-aside, but it will benefit from protection within the proposed Park if effective controls on hunting can be developed.				BAP			

Key to Project phases: P - Pre-Construction (Detailed Design), Const - Construction, Ops - Operations, Clo - Closure, reclamation, rehabilitation and aftercare
* Note: verification monitoring is the responsibility of Lydian