INTEGRATED SAFEGUARDS DATA SHEET
APPRAISAL STAGE

Report No.: ISDSA1180

Date ISDS Prepared/Updated: 15-Apr-2015

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I. BASIC INFORMATION

1. Basic Project Data

Country:	Armenia	**Project ID:**	P152039
Project Name:	Geothermal Exploratory Drilling Project (P152039)		
Task Team Leader(s):	Artur Kochnakyan,Almudena Mateos Merino		
Estimated Appraisal Date:	17-Apr-2015	**Estimated Board Date:**	29-May-2015
Managing Unit:	GEEDR	**Lending Instrument:**	Investment Project Financing
Sector(s):	Other Renewable Energy (100%)		
Theme(s):	Infrastructure services for private sector development (90%), Climate change (10%)		
Is this project processed under OP 8.50 (Emergency Recovery) or OP 8.00 (Rapid Response to Crises and Emergencies)?	No		

Financing (In USD Million)			
Total Project Cost:	10.68	Total Bank Financing:	0.00
Financing Gap:	0.00		

Financing Source	**Amount**
Borrower	2.13
Strategic Climate Fund Grant	8.55
Total	10.68

Environmental Category:	B - Partial Assessment
Is this a Repeater project?	No

2. Project Development Objective(s)

The proposed project development objective is to confirm whether the geothermal resource at Karkar site is suitable for power generation and, if confirmed, to involve the private sector in development of a geothermal power plant.

3. Project Description

Geothermal Exploratory Drilling Project consists of two components: (A) Phase I exploratory drilling program; and (B) Phase II exploratory drilling program and transaction advisory.

Component A – Phase I exploratory drilling program (US$4,300,000 SREP grant)

Sub-component A.1: Construction of access road and first phase of exploratory drilling.
Constructing access road and other associated infrastructure will include provision of a gravel road with sufficient length and width to allow for safe transportation of equipment and other materials to the site. It will also include rehabilitation of an existing groundwater well and arrangement of water supply pipe, preparation of small rig pads, installation of equipment and some minor works, as required.

Drilling of one or two slim wells. The decision on whether to drill the second slim well will be made after drilling the first one and will depend on whether the information obtained from the first well is or not conclusive regarding the nature of the geothermal resource. The coordinates of the two slim wells were determined through field investigations works. The project will proceed to Phase II depending on the results obtained from drilling the slim well(s).

Sub-component A.2: Technical assistance for assessment of the geothermal resource potential and technical supervision.
Well logging and mud logging will include analyzes of the cuttings from the borehole, well temperature and pressure measurements and gathering of essential data (such as drilling progress, changes in temperature, etc.), both as the drilling progresses and at the end of each drilling stage for the slim well(s).

Technical supervision and support consultant. This will include support to the Renewable Resources and Energy Efficiency (R2E2) Fund in technical supervision of the drilling of slim exploratory wells; review of the results and findings of well logging, mud logging, flow testing, and chemical analysis of cuttings; and other technical advice and support.

Project audit and operating costs will include financing: (a) incremental operating costs of the R2E2 Fund related to implementation of the first phase of the project; and (b) project audits.

Any project funds that are not used during the Phase I of the project will be made available for implementation of the Phase II if the results from drilling of exploratory wells during Phase I justify the need for Phase II.

Component B - Phase II exploratory drilling program and transaction advisory (US$4,250,000 SREP grant)

Sub-component B.1: Construction of water infrastructure and rig pads and second phase of exploratory drilling.
Constructing of water infrastructure and rig pads will include (a) provision of infrastructure to supply water from a nearby spring to ensure the continuous water supply required for the drilling operation if drilling of production-size exploratory wells is warranted; and (b) installation of rig pads where the rig and the associated equipment will be placed if drilling of production-size wells is warranted.

Production-size exploratory drilling will include drilling of one (or two, if the remaining budget after

completion of Phase I allows for it) production-size exploratory well if the results from Phase I warrant such drilling. The production-size well(s) will be drilled at the same location as the slim wells. Exact coordinates will be determined after the drilling of the slim wells is completed and if results justify the drilling of production-size wells.

Sub-component B.2: Technical assistance for assessment of the geothermal resource potential and technical supervision.
Well logging and mud logging will include analyzes of the cuttings from the bore hole, well temperature and pressure measurements and gathering of essential data (such as drilling progress, changes in flow line temperatures, etc.), both as the drilling progresses and at the end of each drilling stage for the slim well(s).

Feasibility study for a geothermal power plant will include: (a) assessment of the possible power output of the wells, the ratio between brine and steam; (b) assessment of enthalpy; (c) sampling of the brine to decide the type of power conversion techniques to be used and the type of the plant to be constructed, and estimate the power generation potential for a potential geothermal power plant; (d) assessment of the economic and financial viability of the potential plant; (e) legal gap analyzes of the institutional and regulatory framework for construction and operation of a geothermal power plant; and (f) preparation of conceptual/preliminary design of transmission lines and a substation, and other infrastructure required for connection of the potential power plant to the grid.

Technical supervision and support consultant will assist R2E2 Fund in technical supervision of the drilling operation for the production size exploratory wells; review of the results and findings of well logging, mud logging, flow testing, and chemical analyzes; and other technical advice and support.

Transaction advisory will include provision of transaction advisory services to the Government in order to structure and complete a PPP transaction involving the private sector in construction and operation of the geothermal power plant if adequate resources are confirmed. If needed, the Government will seek additional funding from SREP, Public Private Infrastructure Advisory Facility (PPIAF), Energy Sector Management Assistance Program (ESMAP), and other sources to complement the SREP financing for transaction advisory services.

Project audit and operating costs will finance: (a) incremental operating costs of the R2E2 Fund related to implementation of the Phase II of the project; and (b) project audits.

The project is designed as a 4-year long operation in order to ensure that all the necessary activities can be completed given the limitations on site accessibility caused by weather conditions and also given the time needed to complete the PPP transaction for the power plant. The “window of opportunity” for accessing the site is generally from mid-May to mid/late-September, so at least two seasons would be needed to complete the drilling project. However, the project may be completed in one year if the drilling of the slim well(s) suggests that the resource is a low-temperature.

4. Project location and salient physical characteristics relevant to the safeguard analysis (if known)

The Karkar site is situated in the Syunik province (marz) at an elevation of around 3,500 m above sea level. The site is not in an immediate proximity to human settlements and does not overlap with especially protected areas, natural habitats, or privately owned land plots, however community lands owned by the villages and used as pastures may fall under the direct or indirect impact of the project.

5. Environmental and Social Safeguards Specialists

Darejan Kapanadze (GENDR)

Jennifer Shkabatur (GSURR)

Sarah G. Michael (GSURR)

6. Safeguard Policies	Triggered?	Explanation (Optional)
Environmental Assessment OP/BP 4.01	Yes	Exploratory drilling at the Karkar site will comprise of physical works such as construction of access road, provision of a water supply system, arrangement of rig pads, and drilling at depth to reach the geothermal fluids. Although the project site is in the area with poor vegetation and modest wildlife, lies away from human settlements, and does not carry any natural resources currently used by communities or businesses, the planned works still carry moderate environmental and social risks. Therefore, the project triggers OP/BP 4.01 and is classified as environmental Category B. Potential adverse environmental impacts have been examined through an Environmental and Social Impact Assessment (ESIA). They are related to the extraction of water from a groundwater well and its delivery to the project site, generation of excess material from drilling and other earth works, generation of waste water and possibly some small amount of hazardous waste (i.e. solid materials used and discarded while drilling, toxic materials injected during the drilling and contained in the extracted samples, and those mixed with waste water generated while drilling and/or exhausted with emissions). Likelihood and exact nature of these potential risks were studied during the ESIA and mitigation measures are provided in the Environmental Management Plan (EMP).
Natural Habitats OP/BP 4.04	No	
Forests OP/BP 4.36	No	
Pest Management OP 4.09	No	
Physical Cultural Resources OP/BP 4.11	No	ESIA revealed no physical cultural resources that fall under project impact zone, and the policy is not triggered. Chance finds cannot be excluded during earth works. Therefore blueprint of action in case chance finds are encountered is included into the ESIA report and EMP.
Indigenous Peoples OP/ BP 4.10	No	

Involuntary Resettlement OP/BP 4.12	Yes	The project is not expected to affect any privately owned lands, but construction activities may take place on some of the community lands owned by the villages. These lands are used for pasture. Project implementation will not have significant impact on the pasture use, however minor temporary restriction to pasture land and/or permanent loss of small area for grazing cannot be excluded at this stage. Since the exact footprint of the drilling program will not be known until the detailed designs are finalized, OP 4.12 is triggered as a precaution. R2E2 prepared a Resettlement Policy Framework (RPF).
Safety of Dams OP/BP 4.37	No	
Projects on International Waterways OP/BP 7.50	No	Project implementation will not affect and will not depend on any international waterway. No surface water source within the drilling area will be capable of providing the flow rates required for drilling the slim wells and the production size wells. About 8 km south of the drilling location, there is a groundwater well with a water intake facility which had been used back in Soviet times and was restored recently. It will be used for the purposes of drilling both – slim wells and production-size wells under the project.
Projects in Disputed Areas OP/BP 7.60	No	

II. Key Safeguard Policy Issues and Their Management

A. Summary of Key Safeguard Issues

1. Describe any safeguard issues and impacts associated with the proposed project. Identify and describe any potential large scale, significant and/or irreversible impacts:

Environmental

Because the project finances exploratory drilling only and excludes support to commercial operations, it will have modest environmental impacts confined to the project site which could be mitigated through application of measures provided in the Environmental Management Plan (EMP). The drilling site has extremely poor vegetative cover: no trees or shrubs. There are no designated protected areas in its vicinity. The project site is not critical for supporting livelihood of any plant or animal populations. Part of the area nearby the project site periodically gets logged with seasonal springs and snow-melt water. These snow-melt-related surface water areas do not have ecological significance for animals or birds. They emerge after main spring bird migration, and dry out before fall migration and hence do not support migrating birds. Moreover, the project related activities are not expected to impact those snow-melt surface water areas because the project related drilling activities will be located at least a few hundred meters away.

The exploration works will require improving the access road to accommodate movement of heavy equipment and hauling trucks. Some sections may need widening (from approximately

1.75m to 4m) and/or paving with gravel. Culverts or other drainage control infrastructure will need to be installed at several seasonally dry stream crossings. Establishment of a temporary work camp with a housing facility for workers may be required, depending on the choice of a contractor. With adequate organization and proper maintenance, the camp is not expected to have negative environmental impacts.

One or two drill pads will be established at the test-drilling site, initially 20m x 20m and then 50m x 75m size, assuming the program will proceed to the larger wells. Drilling of slim wells is not a water-intensive activity. Water will be collected from a groundwater well with a recently refurbished intake facility dating form Soviet times. The well is located about 8 km way from the drilling site. Water will be delivered from the well to the project site by specialized vehicles and be stored in containers at the work site. The well is within the administrative area of the Tskhouk village community, but is not used by the latter in any way. Its flow makes 200-250 l/s. Water for drilling of production-size wells will come via pipe from the same groundwater well. This will require installation of pump(s) and a pipeline that will run alongside the road, as well as construction of one or more lined temporary reservoirs in the existing natural depressions near the drilling site.

Drilling fluids and cuttings will be stored and ultimately disposed into sumps created in the process of drilling near the wells.

An ancient tomb dated 12 century B.C. is located in the Karkar area, however, neither exploration not possible commercial use of geothermal resources will affect this historical asset. Environmental and Social Impact Assessment (ESIA) report and EMP included in it carry provisions for handling chance finds in case they are encountered during earth works.

Social

The long-term social impact of this project may be positive. The project will enable to assess whether Karkar holds adequate geothermal resources for power generation and, if so, provide consumers with additional electricity generation resources, and thereby protect them from price fluctuation that is associated with possible natural gas and uranium price increases. This could help minimize the effect of such price fluctuations on domestic electricity tariffs and, thereby, help keep electricity service affordable for consumers.

The land plots affected by the project are owned by the three villages, which apportion pasture use among their communities. Geothermal exploration activities will not have significant impact on pasture use. Minor temporary restriction of access and/or permanent loss of small area for grazing cannot be excluded at this stage. Exact information on this matter will come with the detailed design. However local communities demonstrate strongly positive attitude to the project and are anxious for the access road improvements to occur, as the improved road will enable easier transit by shepherds and cattle. In addition, there is a hot spring in the highlands that citizens sometimes visit for pleasure and for its attributed medicinal benefits. The improved road will enable easier access and more frequent visitation to this resource.

2. Describe any potential indirect and/or long term impacts due to anticipated future activities in the project area:

The ESIA, carried out for exploratory drilling project, covers primarily direct impacts of works to be undertaken under this project and overviews nature and magnitude of likely impacts from the

proposed future commercial operation as well. However if feasibility studies confirm viability of geothermal resource for the operation of a thermal power plant and the decision is made to proceed with its development, then a separate ESIA will be carried out to evaluate risks of the commercial investment and recommend their mitigation measures.

Based on the information available at present, the ESIA of exploratory drilling project estimated that no significant environmental or social damage should be expected from a full-scale development and operation of a small geothermal power plant given that it is properly designed, planned, and implemented. No protected areas, natural or critical habitats, and areas of high conservation value will be affected. Water that will be required for any additional drilling in case a geothermal plant is constructed will come from the same groundwater well as the one identified for use during exploration drilling. Debit of the well is fully sufficient for that purpose.

Local communities are supportive of the installation of a commercial power plant as they have expectations of employment and local revenue generation.

3. Describe any project alternatives (if relevant) considered to help avoid or minimize adverse impacts.

At the detailed design stage, options for aligning access road and the water infrastructure will considered to minimize possible impacts on the areas used as pastures.

4. Describe measures taken by the borrower to address safeguard policy issues. Provide an assessment of borrower capacity to plan and implement the measures described.

The R2E2 Fund carried out ESIA of the proposed Geothermal Exploratory Drilling Project, and developed environmental management and monitoring plans. EMP will be included in the bidding documents and will be annexed to contract(s) for the provision of works. Although the likelihood of the project affecting use of pasture land around the work site is little, it cannot be excluded at this stage. The R2E2 Fund prepared a Resettlement Policy Framework (RPF) as a precautionary measure. In an unlikely case of required resettlement, a Resettlement Action Plan (RAP) will be prepared through in-depth consultations with the communities of affected villages and implemented prior to commencement of works. If any land acquisition is required, Government funds will be used for this purpose.

The R2E2 Fund is the implementing agency for the geothermal exploratory drilling project. At present, the R2E2 Fund is implementing a Bank-supported Energy Efficiency Project financed from the GEF. Past experience of theR2E2 Fund includes implementation of other Bank-financed operations too (Urban Heating Project and Renewable Energy Project). These operations had a good track record in safeguards compliance. The R2E2 Fund employs a safeguards consultant who is well familiar with the Bank's safeguards policies. Institutional capacity of R2E2 Fund for handling environmental and social issues under the exploratory drilling project is fully sufficient.

5. Identify the key stakeholders and describe the mechanisms for consultation and disclosure on safeguard policies, with an emphasis on potentially affected people.

The Ministry of Energy and Natural Resources of the Republic of Armenia, the R2E2 Fund, administration and population of Syunik marz, and potential investors into the development of a geothermal power plant have strong interest in the outcome of exploratory drilling. Local stakeholders are the residents of the villages located closest to the project site (Tsghuk, Sarnakunk, and Spandaryan, all situated along Highway M2). The combined population of these villages is up to 1500 people.

The R2E2 Fund disclosed the draft ESIA report in Armenian and English languages through its web page, carried out consultation with stakeholders on this draft report, and finalized the report having the minutes of public consultation meeting attached. Draft RPF was disclosed and subjected to stakeholder consultation process in a similar way. In addition to posting of draft environmental and social safeguard documents of the exploratory drilling project on the the R2E2 Fund's web page, hard copies in Armenian language were made available to the village communities for easy access. Consultation process was held in a gender-sensitive manner. The finalized ESIA report and RPF were re-disclosed and published through the Bank's InfoShop.

Affected communities will be informed on the commencement of exploratory drilling prior to mobilization of works contractor and a viable Grievance Redress Mechanism will be provided for accepting and entertaining their feedback in the course of the project implementation.

B. Disclosure Requirements

Environmental Assessment/Audit/Management Plan/Other	
Date of receipt by the Bank	07-Nov-2014
Date of submission to InfoShop	14-Apr-2015
For category A projects, date of distributing the Executive Summary of the EA to the Executive Directors	////
"In country" Disclosure	
Armenia	17-Mar-2015
Comments: Consultation meeting with local communities on the ESIA report was held in village Tshguk on 03/26/2015.	
Resettlement Action Plan/Framework/Policy Process	
Date of receipt by the Bank	12-Nov-2014
Date of submission to InfoShop	14-Apr-2015
"In country" Disclosure	
Armenia	17-Mar-2015
Comments: Consultation meeting with local communities on the RPF was held in village Tshguk on 03/26/2015.	
If the project triggers the Pest Management and/or Physical Cultural Resources policies, the respective issues are to be addressed and disclosed as part of the Environmental Assessment/ Audit/or EMP.	
If in-country disclosure of any of the above documents is not expected, please explain why:	

C. Compliance Monitoring Indicators at the Corporate Level

OP/BP/GP 4.01 - Environment Assessment	
Does the project require a stand-alone EA (including EMP) report?	Yes [×] No [ ] NA [ ]
If yes, then did the Regional Environment Unit or Practice Manager (PM) review and approve the EA report?	Yes [×] No [ ] NA [ ]
Are the cost and the accountabilities for the EMP incorporated in the credit/loan?	Yes [×] No [ ] NA [ ]

OP/BP 4.12 - Involuntary Resettlement	
Has a resettlement plan/abbreviated plan/policy framework/ process framework (as appropriate) been prepared?	Yes [×] No [ ] NA [ ]
If yes, then did the Regional unit responsible for safeguards or Practice Manager review the plan?	Yes [×] No [ ] NA [ ]
The World Bank Policy on Disclosure of Information	
Have relevant safeguard policies documents been sent to the World Bank's Infoshop?	Yes [×] No [ ] NA [ ]
Have relevant documents been disclosed in-country in a public place in a form and language that are understandable and accessible to project-affected groups and local NGOs?	Yes [×] No [ ] NA [ ]
All Safeguard Policies	
Have satisfactory calendar, budget and clear institutional responsibilities been prepared for the implementation of measures related to safeguard policies?	Yes [×] No [ ] NA [ ]
Have costs related to safeguard policy measures been included in the project cost?	Yes [×] No [ ] NA [ ]
Does the Monitoring and Evaluation system of the project include the monitoring of safeguard impacts and measures related to safeguard policies?	Yes [×] No [ ] NA [ ]
Have satisfactory implementation arrangements been agreed with the borrower and the same been adequately reflected in the project legal documents?	Yes [×] No [ ] NA [ ]

III. APPROVALS

Task Team Leader(s):	Name: Artur Kochnakyan,Almudena Mateos Merino	
Approved By		
Safeguards Advisor:	Name: Agnes I. Kiss (SA)	Date: 15-Apr-2015
Practice Manager/ Manager:	Name: Ani Balabanyan (PMGR)	Date: 15-Apr-2015