

Khauzak-Shady Biodiversity Action Plan



**Prepared By
LUKOIL Uzbekistan Operating Company LLC**

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Khauzak-Shady Biodiversity Action Plan

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Executive Summary

The International Finance Corporation (IFC) has developed a series of Performance Standards that aim at protecting the environment. Performance Standard 6 “recognizes that protecting and conserving biodiversity—the variety of life in all its forms, including genetic, species and ecosystem diversity—and its ability to change and evolve, is fundamental to sustainable development.” The accompanying guidance notes indicate that in situations where there is the potential of significant negative impacts to biodiversity the project proponent should develop a Biodiversity Action Plan (BAP), to guide its activities so as to protect the natural environment. LUKOIL Uzbekistan Operating Company LLC (LUOC) has committed to the development and implementation of a Biodiversity Action Plan covering its activities in the vicinity of Dengizkul Lake, which is a protected area.

This Khauzak-Shady BAP describes:

- Existing ecological conditions near Dengizkul Lake
- how proposed activities affect biodiversity and renewable natural resources of Dengizkul Lake
- how biodiversity and renewable natural resources can be managed as part of LUOC’s activities and how adverse impacts can be mitigated
- a number of scheduled and budgeted activities to protect biodiversity in the Project areas, and
- responsibilities and resources for implementation, management, mitigation, and monitoring

Dengizkul Lake is an important international conservation area providing numerous ecological services. It is the first area in the republic of Uzbekistan designated as a Ramsar site, meaning that it consists of wetlands of international significance. The lake undoubtedly plays an important role in preservation of wintering and migratory wading birds. Each year Dengizkul becomes a wintering destination for up to 500 thousand birds of 30 species. Dengizkul Lake is a public ornithological reserve (Dengizkul Reserve) which makes it one of Uzbekistan’s areas of preferential protection. For major water bodies a “water protection zone” must encircle the entire water body within 300-500 m (off the water edge). This zone includes a coastal strip in which more stringent restrictions to business activities are applicable. Consequently, construction activities within this strip must take place only in exceptional cases and only upon approval by the State Committee for Nature Protection. Dengizkul’s water protection zone is located 500 m off the water edge when the lake’s water level is at 182.2 m, which is the maximum level that will be maintained by the relevant agencies of the Government of Uzbekistan.

The combination of the need for conservation protection, biological importance of the Lake, and the activities of LUOC and other developers around the lake make it necessary to ensure that the ecological benefits of the Lake conservation area be sustained through the development and implementation of this BAP.

Gas and condensate production activities are currently being conducted on the Khauzak Block. The current project “Development of the Shady Block of Dengizkul Field” provides for commissioning of 14 wells, from where via individual flow lines gas will be delivered to cluster sites and then via a gas collecting main to the existing preliminary gas treatment plant “Khauzak”. Figure 2 in the main report shows the areas of principal activities in the vicinity of Dengizkul Lake.

The State Ecological Expertise has approved the Environmental Impact Statement for construction of Dengizkul Field Shady section, and requires that a Draft Ecological

Consequences Statement shall be submitted for examination by State Ecological Expertise in the legally prescribed manner. LUOC is complying with this requirement.

In the design stage of the Khauzak and Shady site development, all technical particulars of the project, as well as industrial and ecological safety measures were specified for the project, including actions for minimization of impact on biotic components of environment and conservation of species diversity. All this information was submitted to stakeholders for review. A mandatory condition of further project implementation is approval of technical solutions under the project and specified actions by authorized representatives of stakeholders. In addition, all technical and process components of the project are going through mandatory ecological and other public examination.

This BAP demonstrates LUOC's commitment to biodiversity conservation in the vicinity of Dengizkul Lake and in other areas where its activities might affect valuable habitats. From a corporate perspective, biodiversity conservation is:

- An integral component of the environmental planning and monitoring LUOC conducts to assess the impacts of our operations.
- Basic to our commitment to continually improve our environmental performance.
- Built into the planning that goes into deciding the most suitable approach for reclamation or rehabilitation of sites when we have completed our operations.
- One of the many factors we consider when we evaluate the sources of materials we purchase to run our business.

Studies and information available to date indicate that there is no evidence of critical impacts to the Lake's biodiversity from past or ongoing LUOC activities in Khauzak field.

. It is recognized that biodiversity is a complex subject and that there are many potential external activities (such as other development activities or uncontrolled public use of the area), events (such as the effects of climate change), and management actions (such as changing Government regulations or management of surface waters feeding Dengizkul Lake) that can seriously affect biodiversity. Many or most of these are beyond the control of LUOC. Further, there is no guarantee that particular BAP actions will always have the desired effect given the multitude of cause and effect relationships that affect biodiversity. For that reason, this BAP has been designed to be adapted to changing conditions and to the results of the monitoring program. Periodic updates will be developed and implemented to ensure that LUOC will take all feasible measures within its power to protect the biodiversity of Dengizkul Lake.

LUOC's actions for conservation of biodiversity in the Dengizkul area can be divided into three categories: actions already being implemented by LUOC, new conservation-related activities specific to Dengizkul, and general actions on biodiversity conservation.

Conservation Actions Already Being Implemented by LUOC

- Mandatory ecological examination of project technical solutions
- Determination of the maximum water level in Dengizkul Lake and its approval by State Ministry for Nature Protection and Ministry of Agriculture and Water Resources of the Republic of Uzbekistan. Development of measures for control of water level in the lake with due consideration of accepted maximum level (182.2 m). This maximum level is used to determine the protection zone around the Lake (500 m from the shoreline). Actually, taking into account current water level (180 m), all existing field facilities are located at a considerable distance farther from the water edge of Dengizkul lake and do not have any actual impact either on the lake level or on the condition of the lake ecosystems.
- Design and construction of all facilities outside the established water protection zone (with exception of the facilities that cannot be shifted). Development of specific

technical mitigation actions for the facilities within the established water protection zone.

- Construction of road crossing through the lake strait in the narrowest part. Construction of the crossing with culverts, with use of ecologically safe materials (geotextile, gabion structures)
- Execution of construction works in water protection area in summer time
- Using horizontal directional drilling for the pipes crossing under the lake bed, with thick walls and heavy-duty corrosion resistant coating, equipping cathodic protection, automatic control and corrosion monitoring
- Protect Bird Life from Accidental Electrocution on Power Lines

New BAP Actions Specific to Dengizkul

- **Protect the Lake from Access by LUOC or Contractors' Personnel** -
 - LUOC policy is that no company or contractor personnel are to approach within 500 meters of the Lake shore, except with specific permission from State Committee for Nature Protection of the Republic of Uzbekistan.
- **Train LUOC and Contractor Personnel** on the types of sensitive flora and fauna that need to be protected near the Lake
- **Carry out Annual Review of the Operations in the Khauzak and Shady sites** to Review Potential Negative Impacts to Biodiversity at Dengizkul and Implement Appropriate Corrective Actions. Update and enhance BAP as needed based on the mitigation and monitoring program. (see section 6.3).
- **Provide collision deterrents on distribution lines near the Lake to reduce bird mortality due to collisions.** In addition to the current practice of protecting raptors and other birds from electrocution, LUOC will consider and apply a variety of line marking devices, including hanging markers, coils to all LUOC distribution lines within the water protection zone (within 500 meters of the Lake shore at 182.2 m elevation) LUOC will install markers at the crossing across the lake strait and for some distance north and south of the crossing to be determined through field work. This represents the area with highest risk of collision The establishment of the "high-risk" area is further discussed in the BAP section dealing with electrical distribution lines (see Section 4.2.3) . In the process of monitoring there will be defined places with increased risk and recommendations for installation of additional markers will be formed. The exact type of markers will be chosen, based on climatic conditions of the region. Analysis of marker efficiency will be incorporated into monitoring plan (within the framework of monitoring of bird mortality, caused by collision with power distribution lines).
- **LUOC will implement all mitigation measures described in Tables 3 and 4 of this BAP.** In the process of developing this BAP, LUOC identified numerous specific mitigation measures that aim at reducing or eliminating residual ecological impacts that could occur as a result of the Project's implementation. (see Section 5.3)

New General BAP Actions

- **Provide Outreach Workshops for Local Communities on Conservation** In its corporate social responsibility program LUOC will provide for awareness-raising for local residents on the need for conservation, particularly in the Dengizkul Lake area. Workshops and handout materials will be made available at least yearly in Alat district and other communities close to Dengizkul. Age-appropriate materials on conservation will be made available to local schools (see section 5.3.3).
- **Continue to Enhance the Country's Knowledge Base on Biodiversity in the Khauzak and Shady areas surrounding Dengizkul Lake.** As part of this BAP, LUOC will enhance its ongoing monitoring program to provide quarterly data on biodiversity. The data will be reported to the State Committee for Nature Protection,

and will be made available to scientific researchers. In addition, LUOC will take an active part in national conferences on biodiversity. For instance, LUOC is already taking part in one of state programs – “Integration of Biodiversity Conservation Principles into Oil and Gas Sector of the Republic of Uzbekistan”. Further, LUOC will use best endeavors to support and work with the relevant Competent Authorities such as the State Committee on Nature Protection to develop a management plan for Dengizkul Lake.

LUOC has established a schedule for the BAP Actions, and indicated an adequate budget for these activities. Subsequent year budgets will be established as part of the BAP update process. At a minimum, future budgets will include funding for an uninterrupted monitoring program.

LUOC commits to amend this BAP consistent with the Performance Standards for any future activities related to the Production Sharing Agreement Projects that may impact critical species, their habitat, and/or protected areas. The BAP will be amended prior to commencement of such activities. LUOC also commits to preparing and implementing an Enhanced Biodiversity Monitoring Program (EBMP), as detailed later in this BAP. The BAP specifies the process and schedule for developing the EBMP (based on the field work to be carried out in 2012). LUOC commits to carrying this out as well as adapting mitigation measures as needed during construction and operation.

1. Introduction

1.1 Definition of the Biodiversity Action Plan and IFC Performance Standard 6

The International Finance Corporation (IFC) has developed a series of Performance Standards that aim at protecting the environment. Performance Standard 6 “recognizes that protecting and conserving biodiversity—the variety of life in all its forms, including genetic, species and ecosystem diversity—and its ability to change and evolve, is fundamental to sustainable development. The components of biodiversity, as defined in the Convention on Biological Diversity, include ecosystems and habitats, species and communities, and genes and genomes, all of which have social, economic, cultural and scientific importance. This Performance Standard reflects the objectives of the Convention on Biological Diversity to conserve biological diversity and promote use of renewable natural resources in a sustainable manner. This Performance Standard addresses how clients can avoid or mitigate threats to biodiversity arising from their operations as well as sustainably manage renewable natural resources.” (IFC, October 2007)

The guidance notes accompanying Performance Standard 6¹ indicate that in situations where there is the potential of significant negative impacts to biodiversity the project proponent should develop a Biodiversity Action Plan (BAP), to guide its activities so as to protect the natural environment. LUKOIL Uzbekistan Operating Company LLC (LUOC) has committed to the development and implementation of a Biodiversity Action Plan covering its activities in the vicinity of Dengizkul Lake, which is a protected area.

This Khauzak-Shady BAP describes:

- how proposed activities affect biodiversity and renewable natural resources
- how biodiversity and renewable natural resources can be managed as part of LUOC’s activities and how adverse impacts can be mitigated
- a number of time-bound and budgeted activities to protect biodiversity in the Project areas, and
- responsibilities and resources for implementation, management, mitigation, and monitoring

1.2 Purpose and Need of the BAP

The United Nations Conference on Environment and Development (UNCED), was held in Rio de Janeiro, Brazil, in 1992. The international community adopted a number of documents, including Agenda 21 (a global plan of action for sustainable development) and the Convention on Biological Diversity (CBD). There was a recognized need to address increasing rates of biodiversity loss and acknowledged the important roles that all stakeholders, including individuals, legal authorities, and businesses must play to reverse losses to biodiversity. Uzbekistan, along with other signatories to the CBD, agreed to: “...develop national strategies, plans, and programmes for the conservation and sustainable use of biological diversity...”

According to a recent USAID-funded study (Chemonics, 2001), major threats to biodiversity in Uzbekistan include:

- Degradation of natural landscapes and shrinking of natural habitats as a result of the expansion of irrigated agriculture and overgrazing

¹ See (IFC, 2007) and (MIGA, 2007)

- Poor water and soil management practices, leading to desertification, aridization, and salinization
- Pollution from unregulated exploitation of petroleum and mineral deposits, and other industrial activities (airborne pollution increasing susceptibility of natural forests to disease) and heavy metal contamination
- Unregulated forest exploitation (notably for gallery tugai forests) and hunting, particularly for large mammals (gazelles)
- Unregulated fires and lack of fire control and management
- Introduction of non-native fish species, resulting in disruption of natural freshwater communities and decline of native species.

There are four categories of protected areas in Uzbekistan: state nature reserves (*zapovedniks*), national parks, conservation areas (*zakazniks*), and natural monuments. Dengizkul Lake is a conservation area. Conservation areas provide a limited level of protection. The State Committee for Nature Protection has responsibility for monitoring these areas, but the local land use authority retains actual control, including the right to discontinue the conservation regime. (Chemonics, 2001)

As discussed below, Dengizkul Lake is an important international conservation area providing numerous ecological services. It is a Ramsar site, meaning that it consists of wetlands of international significance. Without appropriate mitigation, the LUOC activities in the vicinity of Dengizkul Lake could contribute to the first three biodiversity threats in Uzbekistan mentioned above (shrinking of habitats, poor water and soil management, and pollution). These impacts are described in detail in Section 4. The combination of tenuous conservation protection, biological importance of the Lake, and the activities of LUOC and other developers around the lake make it necessary to ensure that the ecological benefits of the Lake conservation area be sustained through the development and implementation of this BAP.

LUOC recognizes the importance of Dengizkul Lake and its global significance and through this BAP, is taking steps to develop this project in an ecologically responsible manner. Although the Government of Uzbekistan neither requested nor required a BAP, it is hoped that this BAP can facilitate improved management of biodiversity at the Dengizkul Lake protected area.

In addition to this BAP, key environmental documents provided by LUKOIL for the environmental and social review by MIGA include:

- Kandym Gas Field Development Environmental Impact Assessment, prepared by LUKOIL (2011);
- Statement on Environmental Impact (SEI) for Development of the Shady Block of Dengizkul Field, prepared by LUKOIL (2011);
- Preliminary Environmental Impact Statement for Preliminary Feasibility Study Development of Kandym Field Group and Gas Processing Plant Construction, prepared by LUKOIL (2011);
- Environmental Impact Statement (EIS) Infrastructure Construction of Khauzak-Shady Areas of Dengizkul Field, prepared by OOO Ekotexproekt Engineering (2007);
- Environmental Audit of the Contracted Area that includes Khauzak-Shady, Kandym Field Group and Kungard Plots, prepared by LUKOIL (2005);
- Environmental, Health and Safety (EHS) policies and procedures for Khauzak-Shady, including risks registry, emergency prevention and response, training, EHS work plans and budgets for 2010, 2011 environmental monitoring program;
- Kandym Field 2011 environmental monitoring program;
- Independent audit and internal review of LUKOIL's integrated management system;

- UZB: Khauzak-Shady and Kandym Gas Field Development Resettlement Planning (March 2011);
- Khauzak-Shady-Kandym Gas Field Development (Uzbekistan) Independent Technical Project Audit prepared by SGS (January 2011);

These reports are available at LUOC offices in Tashkent.

2. Project Description

2.1 Khauzak-Shady Project

OOO “LUKOIL Uzbekistan Operating Company” (LUOC) is producing gas and condensate on the Khauzak and Shady Blocks of Dengizkul Field under the Production Sharing Agreement (PSA) of June 16, 2004 between the Republic of Uzbekistan and the Consortium of Investors made up of Open Joint Stock Company “Oil Company LUKOIL” and National Holding Company “Uzbekneftegaz”, and license G1 No. BH 0001 of 08/07/2007 authorizing extraction of minerals and the Mining Allotment Certificate for Khauzak and Shady Blocks.

Gas and condensate production activities are currently being conducted on the Khauzak Block. The current project “Development of the Shady Block of Dengizkul Field” provides for commissioning of 14 wells, from where via individual flow lines gas will be delivered to cluster sites and then via a gas collecting main to the existing preliminary gas treatment plant “Khauzak”. Figure 2 shows the areas of principal activities in the vicinity of Dengizkul Lake.

The State Ecological Expertise has approved the Environmental Impact Statement for construction of Dengizkul Field Shady section, and requires that a Draft Ecological Consequences Statement shall be submitted for examination by State Ecological Expertise in the legally prescribed manner. (State Ecological Expertise, 2011)

The project consists of the construction of the Shady section of Dengizkul field, located in the territory of Alat district, Bukhara region, Republic of Uzbekistan. The closest population to the project area is Dengizkul village (8 km north of the site in question). The town of Mubarek is located 60 km to the north-east. Oil and gas production activity has been carried out in this region for several decades. Within a radius of 20-35 km from the designed area there are oil and gas condensate producing fields Urtabulak, North Dengizkul, etc.

In close vicinity of Shady section there is a network of sewers and field wastewater manifolds, the largest of them is South Dengizkul manifold, feeding field wastewater to Dengizkul Lake. Area and depth of the lake constantly change, depending on precipitation and evaporation from the lake surface. The lake is an ornithological reserve, as it is habitat of waterfowl and more than 100 species of avifauna use the lake as migration route in spring and in autumn. Within a radius of 500 m around the lake there is a water protection area (shown as thick green line in Figure 2). Construction of any facilities within the water protection area is limited.

The maximum water level in Dengizkul Lake, approved by State Committee for Nature Protection of the Republic of Uzbekistan, is 182.2 m, although currently the Lake is at about 180 m. The Lake dried out in the 1950's². All LUOC wells and sludge pits will be protected with dykes up to a minimum of 183.2 m water level in the Lake.

LUOC has guarantees from the Ministry of Agriculture and Water Resources and the State Committee for Nature Protection of the Republic of Uzbekistan that maximum watermark of 182.2 m will not be exceeded (see documents in Annex H). These documents mention future construction of additional collectors by the Government of Uzbekistan. LUOC does not have any reliable information regarding timeframe of implementation of state program of main collector construction. However, LUOC has guarantees that maximum watermark of 182.2 m will not be exceeded even after implementation of state program. Relevant decisions and actions are specified in “Research and Feasibility Study of Alternative Measures for

² See Chapter 1.2 of Shady EIA.

Protection of Khauzak and Shady Sections of Dengizkul Field from Underflooding with Water of Dengizkul Lake”, developed by “UzGIP” LLC (Tashkent, 2010), leading design institute of the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan.

Aquifers are characterized by high content of minerals (up to 80 g/l) of chlorine-sulfate type and high content of phenols (up to 1.7 MPC). Near lakes and manifolds ground water depth level is 0.8 – 1.5 m, whereas farther away it is down to 30 m.

In the project region most hydrocarbon deposits are found in Upper and Middle Jurassic carbonate sediments. Based on the results of exploratory drilling it was concluded that Shady and Khauzak sections are large single gas condensate field. Prospective gas resources at Shady section are 1.57 bln. m³ per year, with a condensate content of 15.08 g/m³; weight content of hydrogen sulfide is 3.19%. At present there are two temporarily abandoned wells in the area (№ 305 and 306). Within the framework of Dengizkul field Shady section construction the project provides for putting the abandoned wells into commission and construction of 12 new wells with wellhead sites, two multiple well platforms, gas collecting lines and manifold from multiple well platforms to Khauzak Gas Primary Treatment Facility.

2.1.1 Well Locations

A survey conducted by OJSC “UZLITneftegaz” showed that 5 of 12 designed wells (№ 1034, 1031, 1037, 1043, and 1045) are located within the water protection area of Dengizkul Lake. Location of the wells within the water protection area (500 m) was approved at the earlier stage of their construction environmental impact assessment on condition that there will be implemented activities, meant to prevent pollution of Dengizkul Lake and shoreline. These activities are discussed in Section 4.2.3 and Section 5.

As location of production wells is predetermined by the conditions of minerals occurrence, the project provides for construction of mud pits outside the water protection area in order to minimize environmental impact. It is planned to construct temporary mud pits with double layer of waterproof coating with subsequent restoration of sites. No impacts to birds or wildlife is expected because the project provides full recycling for all kinds of mud, with its complete transportation in specialized disposal vehicles to landfill locations far from the Dengizkul Lake area (see Figure 2). Upon completion of drilling and testing the well head is equipped with shut off and control valves, instrumentation, tie-in points for injection compressor units and fencing, made of lattice panels.

As shown in Table 1 construction of production wells on the Shady Block as required by the "Project of Development of the Shady Block of Dengizkul Field" will result in only five wells (i.e. No. 1034 (463 m), No. 1031 (386 m), No. 1037 (369 m), and No. 1043 (410 m), No. 1045 (495 m)) being located within the water-protection zone of Dengizkul with the Lake's water elevation at its agreed maximum level of 182.2 m. This is based on based on the latest surveys done by OAO “UzLITneftegaz” using maps and repeated engineering surveys data.

In the Law of the Republic of Uzbekistan "On Natural Areas of Protection", enacted on December 3, 2004, N 710-II, in article 40 definitions of the following terms are given: “water protection zone,” riparian, protective sanitary zones of water bodies and zones of day water and ground water formation. Water protection zones are natural areas of protection, adjacent to river channels, lakes, reservoirs, canals, collecting canals and other water bodies. These zones are formed in order to prevent contamination, foulness, depletion and silting of water bodies with products of soil erosion, as well as for maintaining favorable water regime. Riparian is protected water area within water protection zone with strict regime. Water protection zones, riparian, protective sanitary zones of water bodies and zones of day water and ground water formation are established by the Cabinet of Ministers of the Republic of Uzbekistan and local public authorities.

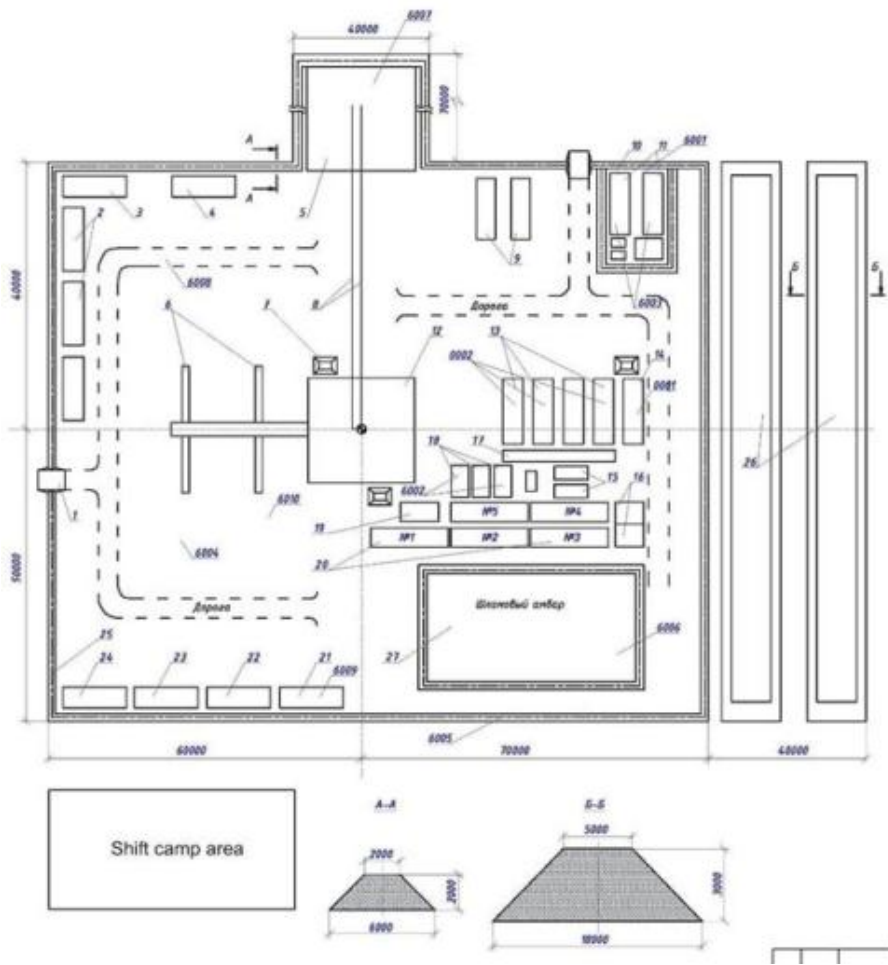
Decree No. 174 of 04/07/1992 [4] and the requirements outlined in opinion No. 18/719z of 09/20/2010 stipulate a range of measures for construction of gas wells, which, when implemented, will help preserve the most efficient scheme of development of the Shady Block, reduce capital expenditures associated with construction, transition of wells outside of the water protection zone and minimize any adverse impact on the environment and Dengizkul's ecosystem. These are summarized as follows:

- construct water-proof dyked sites for tank reservoirs outside of the water-protection zone of Dengizkul;
- construct additional water-proof pits for receipt and disposal of drilling waste outside of the water-protection zone of Dengizkul;
- remove drilling waste from temporary water-proof pits located in the proximity of the wells into additional water-proof pits outside of such zone;
- eliminate temporary water-proof pits and perform reclamation of the drilling sites upon well completion;
- dispose of drilling waste and liquidate additional sludge pits in accordance with the "Regulations for Disposal of Drilling Waste During Construction of Producers on the Shady Block" approved by the State Nature Protection Committee of the Republic of Uzbekistan.

Table 1 Well Mouth Elevation and Distance from Dengizkul Lake

Well	Elevation (m)	Distance from Lake Shore at Water Elevation 182.2 m
West Shady		
1034	184.03	463 m
1040	183.37	over 500 m
1041	184.42	over 500 m
1042	183.32	over 500 m
1035	186.48	over 500 m
1031	185.28	386 m
1036	182.87	over 500 m
1038		over 500 m
1030		over 500 m
305	193.27	over 500 m
306	196.63	over 500 m
1039	184	over 500 m
1037	183.16	369 m
1043	183.03	410 m
North Shady		
1052	n/a	over 500 m
1051	n/a	over 500 m
1050	n/a	over 500 m
1049	n/a	over 500 m
1048	n/a	over 500 m
1047	n/a	over 500 m
1046	n/a	over 500 m
1045	n/a	495 m
1044	n/a	over 500 m

Figure 1 Schematic Layout of Well Drilling Site



Legend	
Item	Description
1	Crossing over banking
2	Household-personnel facilities
3	Tooling shop
4	Control room
5	Pit for blowout equipment
6	Catwalk
7	Sand tank
8	Vent lines of discharge to blowout equipment
9	Water tank
10	Fuel and lubricant storage
11	Fuel tank
12	Drawworks unit
13	Diesel electric-power generator
14	Diesel engine power plant
15	Stand-by tank
16	Site for chemicals
17	Main control panel
18	Mud pump, F = 1,600 (2pcs), F – 1,300 (1pcs)
19	Device for automatic hole fill-up
20	Drilling mud tank
21	Logging unit
22	Fire post
23	Laboratory of drilling mud
24	Foreman office
25	Banking of drilling site
26	Outdoor bank of soil
27	Mud pit

The area of land temporarily allotted for the period of well construction is 3.5 ha. Scheme of drilling site is shown in Figure 1. As shown in the figure, the drilling site will be fenced so larger land animals will not have access to the mud pits, which contain cuttings and remainders of drilling mud. Oil is not used as drill mud component in the process of drilling so no oil which could threaten birds will be present in the mud pits. Impacts on the environment, including avifauna, during well construction, are discussed in Section 4 of this BAP as well as the Shady EIA (section 2.1). As mentioned earlier, additional mitigation measures for the five wells that will be within the water protection zone are described in Section 4.2.3.

For gas transportation it is planned to arrange designed production wells in 2 clusters, 7 wells in each cluster. Gas will be transported through gas collecting lines to multiple well platforms and then through gas pipeline manifold to Khauzak Gas Primary Treatment Facility. It is planned to locate both multiple well platforms outside Dengizkul Lake water protection area. At multiple well platforms there will be control rooms of cabinet type, instrumentation and flare for burning of raw gas during wells blowing out.

Engineering of North Shady section construction has not started yet, so information about potential impact is not available at present. In Figure 2 there is given anticipated location of wells at North Shady section. The design of North Shady will incorporate the same approaches described in this section. Specific information on well locations to the extent that it is known at this time is provided in Table 1 and Figure 2. Not all wells are outside the water protection zone, as explained in Section 2.1.1. Cumulative impacts will be further addressed in the impact section (Section 4).

2.1.2 Gas Pipeline

A gas pipeline–manifold 21.5 km long with operating pressure of 7.5 MPa and volume of transported gas of 4.76 mln.m³/day is planned to be made of a pipe with diameter of 426 mm with wall thickness of 16 mm. Fuel gas pipeline 57 mm in diameter will be laid parallel to gas pipeline–manifold. The most serious ecological risk during construction of the manifold is related to construction of a 260 m long underwater pipeline crossing under Dengizkul Lake bay strait, as disturbance of hydrodynamic regime could endanger natural habitats of waterfowl and riparian birds. It should be noted that no other options for laying the pipeline around the lake without water crossovers exist. This is because a land-only route is not possible – in any route there are at least one or two water crossovers related to the Dengizkul Lake as shown in Figure 3, Figure 4, and further discussed in Section 4.2.2. The West Shady project site is surrounded by water courses on all sides: two collectors, the Amu-Bukhara Canal, and Dengizkul Lake itself.

For the sake of ecological safety during construction and operation of underwater crossing through the neck of Dengizkul Lake, it was decided to use the horizontal directional drilling (HDD) method for laying the manifold and fuel gas pipeline. The method of horizontal directional drilling is used worldwide for burying pipelines at any depth below the line of water bodies' bottom and banks transformation to ensure complete preservation of water bodies' ecological systems. Another important difference of HDD method from conventional one is that pipeline does not come into contact with the aquatic medium it crosses in the process of construction and operation, and it may be buried at bed section at actually any depth, preventing any future external impacts in case of any predicted transformations of bed and banks.

Advantages of HDD method over above ground laying are as follows:

- Possibility to lay pipelines below predicted bed transformations that ensures reliable protection of the pipeline from any physical damages;

- Natural condition of watercourse is maintained during construction and operation that is in line with high environmental standards;
- HDD method does not require dredging, underwater and technical, and diving operations and shore protection during construction of crossings through watercourses;
- Pipeline ballasting (balance weight and weight coating) is not required;
- Explosive works are not required for ripping of compact ground and consequent digging of underwater ditch;
- Crossing may be constructed at any season.
- Instead of performing large volumes of earth works for excavation and backfilling of underwater trenches a well is drilled without disturbance to integrity of the bottom relief and lakeside sections.
- Drilling mud is water suspension of bentonite and does not contain substances harmful to environment. So gas pipelines will be laid through the strait of Dengizkul Lake with minimum environmental impact.

The program of works by HDD method, including specification of the method, was approved by the General Designer – OJSC “UzLITneftgaz”, who also confirmed advantages of this method of gas pipeline crossing construction from the point of view of mitigation of environmental impact.

During construction of underwater section of gas pipeline special attention shall be paid to the protection of surface and groundwater and soils from contamination with oil products (such as fuels and lubricants), maintenance and parking of machinery, as well as location of tanks with oil products within the boundaries of the bay shall be prohibited.

2.1.3 Roads

In order to provide access to all facilities and sites the project provides for a network of internal site roads with hard surface. Two routes of an access road from existing cluster K9 to 305 well were considered by the project as illustrated in Figure 3, and engineering plan and profile sheets of the crossing are found in Annex I. It is emphasized that the road is for use by LUOC to access the West Shady portion of the project only. It does not connect any populated areas or resource areas other than the LUOC project, and therefore the road will not be expanded or lengthened outside the LUOC concession area. Impacts are discussed in Section 4.

Road Alternative 1

The first route option is 15.8 km long and it provides for construction of a causeway crossing parallel to the gas pipeline manifold route at the distance of 500 m from Dengizkul Lake front. Due to the low traffic anticipated for this road (fewer than 50 vehicles in twenty-four hours) the projected road relates to V technical category according to standard SHNK 2.09.20. The parameters of the road are as follows:

- right of way width – 8.0 m;
- carriageway width – 4.5 m;
- shoulders – 1.75 m.

The projected road is connected to the existing roadway network in the area of well cluster site K9. With allowance for requirements of appropriate standards, the following construction methods are proposed:

- Surface treatment is a coating of gravel-sand mixture treated by asphalt – 0.10 m;

- Road foundation is of gravel-sand mixture as per GOST 23558 - 0.10 m³;
- Diaphragm from connected soil- 0.25 m.
- Roadway edges are of consolidated gravel and soil by thickness 0.10 m.

While selecting the route of the Lake crossing, the focus was on long-term, sustainable, safe and reliable operation of the motor road while mitigating the impact of the facility on the level of water and free circulation of the Lake's water mass considering its conservation status. To ensure stable operation of the culvert under the road between the two parts of the Lake, the following design conditions must be met:

- the culvert must be able to transmit at least 50 m³/sec (Pursuant to Letter No. 077-139 of 06/07/2010 of the Ministry of Agriculture and Water Management);
- culvert units must be installed on preformed foundations;
- joints are tightly sealed.

The design provides for construction of a causeway including 4360x3060 mm square culvert units. The length of the culvert is 34.0 m, with the inside dimension of each section of the culvert being 10.14 m². The total area is 162.24 m². For calculation purposes the crossing was divided into 16 sections, and the water velocity was assumed to be 0.34 m/sec. The water flow rate for a single section of the culvert is 3.41 m³/sec, and the total flow of 16 sections enables passing of 54.56 m³/sec. The water transmission tolerance is 9.12%.

Leveling the bottom for placement of culverts shall be done by filling hollow parts with stones or stone square gabions. Gabions represent mesh grids filled up with differently sized stones. In their upper parts gabions have a gravel-sand edging, 70.0 m in length and 1.0 m in height, which is covered with geotextiles from four sides. 16x34=544 concrete blocks are installed onto the edging. The blocks are joined together in accordance with 3501-104 series. The longitudinal section of the causeway showing the culvert and leveling gabions is shown in Annex I.

The Projected road is also envisaged to include the device of round metal pipes (diameter 720 mm) under the road at various locations for ecological purposes (migration of small animals). On the projected motor road fences and directional devices in the form reinforced concrete signal are not envisaged. Security and the convenience of motion by project vehicles is enabled by posting of appropriate highway symbols and directories. Form, dimensions and allotment of directional symbols are administered per GOST 23457.

There will be a low voltage power distribution line along the road for providing power to the wells and other facilities in Western Shady (see Figure 2). Measures to mitigate electrocutions and collisions will be applied to this line, as discussed in more detail in Section 5.3.1.

The road is for use by LUOC to access the project. It does not connect, nor is it anticipated that it will connect, any populated areas or resource areas other than the LUOC project.

Road Alternative 2

The second route of the access road leading to well No. 305 crosses three water barriers, i.e. a 0.3-0.35 m deep channel between the lakes and two connecting channels which are 0.3-0.5 m deep. The water surface crossing part of route 2 is 150 m long, the maximum depth reaches 2.1 m, and the distance to the water edge of Dengizkul is 2 km. The route is 24.071 km long.

³ GOST standards, (Russian: ГОСТ) set of technical standards maintained by the Euro-Asian Council for Standardization, Metrology and Certification (EASC), a regional standards organization operating under the auspices of the Commonwealth of Independent States (CIS).

As mentioned above, one of the primary challenges was to mitigate the impact of the facility on the level of water and free circulation of the Lake's water mass considering its conservation status. From the engineering perspective, it is easier to enable circulation of water while crossing deeper areas, rather than shallow ones. The second route goes across saline land areas which are occasionally marshy which many birds use in spring, and subject to wind erosion, requiring additional expenses to be incurred in the course of road construction. Construction of a longer road will not only be more expensive, but will also be detrimental to soils, flora and fauna over a longer distance. It will require allotment of greater land area for long-term use and will not reduce adverse environmental impact. Figure 4 shows the location of waterfowl nesting, breeding, and wintering areas in and around Dengizkul Lake, indicating that the first route chosen will have less impact on nesting areas than the optional route (see Figure 3, Figure 4, Section 4.2.2). The first route was selected due to its lower impact on water courses and habitats and due to its cost-effectiveness.

2.2 Status of LUOC Activities in the Project Area

LUOC has been operating in the Khauzak site since 2004. Some planning and construction activities in the Shady area are now under way as of January 2012, as presented in Table 2. These activities are subject to the mitigation measures presented in this BAP, and will be monitored using the Enhanced Biodiversity Monitoring Plan (EBMP) described in Section 6. No construction activities are yet under way at the North Shady site (wells 1044 to 1052).

2.3 Activities covered in this BAP

The BAP will focus on all LUOC activities that take place within the water protection zone around the lake, particularly in the Shady area which is now being developed. However, this BAP also considers all LUOC activities in the Khauzak and Shady sites that may have a significant impact on Dengizkul Lake.

Table 2 Ongoing LUOC Development Activities at Shady

Activity		Status as of March 2012	Schedule (beginning and end of activity)	Environmental mitigation Applied to date	Additional mitigation required and committed to during construction and/or operation
1	Road	Construction of road finished and operation started for: - access to wells (1030, 1035, 1038, 305, 306, 1036); - road from Km-2 to Km-19, including bridge across strait). Construction is continuing for: - access to wells (1037, 1040, 1031, 1041, 1042, 1034, 1043)	01/07/11 – 31/10/12	Protect the Lake from Access by LUOC or Contractors' Personnel	Train LUOC and Contractor Personnel to conserve natural habitats and on the types of sensitive flora and fauna that need to be protected near the Lake. At the road there will be put signs of speed limitation for traffic down to 20-30km/h near nesting areas and places, where birds frequently cross the road, moving between nesting, resting and feeding areas (near the bay). Create survey to find places where birds frequently cross the road, moving between nesting, resting and feeding areas (near the bay or other places)
2	Electrical transmission lines	Construction of transmission line poles is finished. Construction of wiring is ongoing.	01/07/11 – 31/10/12	Protect Bird Life from Accidental Electrocutation on Power Lines with Raychem cases	Provide collision markers on distribution lines near the Lake to reduce bird mortality due to collisions
3.	Pipeline(s)	Construction of pipelines finished and operation started for: - wells (1030, 1035, 1038, 305, 306, 1036); - from Km-2 to Km-19, including part under the strait). Construction is continuing for: - access to wells (1037, 1040, 1031, 1041, 1042, 1034, 1043) - from Km-1 to Km-2	01/07/11 – 31/10/12	Using horizontal directional drilling for the pipes crossing under the lake bed, with thick walls and heavy-duty corrosion resistant coating, equipping cathodic protection , automatic control and corrosion monitoring	Regular cathodic inspection and protection and corrosion monitoring
4	Well drilling (# 1039)	Operation	Continuous	Drilling and other wastes were completely disposed of, mud pits were eliminated, recultivation of disturbed soils was conducted.	Not required
5	Well drilling (# 306)	Operation	Continuous		
6	Well drilling (# 305)	Operation	Continuous		
7	Well drilling (# 1030)	Operation	Continuous		
8	Well drilling (# 1035)	Operation	Continuous		
9	Well drilling (# 1038)	Operation	Continuous		
10	Well drilling (# 1036)	Operation	Continuous		

Activity		Status as of March 2012	Schedule (beginning and end of activity)	Environmental mitigation Applied to date	Additional mitigation required and committed to during construction and/or operation
11	Well drilling (# 1037)	Construction (drilling process is finishing, well completion is ongoing)	16/11/11 - 03/04/12	Waterproofing and fencing of mud pits and POL storage facilities.	Disposal of all wastes (including drilling wastes) outside water protection area, elimination of mud pits, complete recultivation of drill site
12	Well drilling (# 1043)	Construction (drilling process is starting)	29/02/12 – 17/07/12		
13	Well drilling (# 1041)	Construction (drilling process is finishing, well completion is ongoing)	10/10/11 – 30/01/12		
14	Well drilling (# 1040)	Construction (drilling process is finishing, well completion is ongoing)	01/01/12 – 23/04/12		
15	Well drilling (# 1031)	Construction (drilling process has not started)	21/03/12 – 13/07/12		
16	Well drilling (# 1034)	Construction (drilling process is finishing, well completion is ongoing)	10/12/11 – 01/04/12		
17	Well drilling (# 1042)	Construction (drilling process has not started)	28/02/12 – 24/06/12		

Figure 2 Location of the Proposed Shady Project Activities

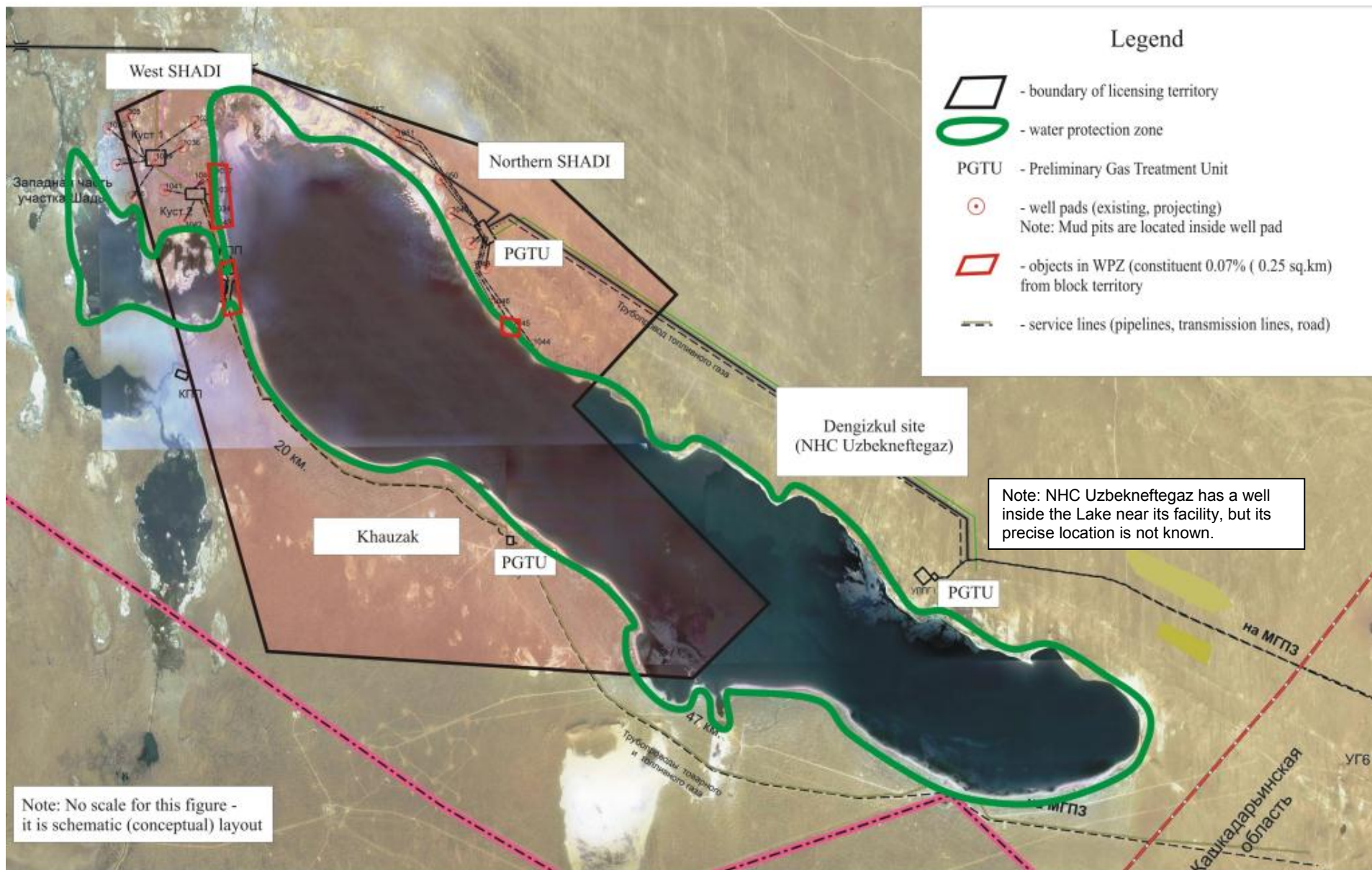


Figure 3 Access Route Options Across Dengizkul Lake Strait

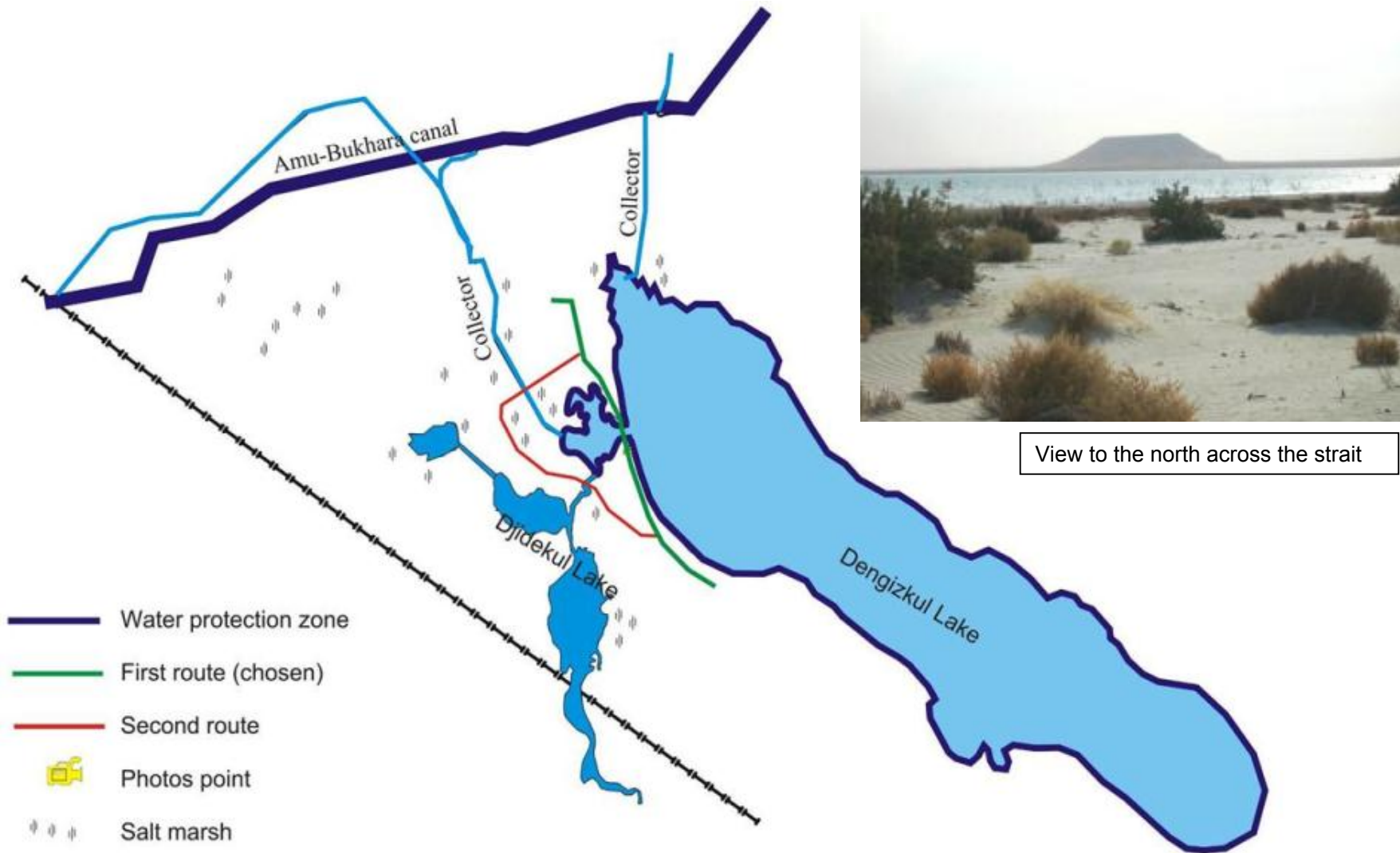


Figure 4 General Location of Nesting, Feeding and Wintering Areas of Dengizkul Lake, Monitoring Stations and Road Options

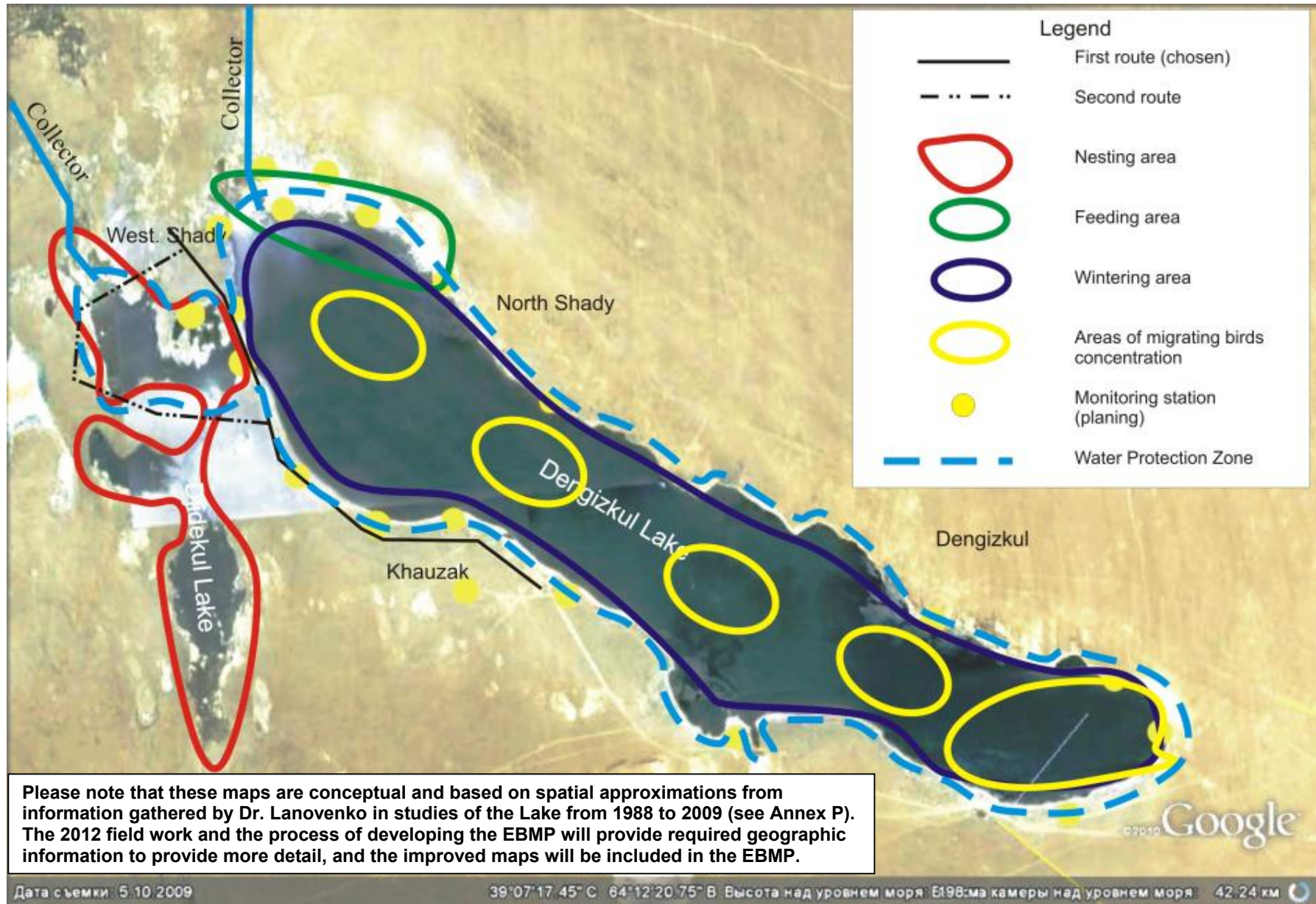


Figure 4a Conceptual Map of Marbled Teal Distribution

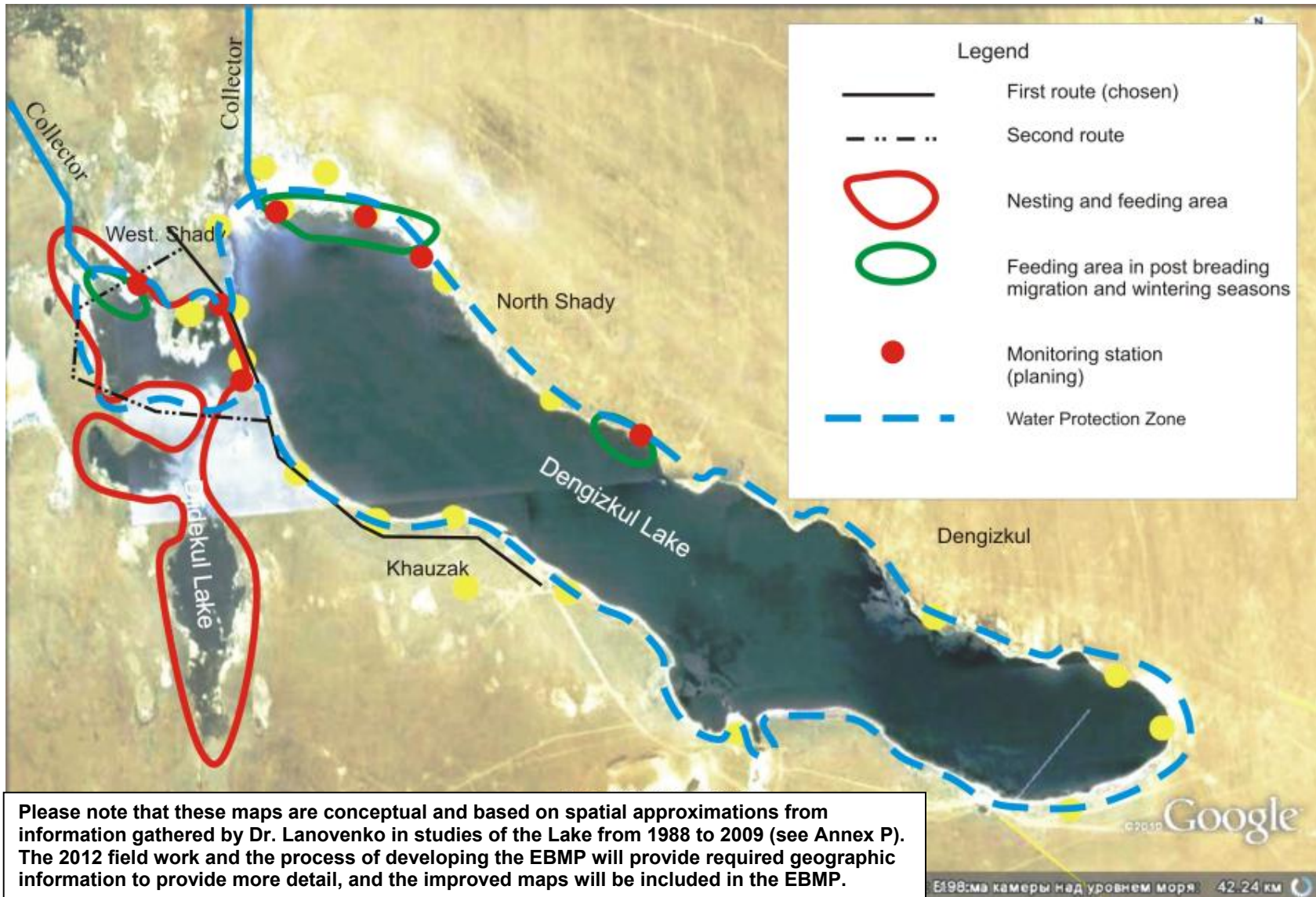


Figure 4b Conceptual Map of former distribution of wintering White-Head Duck

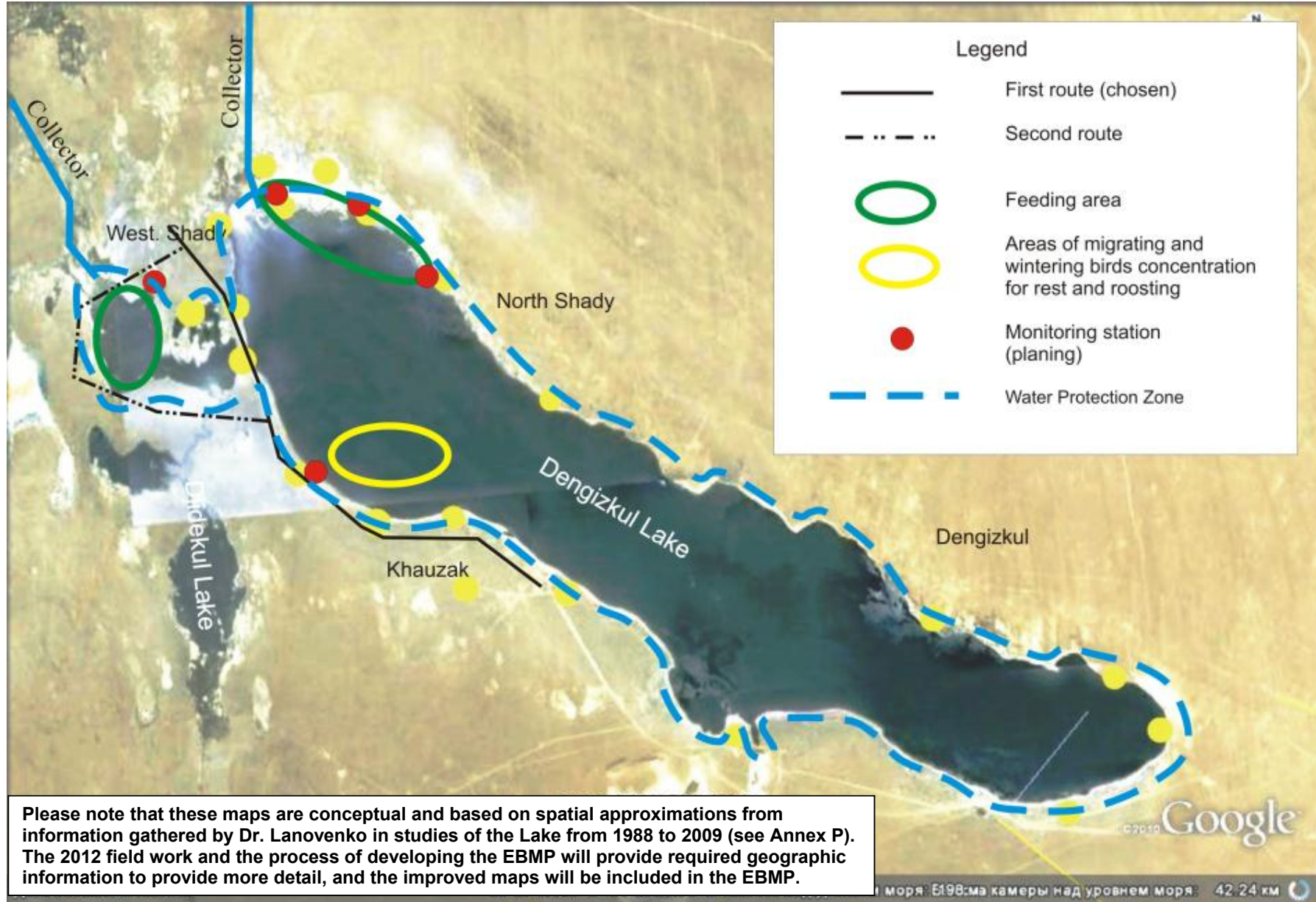


Figure 4c Conceptual Map of Ferruginous Duck Distribution

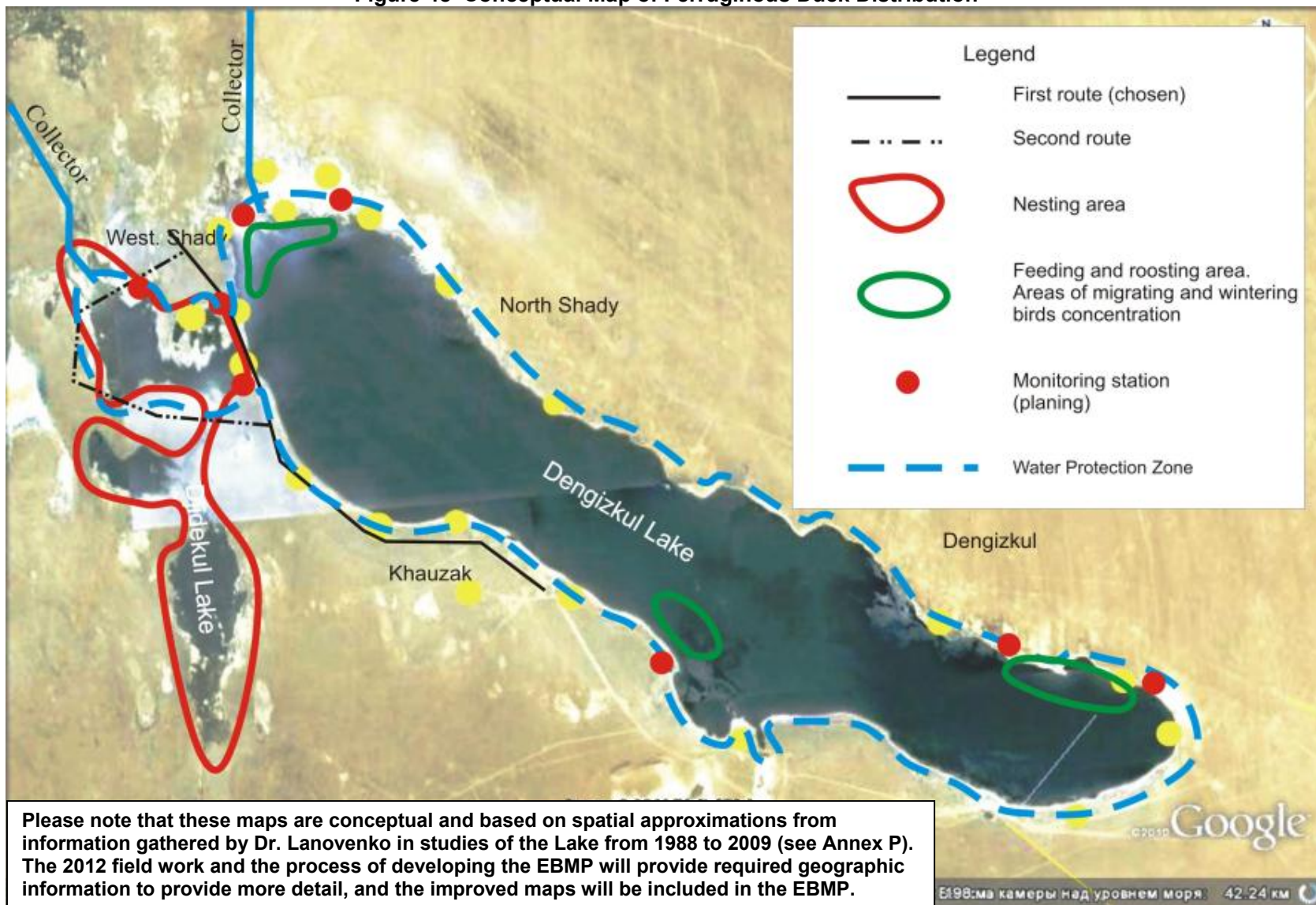
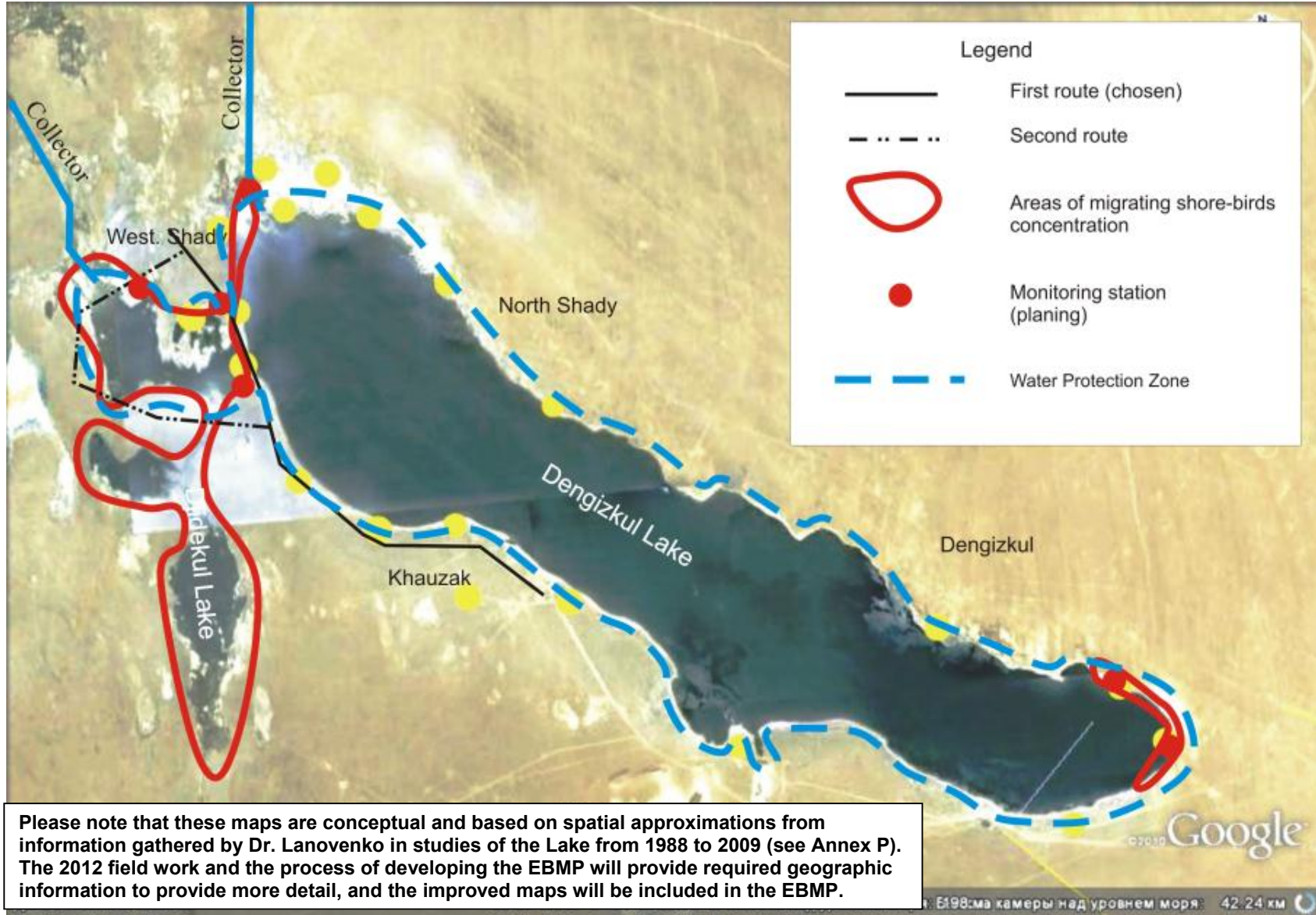


Figure 4d Conceptual Map of Distribution of Shorebirds



3. Baseline Information Review and Potential Impacts

3.1 Dengizkul Lake Protected Area

3.1.1 Background

Dengizkul is on the list of wetlands of international importance. This is the first area in Uzbekistan designated as one meeting the selection criteria of the Ramsar Convention, i.e. wetlands that are of international importance in terms of preservation of wading birds and other semi-aquatic plants and animals. The lake undoubtedly plays an important role in preservation of wintering and migratory wading birds. Each year Dengizkul becomes a wintering destination for almost 500 thousand birds of 30 species. Dengizkul Lake is a public ornithological reserve (Dengizkul Reserve) which makes it one of Uzbekistan's areas of preferential protection. Additional information on completed studies regarding bird life in Dengizkul Lake can be found in Annex P.

3.1.2 Ramsar Site

Since 1992 Dengizkul Lake has status of specialized ornithological preserve, aimed at protection of migrating and wintering waterfowl. In various years this wetland supports up to 500 thousand wintering waterfowl (Lanovenko and others, 2007).

In 2001 Dengizkul Lake was proposed by the Government of Uzbekistan as a water body of international importance and subsequently included into the List of Wetlands of International Importance, established by article 2.1 of the Ramsar Convention as Ramsar site No: 1108. The lake supports a considerable number of migrating and wintering waterfowl, including species, registered in IUCN Red List of Threatened Species. Among these are such significant species as Dalmatian Pelican (*Pelicanus crispus*), Marbled Teal (*Marmaronetta angustirostris*), and White-headed Duck (*Oxyura leucocephala*). During 2001-2005 the wetlands supported as wintering ground up to 30 percent of the world population of white-headed duck (Lanovenko, Turaev, 2008). The border of the Ramsar site includes the land area up to 500 m from the lake shore line, with the big bay in north-western part of the lake and some wetlands situated close to collectors. Djidekul Lake and its surrounding wetlands are not part of Ramsar site.

Within the framework of BirdLife International program, related to the most important ornithological territories in Central Asia, Dengizkul Lake was defined as an IBA (Important Bird Areas) international area (IBA No: UZ 021) with the same border as the Ramsar site. The status of this territory was defined by several criteria: habitat of four globally threatened species ((Dalmatian Pelican (*Pelicanus crispus*), Marbled Teal (*Marmaronetta angustirostris*), Ferruginous Duck (*Aythya nyroca*), White-headed Duck (*Oxyura leucocephala*)); six species (see Table 3), whose area of distribution is limited by biome "Eurasian Deserts and Near-deserts"; seven species, representing more than one percent of ecogeographic population; and habitat of more than 20,000 waterfowl and riparian birds (Lanovenko, Turaev, 2008).

In 2010 Dengizkul lake was included into international network of wetlands of critical importance to migrating birds on the routes of their migration (CSN, Critical Site Network). It was included into the network, based on the following main criteria: support of more than 1 percent of ecogeographic population of 16 waterfowl species and two globally threatened species (Marbled Teal and White-headed Duck).

Until the 1990's the territory around the lake was used by local population as pasture for small livestock. Near the south part of the Lake there was gas field Kokdumalak with wells, located not only on land, but also in south-west part of the lake not far from coastline, soil

was seriously disturbed, as a network of dirt field roads was formed in the area. Not far from the lake there is a shift camp. The lake was also important as a fishery. Near the point of canal inflow in the northern part of the lake there was a fishery co-op. After preserve was established hunting inspection actively patrolled the lake, especially during the hunting season.

Great changes took place after the 1990's. Because of shallowing and disastrous increase of salinity level, the lake lost its importance as fishery. A State border was defined and constructed. In the south-west part of coast line there was constructed a road along the border and near Smantepa heights there was constructed a frontier outpost. As a result soil and vegetation of the heights itself and a section of sand desert with saxaul forest located between the lake shore and the new road were seriously disturbed. Frontier regulations restricting free access to the territory on the west bank of the Lake caused an increase of pasture load on the east bank that aggravates gradual degradation of west bank soil and vegetation.

Landscape peculiarities predetermined the complex coastline of the Lake. The banks of the Lake are gently sloping mostly in its northern and in the western part. The east bank is abrupt nearly throughout its whole length. The lake is surrounded by sand desert on all sides, and in the north part with vast salt marshes. That is why desert vegetation predominates around it. Above-water vegetation mostly develops at shallow places in the north-west part of the Lake. In this part the Lake is less salty, as it is near the inflow canal. In the southern part of the Lake the level of salinity is much higher, which explains why above-water and underwater vegetation has not developed here.

The sand desert surrounding Dengizkul Lake is characterized by drifting semi-blown sands. Here natural tree and shrub vegetation has been enhanced with artificial plantations of saxaul, meant for sand binding. In comparison with other types of Central Asian deserts, sand desert has the most varied species composition (Zakhidov, Meklenburtsev, 1969).⁴ At the same time the ecosystem of sand desert is extremely vulnerable. Loose sandy soil is prone to erosion. Restriction of traffic to constructed roads shall be rigidly observed, as drifting sands easily shift and animals, living in burrows, are not properly protected by fragile soil and can be easily hurt or killed.

Saline basins are mostly located near the shallowest north-west part of the Lake. Saline basins are formed because of unstable hydrological regime. Water shallowing together with high evapo-transpiration, caused by climatic peculiarities (high air temperatures in summer and solar radiation), result in new saline basins, sometimes of a considerable size. In recent years, due to the increasingly arid climate the area of saline basins has been increasing. Mechanical impact on the surface of saline basins causes severe erosion. Salt, forming on the surface of saline basin, is blown by wind around the adjacent territory.

The saline basin is one of the poorest kinds of habitat for plants and animals. Only specialized plants, the Halophytes, grow there. Herbaceous plants are represented by some species from *Salsola* genus. Around the lake there are wide spread shrubs from the *Tamarix* genus, adapted for growing in saline soils. As a rule, animals do not inhabit saline basins, though they may visit them from time to time, especially in spring, when saline basins fill with rain water and turn into shallow saline lakes. Every spring temporary wetlands attract lot of migrating birds, mainly shorebirds, gulls and terns. Tamarisk underbrush serves as a nice shelter for some animals. When saline basins dry up even the Halophytes die.

In accordance with ecological conditions territorial distribution of birds takes place in different seasons. During nesting in late spring and at the beginning of summer many birds

⁴ Fauna and flora of the desert adjacent to Dengizkul Lake is described in section 3.1.5.

concentrate in north-west part of the wetland. In after-nesting period many of them appear in different parts of lakescape. As migration begins starting from August migrating flocks of sandpipers concentrate in south part of the lake and in its north part. Migrating flocks of waterfowl rest in different parts of water area, practically around the whole lake. Their feeding places are concentrated in shallow places, mostly in north part of the lake. Ducks and bald-geese wintering at the lake also spread throughout the entire water part. They use the same feeding place as migrating birds.

Rare species are distributed at lake stations depending on peculiarities of their biology. For example Marbled Teal during nesting period will stay in thick reed, which can be found only at north-west part. In winter flocks of these birds can also be found near west bank, covered with bushes of tamarisk. White-headed duck feeds in shallow water of north part of the lake, but rests in deep bays near Samantepa elevation. Ferruginous Duck in winter was found both in north and in south parts of the lake. During nesting period they can be found only in the north-west part of the lake. Dalmatian pelican during migration can be found in the bay in north-west of the lake. Desert species, such as sand grouse and Pallas sand grouse, using the lake for drinking, prefer gently sloping banks of shallow places.

The Convention on Wetlands which are of international importance primarily as waterfowl habitats was signed on February 2, 1971 in Ramsar (Iran) and has been called the Ramsar Convention ever since. The Republic of Uzbekistan became a party to the Ramsar Convention in pursuance of Resolution No. 278P of August 30, 2001 of the Oliy Majlis of the Republic of Uzbekistan, which became binding upon the Republic of Uzbekistan on February 8, 2002.

According to the law of the Republic of Uzbekistan “On Areas of Preferential Protection” No. 711-II of December 3, 2001 specific goals and peculiarities of public ornithological reserves are set out in the regulations subject to approval by the agencies of the State Committee for Nature Protection of the Republic of Uzbekistan. These affect land owners and the authority that decided on establishment of a public reserve.

An area of preferential protection must be encircled with a water protection zone that is subject to a special regime intended to prevent contamination, pollution, depletion and sedimentation of water bodies with soil erosion products and sustain a favorable water regime. Water protection zones must be created in accordance with the procedure approved by the Cabinet of Ministers of the Republic of Uzbekistan as advised by environmental and water management authorities. On April 7, 1992 the Cabinet of Ministers of the Republic of Uzbekistan adopted its Resolution “On Approval of the Regulations on Water Protection Zones of Man-Made and other Water Bodies; Rivers, Main and Connecting Channels, as Well as Sources of Potable and Household Water Supply, and Water Bodies Used for Health and Recreational Purposes in the Republic of Uzbekistan” No.174. The procedure for establishment of water protection zones as well as the regime of business activities in such zones to prevent pollution, contamination and depletion of water resources is governed by the Water Protection Zone Regulations.

For major water bodies the water protection zone must encircle the entire water body within 300-500 m (off the water edge). The water protection zone includes a coastal strip in which more stringent restrictions to business activities are applicable. Consequently, construction activities within this strip must take place only in exceptional cases and only upon approval by the State Committee for Nature Protection. Dengizkul’s water protection zone is located 500 m off the water edge with the water reaching the level of 182.2 m.

Dengizkul Lake is included into the IBA List – important bird areas. Creation of IBA program was initiated by Birdlife International, an international union for protection of birds.

The reserve border goes along a line 500 m from the lakeshore. At the moment there is no State Plan of Reserve Management. The reserve is not a legal entity. According to the Law of the Republic of Uzbekistan “On Natural Areas of Protection” (article 32) if state reserves are not legal entities and their areas are not withdrawn from practical use by landowners, land users, as well as land holders and owners of land plots.

The territory of the reserve and Ramsar site are under protection of Flora and Fauna Conservation Inspectorate of Bukhara Regional Committee for Nature Protection. Being a natural area of protection – state ornithological reserve Dengizkul Lake is included into National Plan of Actions for Biodiversity Conservation. However an individual Plan of Actions for Dengizkul Lake itself has not been developed up to now. The reserve category according to International Union for the Protection of Nature is IV (Territories for conservation and reproduction of biodiversity).

3.1.3 Historical and ethnographic description

Khauzak-Shady gas condensate field is administratively located in Alat district of Bukhara region of Uzbekistan.⁵ The nearest town is Alat, located 60 km to the north-west. In 8-10 km to the north of the field there is a homonymous Dengizkul settlement, and 60 kilometers to the north-west there is a Regional Center Mubarek (railway branch Kagan-Karshi). In 20 km to the south-east of the field there is Urta-Bulak gas field. By geographical location the Khauzak-Shady site refers to Karakul oasis of Bukhara region.

In 1950-51, 1953-54 and 1960-64 Mokhandarinsk archaeological expedition in the area Zamonbobo near Dengizkul Lake within 10-15 years were carried out excavations, as a result of which the significant sites belonging to Paleolithic, Neolithic, Eneolithic, Bronze and antiquity ages were found and studied. All the significant sites of earlier periods are located on the air-supported sands in the vicinity of lakes and reservoirs. Differences of the water level often forced ancient people to change place of living, so all the dwelling sites of Neolithic were found in the northern and north-eastern shores of saline Large Tuzkan, formerly being a lake. Only in one area of the coast of an ancient reservoir Big Tuzkan (now saline) archaeologists studied more than 30 sites of primitive hunters and fishermen of the Neolithic. Shelters built of wooden frame and covered with reeds show that banks were abundant with dense thickets of wild riparian trees and rushes.

As a result of the destruction of the cultural layer of soil the archaeological material, indicating the continuous occupation of these places by primitive farmers and ranchers, comes across elsewhere. In the existing oases all the material remains were buried beneath the cultural and irrigation canals, and traces of primitive or ancient culture were destroyed during the excavation. The district of Dengizkul Lake, where the medieval layer is shallow and the upper one is intensively weathered, used to be a network of medieval water irrigation. Here, in the form of clusters of fragments of domestic inventory, remnants of dwellings, possibly of zamonbob type, can be met.

The next phase (end of second - early first millennium BC) is characterized by cultural and household assimilation of alien tribes of andronov culture by zamonbob people, the spread of agriculture, the emergence of small efferent channels of local character. The use of large irrigation canals allowed to reclaim lands in the lower reaches of the powerful flow Zarafshan.

In the Bronze Age the life moved slightly higher along the channel Gudjeyli in the district Zamonbobo-1, Zamonbobo-2, Kaptarlikum and to the northern side of the upper site Dengizkul. This area has an open burial ground; many burials in catacombs without external

⁵ Sections 3.1.3 and 3.1.4 are largely excerpted from the 2005 Environmental Audit, which contains additional historical and socio-economic information (LUKOIL-VolgogradNIPImorneft, 2005).

mound, and without other signs were discovered. In the catacombs there are male, female and children's burials with rich burial items in the form of pottery, stone arrowheads, stone beads, bronze mirrors, and various items of women's toilet. In one of the graves a clay statue of the goddess of fertility, as well as beads made of Badakhshan stone, pottery and other products of the tribes living in southern Turkmenistan were found, which is the evidence of the economic and cultural ties with other tribes. Also, this area was inhabited by tribes belonging to the culture Kaltaminar, Andronov's culture was widely distributed.

In general, the ancient history of the area Zamonbobo (15 km north-east of the town of Karakul) can be divided into three periods:

- 1-period: the period of the original habitat of hunters and fishermen in Darvozakir and its environs;
- 2-period: the period of the original habitat of farmers and pastoralists in Zamonbobo and its environs;
- 3-period: the period of arrival of pastoral populations from the north. These people remained residents and mingled with the native population.

The political history of the area is closely linked with the history of Bukhara. In the first millennium BC the area was a part of Sogdiana, and later was subordinated to the State of Turkic Kagan and Ephtalites. On the eve of the attack of the Arabs (6th century) the city of Paikend was founded, which became the capital of the Ephtalites. It is located 15 kilometers to the north-east of Karakul city. At the beginning of the 8th century the Arabs invaded Paykand.

In the 9th-10th centuries the territory was a part of the Samanid state, and in the 11th- 12th centuries, it passed to the State of Karakhanids. In the 14th – 15th centuries the area subjected to Tamerlane. Since the beginning of 16th century the area was a part of the Khanate of Bukhara, and from the middle of the 18th century - Bukhara Emirate. In 1920-24 Karakul tuman was created (at the Bukhara People's Soviet Republic). Following the establishment of the Uzbek SSR, in 1925, the region became a part of Karakul district of Bukhara region, which remained as an administrative-territorial division until the beginning of the 21st century.

Near the considered site (about the land of Kandym group of deposits) the ruins of area Zamonbobo (an archaeological site) and the city of Paikend preserved up to date. In addition, in this area ancient settlements such as large Tuzkon, small Tuzkon, Darvozakir, Odilkuduk, Uchbosh, Kaptarlikum, Akrobat, Nargizkala were revealed.

In this area, mostly Uzbeks lived. In the late 19th - early 20th century, the ethnic composition of the population consisted of Bayats, Bakhrins, Durmans, Jalayirs, Mangyts, Sarays, Sayats, Sogdians, Kungrads, Karakuls and other Uzbek clans and tribes. Also, Turkmens, Tatars and Russians live here.

Mangyts were very large, strong and powerful Uzbek tribe in Bukhara. Numbers of this tribe, in the years 1924-25. was about 8000 people in the lower river Zarafshan. About the origin of mangyts it is known that there was a considerable group of mangyts among the Mongols of Genghis Khan, who apparently took part in his conquests on the territory of modern Central Asia and Afghanistan, therefore, the time of appearance in mangyts in Movaraunnahre (Mesopotamia) must be attributed to the beginning of the 13th century. In the 16th century, they participated in the campaign of Shaybanikhon to Samarkand. Like other numerically small groups, their further power and influence were determined by the fact that they had managed to unite the various Turkic tribes, both local and alien. The importance of the tribe of mangyts was special in the middle of the 18th century, when it defeated the tribe Kungrad in the political struggle of the Bukhara Khanate and made Bukhara emirs (1753-20) be elected from its environment. The last emir of Bukhara was Said Alimhon (1881-1944).

Kungrads are the second largest Uzbek group in Bukhara. In Karakul oasis Kungrads were much less than in Bukhara - 2670 people (1924). A part of Karakul Kungrads moved to the left bank of the river Amu Darya, where in the area of old Chardzhuy 540 people of them were registered. As known, the khans of Khiva came from the Kungrad tribe and relied on him in the fight with the rest of the Uzbek and Turkmen tribes. Uzbeks-Kungrads are not a single tribe but a union of tribes and generations of different origin.

Sarays are one of the largest Uzbek generations (tribes) of the West of Bukhara. 205 people from the generation of sarays lived near Paykent.

According to Muhammad Haidar, Mongols of Dzhogatev ulus (Chigatoy ulus) were divided into Moguls and Chaghatays who were at enmity between themselves. Chaghatays called Moguls dzheste, that the Mongolian dictionary means "a bad person, bum". In the first quarter of the XX century 565 chagatays lived in Karakul oasis. In the vicinity of Dengizkul Lake ethnic composition in the late 19th and early 20th centuries consisted of Arlats (Alats), Bayats, Bahrins, Mangyts, Sayats, Chendirs, Kungrads and other tribes and generations, the members of the Uzbek people. Among them there were also partly Turkmen. Arlats are mentioned in the history of the Emirate of Bukhara and in the conquest of Samarkand. Representatives of this tribe took part in the elevation of Bukhara khans (emirs) on the throne, they lived mostly in Karakul oasis. In 1924-25 there were 225 people registered. Alat tuman and the city of Alat has their name ("ArLOT").

In the valley of Amu Darya river, in Karakul oasis, and partly in Alat district in the 1924-25 several groups calling themselves Uzbeks, but having the names of the Turkmen tribes and generations were recorded. They also can be met in the same areas where Turkmen live. About a thousand people from the generation Chandir were registered in Karakul oasis (Alat area). Chandirs gave the name to Jandar settlement, now the city - the district center of Dzhandar tuman. Also the name "Chandir" has been given to several villages in Alat, Karakul, and Shafirkan tumans.

In the early 20th century, in the oasis of Karakul, mainly in Alat tuman one numerically small Bahrin group in the quantity of 75 people was registered. The representative of this tribe, along with three others (Arlat, Batash, Ming) participated in the elevation of the Khans of Bukhara on the throne, raising them on the felt mat. This was a historical value of bahrins, as they, despite the small numbers, played a prominent role, at least in local politics.

About 150 people living in the Bukhara oasis, consider themselves a small part of the tribe of Bayat. However, the majority of Uzbeks - Bayat (1460 people living on the ditch Hayrabad, and, mainly, in the Karakul oasis) are in no connection with Bahrins and are related to the Turkmen. Uzbeks of the tribe Khidhir-eli in 1925 were registered in the quantity of 1,835 people in the Karakul oasis and 7,730 people - in the valley of Amu Darya river, mainly on the right bank, in Farab area, in the immediate vicinity from Karakul.

3.1.4 Socio-economic characteristics

Objective and subjective problems of the transition period in the early 1990's have affected, primarily, the social sphere, in particular, rising unemployment. According to official figures in 2005, the level of unemployment in the republic is 0.4 – 0.5%, according to unofficial data - hidden unemployment is around 10% and higher in some regions. The presence of unemployment is associated with complex processes in the economy of Uzbekistan and the establishment of market relations. About a half of the unemployed are young people (under 30 years), the most of whom have no professional education. The retirement age in Uzbekistan reaches, in males at age 60, females at 54. The official currency is the soum.

Average wages is 22.5 thousand soums. The average monthly pension is 17.1 thousand soums. The average monthly income per capita is 16.8 thousand soums.

Despite the fact that Uzbekistan has a policy of social protection of women, an acting system of incentives to protect the rights of the mother, and there are legal guarantees of equality in employment, actually a worker's gender, marriage and availability of children may be perceived as negative aspects of employment. The formation of market relations in Uzbekistan has led to increased discrimination against women in employment. At the beginning of 2003, women's content was 50.1% of the population, and only 44% of total employment was involved in the economy. Demographic trends continue to remain at a high level. Birth rate per 1000 people, on average, in the area is 20.2, mortality 4.4, an increase is 15.8 persons. Migration processes are currently low, not more than 4-5 families leave during a year, the number of arrivals in the region is practically absent.

One of the risk factors that determine the level of health is poor quality drinking water and effluent sewage. Only 17% of the population may use central water supply. There is no canalization in the area. Gas supply is more successful, its coverage is 98%.

In the district, as well as in the Republic of Uzbekistan, in general, cardiovascular diseases and other chronic non-communicable diseases remain a leading cause of death and disability and lead to great economic losses. Cases of hepatitis are most prevalent among infectious diseases. There are no officially reported AIDS cases. During the last period, events of tuberculosis and typhoid have become more frequent. As in the whole republic, in the district great attention is paid to commissioning of new health facilities and education.

The growing number of workforce not employed in the economy has led to the increased flow of migrants to more favorable conditions of the country for the earnings. In search of work Uzbek citizens travel to Russia, Kazakhstan and Kyrgyzstan, as well as far abroad. The territory of Alat district is 3.2 thousand square kilometers with a population density of 24.6 people per 1 sq.km. About 21% of the population lives in the district center – city of Alat. The language of communication and record keeping is Uzbek. The rate of population speaking Russian is about 42%, mainly living in Alat city.

The road network of the area is poorly developed. The length of roads of international importance is 26km, total asphalted roads - 212km.

Children receive primary and secondary education in schools, colleges and lyceums. Admission to a school is from 7 years, training period is 11 years. The increasing young people and their reducing school attendance leads to formation of a significant segment of the population with low job opportunities.

Alat district is notable for adherence to the ancient traditions. Wedding and other rituals have been preserved until now. Local population is notable for devoutness as well.

3.1.5 Threats to Dengizkul Lake Protected Area

Though during certain periods of the Lake history its salinity was high, there is no information about death of birds caused by saline toxicosis. In the past the principal threats to the lake biota were: the reduction or ceasing of water inflow from canals, causing sharp decrease of water level in the lake and fast increase of lake water mineralization; and, inflow of waste water, containing chlororganic and other chemical compounds (mineral fertilizers, plant killers, pesticides and defoliant) prolifically used in agriculture up to 1990's.

In the present stage, the actual threat is the reduced area of natural lake ecosystems and loss of their components at the level of species and flora and fauna coenosis caused by

transformation of natural habitats as a result of upstream human economic activity, including industrial development, as well as increased disturbance factor.

Future threats may be related to lack of water inflow into the lake if irrigation scheme of the Republic of Uzbekistan changes, a high rate of human economic activity, and respective increase in disturbance.

There are no known cases of mass bird and fish mortality at the Lake due to human activities. Conservation of lake's avifauna is of global, regional and national importance. The establishment of Dengizkul Republican Ornithological Reserve proves underscores the national importance of the Lake. Global and international importance is also proven by the fact that the lake received status of Ramsar site and was included into Ramsar List, received status of the most important ornithological territory (IBA), and was included into the international network of key wetlands along Central Asian migration route (CSN).

Analysis of existing data and monitoring results shows that Dengizkul lake avifauna list includes 170 bird species (Table 2). Fourteen globally threatened species live here. Four of these species exceed the threshold indicating international importance of the territory for conservation of world populations of these four species (Dalmatian Pelican, Marbled Teal, Ferruginous Duck, and White-headed Duck). Twenty two species are registered in the National Red Data Book, most of them are registered in the Red Data Books of neighboring Central Asian countries: Turkmenistan, Tajikistan, and Kazakhstan. Global and regional importance of the lake is also determined by the presence of 16 species of waterbirds and two globally threatened species (Marbled Teal and White-headed Duck), representing 1 percent or more of ecogeographic population; habitation of more than 20 thousand waterbirds and riparian birds during migration and wintering, and 6 species, whose distribution area is limited by "Eurasian Deserts and Semi-deserts" biome.

Recurrent extreme climatic events enveloping Central Asian region are of global importance for Dengizkul Lake avifauna. These are extremely cold winters and summer droughts. During the summer drought of 2000-2001 the Lake water level decreased, its salinity increased, reed and tugai (riparian forest) vegetation deteriorated and there formed vast salt marsh, that resulted in loss of nesting and feeding stations of nesting bird species. The Lake is situated in an area of "risky wintering grounds". Extremely low temperatures in January 2008, caused freezing of the water body. Waterbirds concentrated here for wintering lost wintering ground, many died from freezing into ice and fodder shortage, others abandoned the water body and moved to southern regions. Climatic fluctuations have been shown to influence the population dynamics of White-headed Ducks in Central Asia as critical, but for drought conditions only (AEWA 2006). Information gathered by local experts about negative influence of cold winter on population of White-headed Duck confirmed this statement for both extreme climate changes, indicating that the South-Central Asian population of this species is critically vulnerable (Lanovenko E.N., Filatov A.K., et al, 2008).

Usually ice-free water body in 2008 was covered with ice starting from the second half of January and until the end of February. This hardship for winter waterbirds resulted in disastrous reduction of waterbird quantity and species composition of nesting, migrating and wintering species. Restoration process takes several years and is continuing at present. This winter produced especially adverse effect on white-headed duck. In 2011 this species could not be found at the lake in any season: neither in nesting, nor in migrating, nor in wintering season (IWC data base of the laboratory ornithology of the Institute of Zoology of Uzbek Academy of Sciences).

The existing threats of man-made origin include: unstable hydrological regime, reduced habitat area and disturbance factor caused by human economic activity. These influence species composition and results in decreasing quantity of individual species at national,

regional and global levels. These factors are of special importance for nesting species. At global level these factors will influence Marbled Teal, and Ferruginous Duck, at regional and national level, Pygmy Cormorant, Spoonbill, Little Egret, Mute Swan. Impact of these threats may be mitigated if special measures are taken.

As Dengizkul Lake has nature protection status of national ornithological reserve bird hunting in its territory is prohibited. As the Lake lost its importance as fishery water area is not used for fishing. The establishment of fish farming near north edge of the lake has positive impact, as it increases wetland area and it is protected area. Another traditional economic activity such as mowing of reed for food of domestic animals is not performed here either. Poaching at the Lake has been repeatedly recorded, and it always takes place in northern part of the lake (outside LUOC territory). Illegal fishing with use of fishing-net at shallow places in north part of the lake near canal inflow is also dangerous for diving birds. The group of birds risking to be caught by net includes little cormorant, all kinds of pochards, among them globally threatened ferruginous duck and white-headed duck. Control over illegal hunting and poaching fishing is exercised by State inspection for flora and fauna protection. To minimize this threat special measures are required such as educational campaign among local population and the personnel involved in construction and development of Khauzak-Shady field and then maintenance personnel servicing the field during operation.

Distribution of birds by types of habitats is given in Table 2. Nesting waterbirds live mostly in shallow places and reed. Other nesting birds inhabit riparian forests or deserts. Waterbirds predominate among migrating or wintering species whose quantity is considerably higher than quantity of nesting birds. Peculiarities of their ecology predetermine their predominance at water area and shallow parts of the Lake. To a much lesser degree, migrating and wintering species use reed areas. Shallow places are the main forage lands for many waterbirds and wading birds throughout the year. They are used by piscivorous birds such as herons, geese, ducks, bald-coots, and sandpipers, and among them there are globally threatened species and species registered in the Red Data Book of the Republic of Uzbekistan.

The north-west part of the lake is the part with the greatest bird species diversity. Birds concentrate here during all periods of their biological life cycle.

Birds of prey such as Long-legged Buzzard (*Buteo rufinus*), Saker Falcon (*Falco cherrug*), Kestrel (*Falco tinnunculus*) were observed during survey of Dengizkul Lake in 2000-2002 nested on distribution line poles near the Lake's south-west part, at the border with Sundukly desert. In recent years birds of prey nesting on distribution lines have not been observed. Nests of Long-legged Buzzard were also found at saxaul bushes not far from Samantepa hill. Eagle Owl (*Bubo bubo*) nested at a bluff formation near south end of the Lake in the area of Kokdumalak. All these species hunt mostly over the land. They often use distribution line poles as perches for rest and hunting. As discussed in Section 4, the Project provides for the use of electrical insulation to protect birds of prey sitting on the insulators or upper part of the pole.

In October – February at the banks of Dengizkul one can find up to 10-15 White-tailed Eagles (*Haliaeetus albicilla*) and 1-2 Pallas's Sea-Eagles (*Haliaeetus leucoryphus*). These birds of prey hunt waterfowl and fish over the water area of the Lake. They eat their kill and rest sitting on the bank. During construction works territorial redistribution of the birds of prey will probably take place, as they avoid human disturbance.

3.1.6 Dengizkul Fauna and Flora

At the time of the EIA (2007)⁶ 30% of soil in the Project area was covered with vegetation. Plants have morphological changes but they are minor (mainly necroses). Vegetation is very thin; there are spots with no vegetation at all.

The Fauna is represented by 27 species of mammals, 17 species of reptiles, over 160 species of birds, out of which 3 species of mammals, 24 species of birds, 2 species of reptiles and 7 species of arthropoda are red-listed.

The lesser white-toothed shrew and piebald shrew are widespread in the Project area. They are active mainly at night in autumn, sometimes in the daytime. The species population varies.

The long-eared hedgehog is widespread on the whole territory. It lives in holes and eats a variety of food, such as ground beetles, scarabs, acridoid grasshoppers, butterfly caterpillars, and other beetles. It also eats vertebrates (lizards, small birds) and plants. The Red-listed Brandt's hedgehog is less common than the long-eared hedgehog and lives in the same conditions as the long-eared hedgehog. The European free-tailed bat is a Red-listed vulnerable rare species. The tolai hare, long-clawed ground squirrel, Severtzov's Jerboa, southern jird, Libyan jird, giant day jird are the typical faunal forms of these regions.

Foxes are a bit smaller and lighter here than in other places. The Caffre cat living in some habitats is relatively small in size. The marbled polecat is a numerically insignificant species, and the Steppe polecat is a very rare species in this area.

The goitered gazelle used to be wide-spread in the desert of the considered territory. Intensive desert land development and animal breeding as well as poaching caused rarity of the goitered gazelle as species and it was Red-listed.

The territory of the area considered is inhabited by many reptile species, which, due to their biology, can be either rare or numerous: toad agama, sunwatcher, plate-tailed gecko, racerunner, *Eremias lineolata*, *Eremias intremedia*, *Eremias grammica*, *Coluber karelini*, corn snake (*Elaphe guttata*), and *Psammophis lineolatus*.

The steppe tortoise inhabits loess-like, sandy-loam and sandy areas of the plain and foothills. The steppe agama is a widespread common species in this territory. The toad agama is a common numerous species. The desert monitor is a scarce Red-listed species. The Tartar sand boa inhabits sandy areas fixed and semi-fixed sands. The Red-listed Central Asia cobra was sometimes found. The Saw-scaled viper was also found.

From the amphibia the green toad and lake frog inhabit the Project area.

The ichthyofauna of Dengizkul Lake is basically known for its commercial fish species: European carp, pikeperch, zherekh, fresh-water catfish, shemaya, carpbream, and snakehead. There are other fishes in the lake; they don't have any commercial value but constitute an integral part of the water body ichthyofauna and are particular valuable in biological diversity.

As part of the Environmental Audit, ecotoxicological researches on microelements and pesticides accumulation in local plants tissue were carried out to determine physical and chemical conditions of the territory on the physiological state of living organisms and

⁶ This section is largely based on the EIA, and more detailed information can be found there and in the Environmental Audit.

vegetation. The results showed that physical and chemical conditions of the Khauzak and Shady sites are, on the whole, unfavorable and produce a negative effect on the physiological state of flora and, subsequently, fauna, though this effect is localized. Liver dysmorphology, hepatocyte necrobiosis and dissection of muscle fibres (myopathy) is mainly true for the rodents eating tree roots than for those eating fruit, which have comparatively less manifested functional disorders only in liver tissue. Liver dysmorphology, partial hepatocyte necrobiosis and dissection of muscle fibres (myopathy) are mainly true for herbivorous fishes. No visible histopathological changes in predatory fish have been detected in any of the examined tissues (muscles, liver, gonads). In animal tissues, collected in the area under review, there were not detected any changes related to poisoning. There have been no reported fish kills or associated large scale deaths of water fowl or other fauna feeding on dead fish. The ecological audit report, as well as further ecological monitoring reports, do not mention any detected fish kills or bird mortality (see Chapter 9 of ecological audit report). The monitoring plan, developed as part of the present BAP, provides for further research in this direction (see Section 6).

Researches of the avifauna showed that there are over 170 species of birds inhabiting the territory, about 40 species are nesting there. 22 species are red-listed at national and 14 at international level (see Table 3). A lot of bird species visit the area during seasonal migrations. Typical inhabitants include sky lark, fringillidae family, chats, sand grouses, small predatory birds, besides the lake is also inhabited by aquatic and semi-aquatic birds.

The birds of prey are represented by a great many of falcon and goshawk species. Besides, many other species of birds are found on the sites: corvidae family, coraciiformes, starlings, fringillidae family, sky larks, wagtails, warblers, the Turdinae and other.

Table 3 shows the most current available information on birds using Dengizkul Lake based on published information⁷ (and departmental data of Zoology Institute of Academy of Sciences of the Republic of Uzbekistan for 2000-2011. Additional information (from 2003) can be found in Annex J.

Dengizkul Lake macrophytes are represented by two species – reed and narrowleaf cattail (*Typha angustifolia* L.). They are mostly concentrated in the north-west part of the Lake, in the area of desalinating effect of the Dengizkul collecting drain, where main concentration of fish is observed. Along the rest of the lakeside there dominates reed, growing in small greatly thinned patches. The total area, occupied by reed and cattail, is quite small in comparison with the total area of the water body, about 1-2 percent.

Submergent vegetation grows down to the depth of 7-9 m and is represented by short bunches of *Potamogeton trichoides* and hard root mats of limby thicket (species is not defined), which create in shallow waters underwater meadows in some areas covering up to 70 percent of the bottom surface. At the bottom and underwater background there is a well-

⁷ Birds of Uzbekistan. Vol.1,2,3. "FAN", Tashkent, 1987, 1990, 1995; Mukhina E.A., Lanovenko Ye.N. 1998 Marbled Teal and Ferruginous Duck breeding in South-west Uzbekistan. TWSG News, No.11. (in English); Lanovenko Ye.N. 2001 On the study of the ornithological fauna of Dengizkul lake. Transaction of the nature reserves of Uzbekistan, issue 3. Tashkent. FAN; Lanovenko Y. 2004 Importance of Uzbekistans wetlands for supporting wintering waterfowl on the Western-Asian Flyway // Waterbirds around the World. A global review of the conservation, management and research of the world's major flyways. 3-8 April 2004 Edinburgh, UK. (in English); Lanovenko Ye, Filatov A. and Zagrebin S. 2000 White-headed Duck at Dengizkul Lake, Uzbekistan. TWSG News. The bulletin of the Threatened Waterfowl Specialist Group. No.12; Lanovenko Ye.N.and M.M.Turaev Dengizkul Lake // Important birds Areas in Uzbekistan. Priority sites for conservation. Tashkent. 2008. p.102-104.(in English); Solokha A. 2006 Results from the International Waterbird Census in Central Asia and Caucasus 2003-2005/ Wetland International, Moskow, Russia.(in English); Red Data Book of Uzbekistan, 2009; IUCN Red List, 2011). Please refer also to Annex P.

developed biocenosis of periphyton in the form of settling and scum. In shallow broads closer to the water edge there are some accumulations of filamentary green algae.

Species composition of Dengizkul Lake macrozoobenthos is not varied, which is characteristic of water bodies with high level of evaporation. Most freshwater species are actually excluded from Lake periphyton, where they are replaced by typical brackish water marine diatomic algae from genera Mastogloia, Synedra, Diploneis, Navicula, Amphora, Hantzshia, Nitzschia, and Actinocyclus.

The intensive increase of Dengizkul Lake salinity, caused by the quality of received drain water and irrigation regimes, may lead to metabolic devolution, when biologic processes develop towards adaptation of salt tolerant populations.

Table 3 List of birds that use Dengizkul Lake

№	Species (Latin and English name)	Abundance	Reason of presence	Occurrence	Protection and other status	Habitats						
						Desert	Settlement	Tugai forest	Open water	Shore-line	Reed-bed	Precipice
1	Little Grebe <i>Tachybaptus ruficollis</i>	common	B, W	the whole year round						+	+	
2	Black-necked Grebe <i>Podiceps nigricollis</i>	low number	M, W	Apr-May, Sept-Feb						+		
3	Red-necked Grebe <i>Podiceps grisegena</i>	rare	M, W	Apr-May, Sept-Feb						+		
4	Great Grebe <i>Podiceps cristatus</i>	low number	B, W	the whole year round						+	+	
5	White Pelican <i>Pelecanus onocrotalus</i>	low number	M, W	Oct-Apr	UzRDB				+	+		
6	Dalmatian Pelican <i>Pelecanus crispus</i>	low number	M, W	Mar-Apr, Sept-Feb	UzRDB, IUCN RL, VU >1%				+	+		
7	Cormorant <i>Phalacrocorax carbo</i>	common	B, M,W	the whole year round					+	+	+	
8	Pygmy Cormorant <i>Phalacrocorax pygmaeus</i>	common	B, M, W	the whole year round	UzRDB				+	+	+	
9	Eurasian Bittern <i>Botaurus stellaris</i>	low number	M	Mar-Apr, Sept-Oct							+	
10	Little Bittern <i>Ixobrychus minutus</i>	low number	M, B	Apr-Oct							+	
11	Night Heron <i>Nycticorax nycticorax</i>	low number	M, B	Mar-Sep							+	
12	Great Egret <i>Egretta alba</i>	low number	M, W	the whole year round							+	
13	Little Egret <i>Egretta garzetta</i>	low number	M, B	Apr-Oct	UzRDB						+	
14	Grey Heron <i>Ardea cinerea</i>	common	M, B, W	the whole year round							+	
15	Purple Heron <i>Ardea purpurea</i>	low number	M, B	Apr-Oct							+	
16	Spoonbill <i>Platalea leucorodia</i>	rare	M, B	Mar-Oct	UzRDB,				+		+	
17	Glossy Ibis <i>Plegadis falcinellus</i>	rare	M	Apr, may, Sep, Oct	UzRDB				+		+	
18	Greylag Goose <i>Anser anser</i>	low number	M, B, W	the whole year round		+			+	+	+	
19	Mute Swan <i>Cygnus olor</i>	low number	M, B, W	the whole year round	UzRDB				+	+	+	
20	Whooper Swan <i>Cygnus cygnus</i>	rare	M, W	Oct-Apr	UzRDB				+	+		

№	Species (Latin and English name)	Abundance	Reason of presence	Occurrence	Protection and other status	Habitats						
						Desert	Settlement	Tugai forest	Open water	Shore-line	Reed-bed	Precipice
21	Ruddy Shelduck <i>Tadorna ferruginea</i>	low number	M, W	Sept-Apr						+		+
22	Shelduck <i>Tadorna tadorna</i>	low number	M, B, W	the whole year round					+	+		
23	Mallard <i>Anas platyrhynchos</i>	common	B, W	The whole year round	>1%, W				+	+	+	
24	Teal <i>Anas crecca</i>	common	M, W	Aug-Apr					+	+		
25	Gadwall <i>Anas strepera</i>	low number	B, W	the whole year round					+	+	+	
26	Eurasian Wigeon <i>Anas penelope</i>	low number	M, W	Sept-Apr					+	+		
27	Pintail <i>Anas acuta</i>	common	M, W	Sept-Apr					+	+		
28	Garganey <i>Anas querquedula</i>	low number	M	Mar-May, Jul-Oct					+	+		
29	Shoveler <i>Anas clypeata</i>	low number	M, B, W	Sept-Apr					+	+	+	
30	Marbled Teal <i>Anas angustirostris</i>	rare	M, B, W	the whole year round	UzRDB, IUCN RL, VU >1%					+	+	
31	Red-crested Pochard <i>Netta rufina</i>	numerous	B, W	the whole year round	>1%, W				+	+	+	
32	Pochard <i>Aythya ferina</i>	numerous	M, W	Sep-Mar	>1%, W				+			
33	Ferruginous Duck <i>Aythya nyroca</i>	low number	B, W	the whole year round	UzRDB, IUCN RL, NT >1%, W				+	+	+	
34	Tufted Duck <i>Aythya fuligula</i>	Low number	M, W	Oct-Mar					+			
35	Greater Scaup <i>Aythya marila</i>	rare	M, W	Oct-Mar					+			
36	Goldeneye <i>Bucephala clangula</i>	low number	M, W	Oct-Mar					+			
37	White-headed Duck <i>Oxyura leucocephala</i>	rare	M, B, W	the whole year round	UzRDB, IUCN RL, EN >1%, W				+	+	+	
38	Smew <i>Mergelus albellus</i>	low number	M, W	Oct-Mar	>1%				+			
39	Goosander <i>Mergus merganser</i>	low number	M, W	Nov-Mar					+			
40	Osprey <i>Pandion haliaetus</i>	rare	M	Mar-Apr, Sep-Nov	UzRDB,				+			+
41	Black Kite <i>Milvus migrans</i>	low number	M	Mar-May, Aug-Oct		+	+			+		
42	Hen Harrier <i>Circus cyaneus</i>	common	M,W	Sep-Apr		+				+	+	
43	Pallid Harrier <i>Circus macrourus</i>	common	M	Mar-Apr, Aug-Oct	UzRDB, IUCN RL, NT	+				+	+	
44	Marsh Harrier <i>Circus aeruginosus</i>	common	R	the whole year round		+		+	+	+	+	

№	Species (Latin and English name)	Abundance	Reason of presence	Occurrence	Protection and other status	Habitats						
						Desert	Settlement	Tugai forest	Open water	Shore-line	Reed-bed	Precipice
45	Long-legged Buzzard <i>Buteo rufinus</i>	rare	M, B, W	the whole year round		+	+			+		+
46	Steppe Eagle <i>Aquila rapax</i>	rare	M, W	Oct-Mar	UzRDB,	+				+		
47	Golden Eagle <i>Aquila chrysaetos</i>	rare	R	the whole year round	UzRDB,	+						
48	Pallas' Sea Eagle <i>Haliaeetus leucoryphus</i>	rare	M, W	Oct-May	UzRDB, IUCN RL, VU					+		
49	White-tailed Sea Eagle <i>Haliaeetus albicilla</i>	common	M, W	Sep-Mar	UzRDB,					+		
50	Egyptian Vulture <i>Neophron percnopterus</i>	rare	M	Mar-Apr, Sep-Oct	IUCN RL, EN	+	+					
51	Saker Falcon <i>Falco cherrug</i>	rare	M,B, W	the whole year round	UzRDB, IUCN RL, EN	+						+
52	Merlin <i>Falco columbarius</i>		M, W	Oct-Apr		+		+				
53	Common Kestrel <i>Falco tinnunculus</i>	low number	M, B,W	the whole year round		+	+					+
54	Quail <i>Coturnix coturnix</i>	common	M	Apr-May, Aug-Oct		+						
55	Pheasant <i>Phasianus colchicus</i>	common	R	the whole year round		+						
56	Common Crane <i>Grus grus</i>	common	M	Mar, Aug-Oct		+				+		
57	Demoiselle Crane <i>Anthropoides virgo</i>	common	M	Mar-Apr, Aug-Oct		+				+		
58	Water Rail <i>Rallus aquaticus</i>	low number	M, B	Mar-Nov							+	
59	Moorhen <i>Gallinula chloropus</i>	common	R	the whole year round							+	
60	Coot <i>Fulica atra</i>	numerous	M, B, W	the whole year round	>1%, W				+		+	
61	Great Bustard <i>Otis tarda</i>	low number	M	Mar-Oct	UzRDB, IUCN RL, VU	+						
62	Little Bustard <i>Tetrax tetrax</i>	low number	M	Apr-Nov	UzRDB, IUCN RL, NT	+						
63	Houbara Bustard <i>Chlamydotis undulata</i>	low number	M, B	Mar-Oct	UzRDB, IUCN RL, VU	+						
64	Stone-curlew <i>Burhinus oedicephalus</i>	low number	M, B	Mar-Oct		+						
65	Grey Plover <i>Pluvialis squatarola</i>	common	M	Mar-May, Jul-Oct						+		
66	Golden Plover <i>Pluvialis apricaria</i>	low number	M							+		

№	Species (Latin and English name)	Abundance	Reason of presence	Occurrence	Protection and other status	Habitats						
						Desert	Settlement	Tugai forest	Open water	Shore-line	Reed-bed	Precipice
67	Ringed Plover <i>Charadrius hiaticula</i>	common	M, W	Apr-May, Aug-Oct						+		
68	Little Ringed Plover <i>Charadrius dubius</i>	common	M	Mar-Apr, Jul-Sep						+		
69	Greater Sand Plover <i>Charadrius leschenaultii</i>	rare	M	Mar-Apr, Jul-Aug		+				+		
70	Kentish Plover <i>Charadrius alexandrinus</i>	low number	M, B	Mar-Sep						+		
71	Nothern Lapwing <i>Vanellus vanellus</i>	low number	M	Mar-Apr, Sep-Oct						+		
72	White-tailed Lapwing <i>Vanellochettusia leucura</i>	common	M, B	Mar-Sep						+		
73	Ruddy Turnstone <i>Arenaria interpres</i>	common	M	May, Jul-Sep						+		
74	Black-winged Stilt <i>Himantopus himantopus</i>	common	M, B	Apr-Sep						+		
75	Common Oystercatcher <i>Haematopus ostralegus</i>	common	M	Mar-May, Jul-Sep						+		
76	Green Sandpiper <i>Tringa ochropus</i>	low number	M, W	Jul-May						+		
77	Wood Sandpiper <i>Tringa glareola</i>	rare	M, W	Jul-May						+		
78	Common Redshank <i>Tringa totanus</i>	rare	M, W	Jul-May						+		
79	Marsh Sandpiper <i>Tringa stagnatilis</i>	rare	M, W	Jul-May						+		
80	Red-necked Phalarope <i>Phalaropus lobatus</i>	low number	M	Apr-May, Jul-Sep						+		
81	Ruff <i>Phylomachus pugnax</i>	low number	M	Mar-May, Jul-Oct						+		
82	Little Stint <i>Calidris minuta</i>	low number	M	Mar-May, Jul-Oct						+		
83	Dunlin <i>Calidris alpina</i>	low number	M, W	Apr-May, Aug-Oct						+		
84	Broad-billed Sandpiper <i>Limicola falcinellus</i>	rare	M	Mar-May, Aug-Sep						+		
85	Jack Snipe <i>Lymnocyptes minimus</i>	low number	M	Mar-May, Oct-Nov						+		
86	Common Snipe <i>Gallinago gallinago</i>	low number	M	Mar-May, Sep-Nov						+		
87	Eurasian Curlew <i>Numenius arquata</i>	low number	M	Mar-May, Aug-Oct	IUCN RL, NT					+		
88	Collared pranticole <i>Glareola pratincola</i>	low number	M	Apr-May, Jul-Oct						+		

№	Species (Latin and English name)	Abundance	Reason of presence	Occurrence	Protection and other status	Habitats						
						Desert	Settlement	Tugai forest	Open water	Shore-line	Reed-bed	Precipice
89	Black-winged Pranticole <i>Glareola nordmanni</i>	rare	M	Apr-May, Jul-Oct	UzRDB, IUCN RL, CRE					+		
90	Черноголовый хохотун <i>Larus ichthyaetus</i>	rare	M, W	Oct-Apr					+	+		
91	Yellow-legged Gull <i>Larus cachinnans</i>	common	M, B, W	the whole year round					+	+		
92	Black-headed Gull <i>Larus ridibundus</i>	common	M, B, W	the whole year round					+	+		
93	Slender-billed Gull <i>Larus genei</i>	low number	M, B, W	the whole year round					+	+		
94	Whiskered Tern <i>Chlidonias hybrida</i>	low number	M, B	Apr-Sep					+	+		
95	Caspian Tern <i>Hydroprogne caspia</i>	common	M, B	Mar-May, Sep					+	+		
96	Common Tern <i>Sterna hirundo</i>	common	M, B	Mar-Apr, Jul-Sep					+	+		
97	Little Tern <i>Sterna albifrons</i>	common	M, B	Apr-May, Aug-Sep					+	+		
98	Black-bellied Sandgrouse <i>Pterocles orientalis</i>	common	M, B	Mar-Nov		+				+		
99	Pin-tailed Sandgrouse <i>Pterocles alchata</i>	low number	M, B	Mar-Oct		+				+		
100	Pallas' Sandgrouse <i>Syrrhaptes paradoxus</i>	low number	M, B	Mar-Oct		+				+		
101	Rock Dove <i>Columba livia</i>	common	R	the whole year round		+				+		+
102	Collared Dove <i>Streptopelia decaocto</i>	low number	R	the whole year round			+					
103	Turtle Dove <i>Streptopelia turtur</i>	low number	B	Apr-Oct		+		+				
104	Oriental Turtle Dove <i>Streptopelia orientalis</i>	low number	M	Apr-May, Sep		+		+				
105	Laughing Dove <i>Streptopelia senegalensis</i>	low number	R	the whole year round			+					
106	Cuckoo Cuculus canorus	low number	M, B	Apr-Sep							+	
107	Eagle Owl <i>Bubo bubo</i>	rare	R	the whole year round		+						+
108	Little Owl <i>Athene noctua</i>	rare	R	the whole year round								+
109	European Nightjar <i>Caprimulgus europaeus</i>	low number	M	Apr-Oct		+						

№	Species (Latin and English name)	Abundance	Reason of presence	Occurrence	Protection and other status	Habitats						
						Desert	Settlement	Tugai forest	Open water	Shore-line	Reed-bed	Precipice
110	Egyptian Nightjar <i>Caprimulgus aegyptius</i>	low number	M, B	Apr-Oct	B	+						
111	Common Swift <i>Apus apus</i>	common	M	Mar-Jun, Aug		+						
112	Eurasian Roller <i>Coracias garrulus</i>	common	M, B	Apr-Sep	IUCN RL, NT	+						+
113	European Bee-eater <i>Merops apiaster</i>	common	M	Apr-May, Sep-Oct		+						
114	Blue-cheeked Bee-eater <i>Merops superciliosus</i>	common	M, B	Apr-Oct		+						+
115	Hoopoe <i>Upupa epops</i>	rare	R	Mar-Apr, Sep-Oct			+					
116	Sand Martin <i>Riparia riparia</i>	common	M	Apr-Oct		+				+		
117	Barn Swallow <i>Hirundo rustica</i>	common	M, B	Mar-Oct		+	+					
118	Red-rumped Swallow <i>Hirundo daurica</i>	low number	M	Apr-Oct		+	+					
119	Crested Lark <i>Galerida cristata</i>	common	R	the whole year round		+	+					
120	Red-capped Lark <i>Calandrella cinerea</i>	low number	M, B	Mar-Apr, Aug-Oct		+						
121	Calandra Lark <i>Melanocorypha calandra</i>	common	M	Feb-mar, Jul-Oct		+						
122	Richrds' Pipit <i>Anthus richardi</i>	rare	M	?		+				+		
123	Tawny Pipit <i>Anthus campestris</i>	common	M	Mar-Apr, Aug-Oct		+				+		
124	Water Pipit <i>Anthus spinoletta</i>	common	M	?		+				+		
125	Yellow Wagtail <i>Motacilla flava</i>	common	M	Mar-May, Aug-Oct						+		
126	Citrine Wagtail <i>Motacilla citreola</i>	common	M	Mar-Apr, Aug-Sep						+		
127	White Wagtail <i>Motacilla alba</i>	common	M, W	Aug-Apr		+	+			+		
128	Pied Wagtail <i>Motacilla personata</i>	common	M, B	Mar-Oct			+			+		
129	Isabelline Shrike <i>Lanius isabellinus</i>	rare	M	Apr-May, Aug-Sep		+						
130	Long-tailed Shrike <i>Lanius schach</i>	rare	M	Apr-May, Aug-Sep		+						
131	Great grey Shrike <i>Lanius excubitor</i>	low number	M, B	Mar-Oct		+						
132	Common Starling <i>Sturnus vulgaris</i>	common	M,W	the whole year round			+			+		
133	Myna <i>Acridotheres tristis</i>	common	R	the whole year round			+					

№	Species (Latin and English name)	Abundance	Reason of presence	Occurrence	Protection and other status	Habitats						
						Desert	Settlement	Tugai forest	Open water	Shore-line	Reed-bed	Precipice
134	Magpie <i>Pica pica</i>	common	R	the whole year round				+				
135	Pander's Ground Jay <i>Podoces panderi</i>	common	R	the whole year round		+						
136	Jackdaw <i>Corvus monedula</i>	common	M	Mar, Oct			+			+		
137	Rook <i>Corvus frugilegus</i>	common	M, W	Oct-Apr			+			+		
138	Carrion Crow <i>Corvus corone</i>	low number	R	the whole year round				+			+	
139	Eurasian Hooded Crow <i>Corvus cornix</i>	low number	M, W	Oct-Apr			+					
140	Brown-necked Raven <i>Corvus ruficollis</i>	low number	R	the whole year round	B	+						
141	Black-throated Accentor <i>Prunella atrogularis</i>	rare	M	Mar, Oct				+				
142	Paddyfield Warbler <i>Acrocephalus agricola</i>	common	M, B	Apr-May, Aug-Oct							+	
143	Clamorous Reed Warbler <i>Acrocephalus stentoreus</i>	common	M, B	Apr- Sep							+	
144	Great Reed Warbler <i>Acrocephalus arundinaceus</i>	common	M	Apr-May, Sep-Oct							+	
145	Booted Warbler <i>Hippolais caligata</i>	common	M	Apr-May, Aug		+						
146	Southern Booted Warbler <i>Hippolais rama</i>	low number	M, B	Apr-Aug	B	+						
147	Common Whitethroat <i>Sylvia communis</i>	low number	M	May, Aug		+	+					
148	Lesser Whitethroat <i>Sylvia curruca</i>	low number	M	Apr-May, Aug-Oct		+		+				
149	Desert Warbler <i>Sylvia nana</i>	rare	B	Apr-Oct	B	+						
150	Chiffchaff <i>Phylloscopus collybita</i>	common	M	Mar-May, Sep-Oct		+		+				
151	Scrub Warbler <i>Scotocerca inquieta</i>	low number	R	the whole year round	B	+						
152	Spotted Flycatcher <i>Muscicapa striata</i>	low number	M	Apr-May, Aug-Sept		+		+				
153	Common Stonechat <i>Saxicola torquata</i>	low number	M	Apr-May		+						
154	Wheatear <i>Oenanthe oenanthe</i>	low number	B	Mar-Oct		+						

№	Species (Latin and English name)	Abundance	Reason of presence	Occurrence	Protection and other status	Habitats						
						Desert	Settlement	Tugai forest	Open water	Shore-line	Reed-bed	Precipice
155	Pied Wheatear <i>Oenanthe pleschanka</i>	low number	M, B	Mar-Oct		+						
156	Finsch's Wheatear <i>Oenanthe finschii</i>	common	B	Mar-Oct		+						
157	Black-eared Wheatear <i>Oenanthe hispanica</i>	common	B	Mar-Oct		+						
158	Desert Wheatear <i>Oenanthe deserti</i>	low number	M,B	Mar-Oct		+						
159	Isabelline Wheatear <i>Oenanthe isabellina</i>	low number	M, B	Mar-Oct		+						
160	Rufous Scrub Robin <i>Cercotrichas galactotes</i>	low number	M,B	Apr-Sep		+		+				
161	Common Nightingale <i>Luscinia megarhynchos</i>	low number	M	Apr-Sep				+				
162	Thrush Nightingale <i>Luscinia luscinia</i>	low number	M	Apr-May, Aug-Sept				+				
163	Bearded Reedling <i>Panurus biarmicus</i>	Common	R	the whole year round							+	
164	Turkestan Tit <i>Parus bokharensis</i>	low number	R	the whole year round	B			+				
165	House Sparrow <i>Passer domesticus</i>	low number	M	Apr-Sept			+					
166	Indian House Sparrow <i>Passer indicus</i>	Common	M, B	Apr-Sept			+	+				
167	Tree Sparrow <i>Passer montanus</i>	Common	R	the whole year round			+					
168	Desert Sparrow <i>Passer simplex</i>	Rare	R	the whole year round		+						
169	Pine Bunting <i>Emberiza leucocephala</i>	low number	M	Mar-Apr, Oct-Nov				+				
170	Reed Bunting <i>Emberiza schoeniclus</i>	Common	M, B	Mar-Nov				+			+	

Note:

Reason of Presence: Migrating (M), Breeding (B), Wintering (W), Resident (R).

Protection Status: UzRDB (Red Book of Republic of Uzbekistan), IUCN RL (Red List).

Other status:

B - species, whose area of distribution is limited by biome "Eurasian Deserts and Semideserts";

>1% - 1% or more from ecogeographic population (Ferruginous Duck – current size for South Asian population not estimated, in 80-s it was about 7%);

W – species, dominating in winter period, whose aggregate number exceeds 20 thou.

3.1.7 Dengizkul Lake and Vicinity Water Quality

During the 2005 Environmental audit conducted at Khauzak and Shady sample analyses were made separately for three groups: water collected from open water reservoirs, ground water, and drinking water. In total, 22 water samples were collected on the sites, including 10 samples from surface water reservoirs, 6 ground water samples and 6 drinking water samples. The analyses results showed the following.

Sulfate and magnesium water predominates in Dengizkul Lake, its mineralization being 20-25 g/l, which manifold exceeds the set MPC level. As the distance of the discharge collector inflow point to the lake increases, water mineralization goes up and exceeds 25 g/l at a small distance from the discharge collector, i.e. Dengizkul Lake belongs actually to the category of brackish water.

Though biological and chemical oxygen demands exceed the allowable MPC level on the whole lake surface, as the distance of the discharge collector inflow point to the lake increases, their values grow 3 and 15-fold, respectively. BOD and COD are maximum in the south-eastern shore of Dengizkul Lake (up to 70 and 50 MPC, correspondingly).

The average amount of dissolved oxygen in the lake is about 0.5 mg/l, which is 8 times lower than the minimum limit set for the fishery bodies of the 2nd category. At the same time the amount of dissolved air in the discharge collector water corresponds to the value set for the fishery bodies of the 1st category.

The amount of phenol in Dengizkul Lake goes up as the distance of the discharge collector inflow point increases and its concentration exceeds the set MPC in the middle of the lake water surface, its maximum concentrations being detected on the north-eastern lakeshore of Dengizkul. According to the conclusion of the specialists of State Specialized Analytical Control Inspection phenol concentration in the lake depends on natural factors - quality of inflowing waste waters and temperature regime (natural evaporation process). Phenol concentration gradually accumulates as distance from the collector grows longer, because there is no out-flow and in the middle and eastern part of the lake there are stagnant areas. Benzol and oil products in the ground water have been detected at all sampling stations, however, their concentrations do not exceed the set MPC.

All over the ground water suspended solids and dry residue exceed the allowed MPC by 25 Times or more (from 25 to 48 MPC), total water mineralization – 27.5 times (from 9.18 to 47.8 MPC), BOD and COD (from 4.29 to 41.2 MPC), BOD5 (from 3.07 to 29.4 MPC). Ammonium, nitrites and carbonate ions haven't been found in the ground water. High concentrations of Xylol - from 3.4 to 105 MPC were detected there. Ammonium, cadmium, copper, nickel, lead, iron and zinc were found in the drinking water but most of their concentrations are considerably lower than the allowed MPC. Concentrations of cadmium (from 3 to 10 MPC) and aluminum (2.3 times more than MPC) were detected, but practically no concentrations of these were found in artesian wells. Pesticides in the drinking water were not found either. Benzol and oil products were detected but their concentrations in the drinking water was considerably lower than the MPC. Water from artesian wells used on the site as drinking water is mineralized, its mineralization exceeding MPC 6.6-7.2 times.

According to sanitary and bacteriological characteristics water from only one artesian well meets the established norms. Microorganisms capable to reproduce due to oxidation of oil hydrocarbons are found in all water samples (excluding discharge water collector) and bottom silts. In most samples their number is in the range of 10³-10⁴ cells per 1 ml.

According to subsurface water difference in age and lithological deposits on the considered territory, the following hydrogeological elements can be distinguished: aquiferous, locally

aquiferous, water permeable, but waterless and water-proof complexes, and fractured aquiferous zones.

The Project area belongs to the Bukhara-Karshinsk artesian basin. According to the surveys, quaternary deposits aquifer system is the closest to the ground surface. Groundwater depth is 10 meters and more.

Subsurface water mineralization is over 3 g/l. Water type changes from hydrocarbonate calcium to sulfate chloride water. Water is salty and can be used only as utility water; subsurface water is fed through filtration of discharged surface water from the main collector and partly by means of precipitants infiltration.

Subsurface water was found for the period of geological engineering survey at the depth of 0.6-2.1m in the area of border roadway construction near the frontier post and on the territories adjacent to Dengizkul Lake (bordering on Turkmenistan).

3.1.8 Dengizkul Lake Water Management

Dengizkul Lake is part of Right-bank Amu-Darya collecting drain (main water discharge channel) facilities system. The system of Right-bank main collecting drain includes a network of the existing, constructed and designed collecting drains that incorporates Sichankul, Dengizkul and Medami Lakes, used as regulating reservoirs. Dengizkul Lake, located in the south-east edge of Bukhara oasis, is one of three largest wastewater lakes in the Aral Sea basin. Dengizkul Lake is a natural depression and it is used for collection of drain water, diverted from irrigated lands of Bukhara and Navoi provinces of the Republic of Uzbekistan. Regulation of Dengizkul Lake water balance is performed by the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan, and Lake level depends only on the conditions and irrigation design, developed by specialized subdivisions of the Ministry of Agriculture and Water Resources.

The State Committee for Nature Protection is a controlling body, dealing with the issues of biodiversity conservation at Dengizkul Lake, and an authorized control entity at this water body within the framework of Ramsar Convention provisions.

There's no constant hydrographic network at Khauzak and Shady, except for a well-developed drainage system and a discharge collector. The largest of them is South-Dengizkul discharge collector, the flow of which varies from 0.31 to 1.4 m³/s, correspondingly. Collector drainage water salinity ranges from 10.9 to 13.7 g/l.

At the present moment the main arm of the Zaravshan river – Taikir, as well as several waste and drainage water channels flow into Dengizkul Lake situated in the lower reach of the Zaravshan river in the deepest area of a big tectonic depression. Dengizkul Lake is of a closed type (there is no outlet). The area and depth of lake varies constantly: in high-water years the lake surface reached 110-120 thousand hectares with the water volume of 3-3.5 bln. m³ and the inmost maximum depth of 25-30 m. As reported in the EIA, in 2007 its area was 50,000 – 60,000 ha. The water is very salty; its bottom is covered with 4-6 cm of salt.

Only 150-230 mln. m³ of water flowed into the Lake in 1993-2003 compared to 480-550 mln. m³ of water inflow in the years 1985-90. This amount of inflow water doesn't cover evaporation losses and the water volume decreased by 60 percent. As a result, the lake area was reduced almost twofold and produced a salted lakeshore line.

Water mineralization increased approximately 5-8-fold, including: 8-fold in chlorides, 26-fold in sulfates, 7-fold in nitrates, and 6-fold in biological oxygen demand (BOD) content.

Decreases of Lake level are predetermined by the fact that evaporation exceeds inflow. However this tendency may stop at a certain stage, when evaporation and inflow stabilize. Time periods of water level depend on the inflow of drain water throughout a year. The highest water level is observed during 2nd, 3d and 4th month of the year, and during the rest of the year water level is at its lowest. Amplitude of seasonal fluctuations, depending on the Lake surface area, is about 0.7-0.9 m per year. Table 4 shows different long-term data on inflows and water surface elevations of the Lake

Table 4 Long-term data on filling volume and actual elevation in Dengizkul Lake⁸

Years	2001	2002	2003	2004	2005	2006	2009
Maximum water volume (km ³)	3.5		3.2	3.15	3.1	2.8	2.55
Water surface area (km ²)	315	292	287.5	281	278	258	250
Actual elevation, water table, (m)	184.4	183.45	182.51	182.04	181.8	181.47	180.32

LUOC, as it was said above, together with the Ministry of Agriculture and Water Resources and State Committee for Nature Protection of the Republic of Uzbekistan agreed upon the maximum level of Dengizkul Lake to be 182.2 m, and border of water protection area was accepted based on that level. Actually, taking into account current water level (180 m), all field facilities are located at a considerable distance from the water edge of Dengizkul Lake and do not have any actual impact either on the Lake level or on the condition of the Lake ecosystems.

3.2 Key Environmental and Social Issues and Impact Significance Criteria

According to the articles of Ramsar Convention in order to promote conservation of wetlands, included into the list, contracting parties (environment-oriented and business entities) shall develop and implement joint action plans. Every contracting party takes measures to inform the partner, as soon as possible, about the changes that may occur as a result of industrial development, pollution and other kinds of human intervention. Information about such changes is immediately transferred to nature preservation bodies that in their turn must inform Convention Secretariat.

In the process of its activity LUOC submits information to State Committee for Nature Protection of the Republic of Uzbekistan under the procedure of EIA and obtaining approval of state supervisory bodies for all design solutions.

At this time LUOC does not conduct any activities in the Dengizkul water protection area, which is a critical habitat, although some activities within this zone are contemplated. The surroundings of Dengizkul area, where process facilities (such as pipelines, roads, and flares), including where the crossing area (both options) are located, are natural habitats. Environmental analysis suggests that ecological impacts of the proposed development are either minor or mitigable, and LUOC's proposed development is predicated on taking steps to avoid, minimize, and mitigate those impacts to the extent possible. LUOC recognizes the ecological importance of Dengizkul Lake, and specifically its global significance as a habitat

⁸ Official certificate (letter #05-1/32-21 from 29/01/10) of the Ministry of Agriculture and Water Resources

for a large diversity and abundance of water birds, and through its monitoring and mitigation plan, is taking steps to develop this project in an ecologically responsible manner

Figure 5 Typical View of Khauzak-Shady Area



As discussed in the Environmental Audit and the EIA⁹, up to the present, no evidence has been found of flora and fauna degradation in the process of the facilities operation. Disturbed areas are rehabilitated upon completion of construction. At the same time in the area of the shift camps there appeared new synanthropic animal species, whose life is related to human beings, such as myna (*Acridotheres*) and laughing dove.

As natural habitats in the Project area are typical of desert areas (Figure 5), i.e. area with scarce fauna, from the point of view of species and quantity, it is impossible to single out any single species as an indicator. In the given case habitat condition is of great importance, in particular vegetation condition. However, as it's already been noted, up to the present there is no evidence of vegetation degradation caused by LUOC activity near Dengizkul Lake.

Based on the information reported in the Environmental Audit and the EIA, as well as other research carried out by the experts who contributed to this BAP, the existing monitoring data and conducted long-term histologic studies of plant and animal tissues is insufficient to allow saying with complete certainty if there is any actual impact on biodiversity condition related to LUOC activity. The implication of this statement is that the BAP will need a robust monitoring program that will allow the application of additional actions to protect biodiversity if warranted by future monitoring (see Section 6.3).

As reported in the Environmental Audit, during the first year of biotic monitoring (2005), when there were not yet any activities at Khauzak and Shady sections, a detailed inventory of species and quantitative composition of flora and fauna was taken. The inventory detected (visually and also based on the presence of tracks and sounds) 154 wildlife species, among them 13 species of mammal, 111 species of birds, 21 species of reptile, 2 species of amphibians and 7 species of fish. 83 species of plants are registered in the area. Among detected species of birds 67 species were defined to be migrating and 8 species were nesting. It should be noted that the majority of detected animals were found directly at Dengizkul Lake. As it was said above animal species composition drastically decreases as

⁹ See EIA Section 3.2

the distance from the Lake increases. Within that period, specialists of State Biological Control took tissue samples of 8 species of animals and studied the samples jointly with the specialists of Republican Pathologicoanatomic Center of the Ministry of Health of the Republic of Uzbekistan. Histologic analyses of taken samples showed absence of any toxic modifications, histologic pattern corresponded to the standard constitution of organs.

Later on in the next stages of monitoring (2006-2010)¹⁰ the specialists of State Biological Control of the Republic of Uzbekistan conducted comparative analysis of species and quantitative composition of flora and fauna at Khauzak and Shady sections. Like during the first year, samples of tissues were taken for histologic analyses¹¹. Samples of animal liver and lungs were analyzed, and the presence and concentration of heavy metals in blood was also studied. Based on comparative analysis results it follows that histology of animals and blood composition are stable and change only depending on season (natural variations). Based on the experts' observations and research, species and quantitative composition of flora and fauna are stable, there have not been detected any decline of population, including population of migrating and nesting birds.

As mentioned earlier, the existing monitoring data and conducted long-term histologic studies of plant and animal tissues are not sufficient at present to say if there is any actual impact on biodiversity condition related to LUOC activity.

It should be noted that even during intensive development of Khauzak section (2007), biotic monitoring found tracks of animals near constructed facilities, including tracks of scarce Persian gazelles and nimble hares (Figure 6).

Figure 6 Tracks of Persian Gazelles (left) and Nimble Hares



Studies showed that in most cases there occurs physical damage of plant tissues caused by grazing of cattle by residents of the areas adjacent to Dengizkul Lake. In 2010 specialists of State Biological Control decided that studies must pay greater attention to the presence of heavy metals in soil composition of plant roots. This method was put into action in 2010. The purpose is to trace trends at the beginning of plant – animal food chain and to get earlier results without the necessity to study animal tissues.

Examination by state ecological expertise and analysis of design solutions for further development by LUOC of Khauzak and Shady sections concluded that impact on resting

¹⁰ See Annex N.

¹¹ See Section 6.1 for a description of the existing monitoring program, including the purpose of these analyses.

and nesting sites of migrating birds was not likely, as conducted operations were not expected to affect Dengizkul water area and lakeside¹². During construction, conducted in second half of summer time (after 15 July) and autumn to minimize impacts¹³, there will be short-term impact in the area of the crossing. At the same time adopted design solutions will allow to stabilize water level in the lake that will have favorable impact on the existing biocenosis of Dengizkul Lake, and construction of the crossing will not influence the level of lake flow.

3.3 Applicable Environmental Management Plans

The Program of Nature Conservation Actions for 2008 - 2012 years has been developed and implemented in the Republic of Uzbekistan. This program is approved by the Decree of the Cabinet of Ministers of the Republic of Uzbekistan dated 18.09.2008 №211. This Decree sets forth actual measures (see Annex D) for biodiversity conservation and other aspects of natural resources and environment management, persons in charge of measures implementation, measures budget, assigned supervisory bodies. Biodiversity conservation actions specified by the Program do not provide for any specific actions in the territory of Khauzak – Shady sites.

In the Republic of Uzbekistan there was also implemented the Program of Environmental Monitoring in the Republic of Uzbekistan for 2006-2010 years, approved by the Decree of the Cabinet of Ministers of the Republic of Uzbekistan dated 16.03.2006 №48. It is planned to develop and approve similar State Program for the period of 2011-2015 years before the end of 2011, in the Program there will be set forth basic areas of State Environmental Monitoring in the Republic of Uzbekistan. It should be noted that the State Environmental Monitoring Program does not provide for environmental control at Khauzak – Shady sites.

3.4 Other Oil and Gas Operations in the Area

Current oil and gas operations in the Khauzak-Shady region and their status are as follows:

In the immediate vicinity of the Khauzak-Shady site (see Figure 2):

1. Khauzak (LUOC's site) – production
2. Shady (LUOC's site) – design and construction
3. Dengizkul (NHC Uzbekneftegaz's site) – production

In the region, but more than 20 km distant from the Project area:

4. Urtabulak (NHC Uzbekneftegaz's site) – production
5. Samantepe (NHC Uzbekneftegaz's site) – production
6. Zevardy (NHC Uzbekneftegaz's site) – production
7. Kokdumalak (NHC Uzbekneftegaz's site) – production
8. Mubarek Gas Processing Plant (NHC Uzbekneftegaz's site) – production / operation

This BAP has been developed in compliance with IFC Performance Standard 6, which in turn relies on Performance Standard 1 for clarification of issues such as cumulative impacts. Performance Standard 1 specifies that “in the event of risks and impacts in the project's area

¹² Please note that this refers to the conclusions reached by the State Ecological Expertise, as duly referenced. It is recognized existing monitoring data are insufficient for establishing reliable and robust conclusions about likely impacts of the project. Impacts will be actualized and necessary additional measures identified through the EBMP process will be . Fuller discussion of this is provided in Section 6, the EIA (p. 223) and Annexes G and H of this BAP

¹³ Because of the very hot climate during the summer, faunal activity is at its lowest point of the year. Therefore construction of major infrastructure near the Lake will be done at this time.

of influence resulting from a third party's actions, the client will address those risks and impacts in a manner commensurate with the client's **control and influence** over the third parties, and with due regard to conflict of interest." (*emphasis added*)

LUOC does not possess sufficient information about NHC "Uzbekneftegaz" facilities, nor does it have any control over the operation of those facilities. The current standard operation of Khauzak Shady facilities, including implementation of conservation measures, specified by design solutions, result in low ecological impacts as confirmed by the favorable conclusion of State Ecological Examination. Taking into account that any activity in the Republic of Uzbekistan is subject to mandatory state ecological examination the same may be assumed for other gas production facilities. The cumulative impact of Khauzak and Shady projects is described in Chapter 4.6.

4. Impact Assessment and Mitigation Measures

4.1 Regulatory Compliance

LUOC's activities at Khauzak-Shady are in compliance with:

1. Law of the Republic of Uzbekistan No. 754-XII of 12/09/1992 "On Environmental Protection":
 - Article 28 "Natural Environment Monitoring";
 - Article 29 "Goals of Environmental Control";
 - Article 32 "In-House, Production and Public Environmental Control".
2. Production Sharing Agreement for the Kandym Group of Fields, the Khauzak and Shady Sites, as well as the Kungrad Site made by and between the Republic of Uzbekistan and a consortium of investors comprising OAO LUKOIL and NHC Uzbekneftegaz on June 16, 2004:
 - Article 23 "Safety and Environment";
 - Clause 23.4 "Environmental Auditing";
 - Clause 23.7 "Continuous Monitoring".
3. Health, Safety and Environment Policy approved by the resolutions of the Steering Committees of June 5, 2009.
4. Production Environmental Control Regulations approved by the Operator's order No. 173 of June 10, 2009.
5. Recommendations prepared by the Health, Safety and Environment Subcommittee of the Steering Committee.

Further, the Environmental Impact Statement for the proposed activities at Shady has been reviewed and approved by the Environmental Expertise of the State Committee for Nature Protection of the Republic of Uzbekistan (See Annex H). The approval includes the following condition:

"At the next stage of design it is necessary to develop ecological consequences statement, containing the following information:

- Ecological norms for all kinds of environmental impacts of designed production;
- detailed drawing of gas pipeline crossing through strait with method of underwater section cleaning from condensate and mechanical impurities;
- detailed plan of designed works site with indication of sludge receiving pit at pigging facilities;
- plan of restoration for disturbed lands and environmental quality monitoring."

As developed, this BAP does not contradict the State Programs since they are not applicable to the Dengizkul area, but naturally supplements them and is conducted in accordance with the norms and standards, existing in the territory of the Republic of Uzbekistan.

4.2 Project Technical, Environmental and Business Considerations

This report has been developed in accordance with opinion No. 18/719z of September 20, 2010 of Glavgosekoekspertiza of Uzbekistan. According to the Opinion in preparing EIS it is required to:

- provide more information on how and where the gas pipeline crosses the lake's neck, designating risk areas with uneven bottom, deep holes or loose soils that form the bottom's substrata, and develop measures to prevent pollution of surface water in the course of gas pipeline construction and operation;
- provide details of Dengizkul lake crossing;

- include more information on construction of flow lines and gas collecting mains given the lake's neck crossing specifics.

In response to these requirements the Project provides additional information as follows:

4.2.1 Gas Pipeline Construction

Normal Conditions

Gas will be transmitted from cluster site K-1 of Shady to PGTP "Khauzak" via a 21.5 km long 426 mm gas collecting main, with 16 mm thick walls and the operating pressure of 7.5 MPa. The daily transmitted volume of gas is 4.76 million m³. Onshore the gas lines will be buried in the ground with the difference between the surface and the top of the pipe being at least 1.0 m.

Construction of the collecting main includes crossing of a water barrier i.e. the lake's neck that connects Dengizkul Lake with the bay. As mentioned earlier, the crossing will be located in the narrowest place where the lake adjoins the bay (see Figure 3 and 4). The optimum crossing location was selected taking account hydrological and morphological properties of the lake's neck and variations thereof throughout the entire time of operation of such underwater line.

Determination of the optimal position of the line and profile of crossing included calculations based on the incurred cost criterion in accordance with the requirements for the strength and stability of the pipeline and environmental protection. The proposed gas main crossing is underground, buried at 2 to 2.5 m below the lake's bottom depending upon the bottom's relief at the place of such crossing. As mentioned in Section 2.1, for the sake of ecological safety during construction and operation of underwater crossing through the neck of Dengizkul Lake, it was decided to use the horizontal directional drilling (HDD) method for laying manifold and fuel gas pipeline. Because the pipeline will be drilled well under the bottom of the lake, it will not disturb the lake's ecology.

Sufficient solidity of the underwater line structure is ensured by the following:

- assigning the pipeline section category with respective pipe wall thickness increase;
- utilizing pipes with advanced metal strength properties;
- Weld tests including 100% monitoring with the use of 100% visual-measuring and ultrasonic methods, and repeated 100% radiographic tests.
- utilizing pipes with special factory-made protective coating;
- checking condition of header insulation for correspondence of its resistance to design values using cathodic polarization technique;
- pipeline flow tests in three stages;
- Inter-pipe diagnostics with additional runs of a four-arm caliper and ultrasonic device after completion of construction and assembly operations.

To make the buoyancy of the gas pipeline negative, the thickness of the header wall at the crossing is assumed to be 20 mm. Construction of the gas main and fuel gas pipeline will be simultaneous. In construction of the crossing cutting-edge technologies will be used including gabion structures and geomaterials. Gabion walling consists of wire-made frames (gabions) filled with stones. Over time, the empty space in pores is filled with soil particles. In a few years the gabion work will be fully consolidated, obtain maximum stability and will then have unlimited lifetime.

After the consolidation is completed, even a break in the metallic netting would not cause destruction of the structure, since the soil particles accumulated in the gabions become denser and solidly cement the stone core of the gabions. The key properties of a gabion structure are their flexibility, strength, water permeability, noise absorption, long lifetime and environmental friendliness. Gabion structures are environmentally friendly because of their

high water permeability and the ability to accumulate soil particles which promotes vegetation growth. Their construction in the lakeside area will help the development of aquatic flora and fauna. The research has shown that the use of galvanized steel, including that with plastic shell, does not affect the natural environment. The construction of gabion structures mostly involves manual labor without heavy machines, which itself does not cause any major environmental harm. Of course, of major importance for the area's environmental balance is the unimpeded filtration of water in gabion structures. Gabion structures fit into natural environment so well, and often they simply merge into it. Not only do they preserve the aesthetic value of nature (in contrast to, say, reinforced concrete structures), but also supplement it.

Another material used is the geotextile. Geotextile is the unwoven material made of thermally fixed endless fibers of 100% polypropylene. This ensures resistance to moisture and chemical compounds, particularly to alkali and acids, absence of septicity and resistance to effects produced by various fungi and mold, rodents and insects, improves root-proofness. The environmental friendliness of geotextile is represented by helping reduce industrial impact on the environment and utilization of natural resources in industrial and civil engineering.

The Project is in an area of low seismic activity compared to other parts of Uzbekistan. However, in accordance with KMK 2.01.03-96 "Construction in seismic areas" an estimated seismic activity of the construction area is 8 on Richter scale. All buildings and structures were designed with allowance for such earthquake activity: all other elements of the structure were designed on an individual basis, and the design envisaged seismicity of the area, foundations were designed with allowance for specific combination of loads, which occur due to the seismic force. Therefore earthquake prevention activities are targeted at reliable and safe operations of buildings, structures and process equipment.¹⁴

Emergency Conditions

The initial option of the pipeline project considered in the Shady Ecological Consequences Statement provided that the pipeline cross the lake's strait under water but assuming the vertical elevation of the lake's bottom relief. In this case, in emergency the negative impact from the pipeline would appear in water pollution with methane (CH₄) and hydrogen sulfide (H₂S). The project emergency assessment in this case has identified that the maximum loss of gas at the underwater part of the crossover would be around 1 ton (more than 1000 m³). This type of accident would cause deaths of organisms, mainly planktonic, only in immediate area, close to the place of gas leak at the water surface. Population reactions in this case were not expected.

In case of gas pipeline rupture in the shallow water area, the negative impact by the natural gas on the early stages of fish development would be intensified with strong hydrodynamic blowing which is related to a volley emission of gas being pumped at a high pressure. However, such pump would have localized negative effects and its influence on ichthyoplankton can be assessed as low. It was found that, even during maximally powerful impact of elastic waves caused by explosion of multi-kilogram blasting charges, the radius of the zone of fish lethal affection is not more than several tens of meters.

Emergency emissions of gas during an underwater pipeline rupture can also lead to creation of a ditch (crater) and a local zone of increased turbidity which may be dangerous for biota in the area close to the place of accident.

Generally, the consequences of an accident at the underwater part of a pipeline were assessed as localized with the limited negative impact on water organisms and lake's biota.

¹⁴ See EIA, p. 213.

In order to eliminate such risks and possibility for gas components to emit into the water, the initially projected option was amended – it was decided to do pipeline laying under the lake's bottom in the most narrow part using the horizontal-directional drilling method.

Horizontal-directional drilling method is used in global practice for embedding of pipelines down to any depth lower than the level of bottom and shore reforming with a purpose to completely keep the water basins' ecosystems unaffected.

The major advantages of this method with respect to emergency conditions are:

- possibility to lay pipelines lower than the expected bed deformations. This is a solid protection for a pipeline from any mechanical damages and external corrosion. This therefore minimizes the risk of emergency;
- this method prevents emissions of gas components into the water and eliminates the risk of kills of water organisms in emergency;
- this method allows to promptly remove the consequences of an accident without affecting the water ecosystems.

For emergency shutdown of the pipeline parts there are technological decisions including automated systems and anti-wreck system at the beginning of a pipeline, at each 10 km of the pipeline and at the end of the pipeline. The measure described above is one of the main tools for mitigation of accident consequences at the Lake. The project also provides for automatic system of emergency protection, corrosion monitoring and nondestructive control along the entire length of the pipeline.

4.2.2 Comparative Environmental Analysis of Road Options;

Environmental analysis of the two road construction options (Figure 3 and Figure 4) demonstrated that unimpeded construction of the road is impracticable. It is likely that bypassing of Dengizkul's neck will require construction of facilities to cross several other water barriers. Those are represented by a channel between the lakes and two connecting channels. In this case the additional length of the route will be around 8.3 km.

Both proposed routes are located within Kyzyl-Kumy sands area. The terrain across which both routes go is made up of fixed sands which are from 2 to 5-6 meters high. The vegetation growing on sand dunes includes shrubs of saxaul and zhingil which must be uprooted during construction. Both of the routes cross water barriers.

- The first alternative route of the road from K-9 to well No.305 crosses a water barrier in the form of 0.5 m – 4.5 m deep channels. The water surface part of this route is 260 m long with the maximum depth in this area of 4.5 m, and the distance to the water edge of Dengizkul is 500 m. The route is 15.805 km long.
- The second alternative route of the access road leading to well No. 305 crosses 3 water barriers, i.e. a 0.3-0.35 m deep channel between the lakes and 2 connecting channels which are 0.3-0.5 m deep. The route goes across saline marsh areas which require additional expenses to be incurred in the course of road construction. The water surface part of route 2 is 150 m long, the maximum depth reaches 2.1 m, and the distance to the water edge of Dengizkul is 2 km. The route is 24.071 km long.

Comparison of the two motor road options demonstrated that the longer option results in heavier damage to soil and wetlands, and disruption of flora and fauna. The second route causes fragmentation of nesting areas of first priority bird species (Marbled Teal and Ferruginous Duck), is likely to result in higher risk of collisions of birds with the power distribution line (the line would be 8 km longer) and promotes wind erosion processes. In terms of the road's operation period, if the doubled road length compared to the second option will result in more emissions from motor vehicles. In addition, for the first option, construction of access ways to the underground gas pipeline crossing is a possibility,

whereas the area of the land withdrawn for long-term use for the second option will increase, and so will the impact on the biota living along the road. Since the second alternative route passes through a series of marshes, across three waterways, and is 8 km longer than the first alternative, it would cause greater habitat fragmentation. If significant fragmentation and/or disturbance impacts along the selected route are discovered through the monitoring to be developed in the EBMP (see Annex N), then such impacts will be mitigated.

The design solution for the road crossing over the Lake's neck includes construction of culverts at various locations of the crossing. This will ensure that the neck's hydrological regime is not affected, even in case of a drastic increase of the water level, for the head of water in this case will not be substantial.

Pursuant to Letter No. 077-139 of 06/07/2010 of the Ministry of Agriculture and Water Management the maximum water consumption in the crossing area must be 50 m³/sec. The assumed layout of the units ensures unimpeded circulation of water masses, both vertically, from surface to bottom, and across the lake's neck, which eliminates the possibility of formation of stagnant zones in the areas of the lake adjacent to the facility. This is the most acceptable solution both from the environmental and hydrological perspective. The selected design solution which provides for construction of the road along the neck crossing and construction of culvert is not going to affect the neck's hydrological regime, even in case of a drastic increase of the water level, for the head of water in this case will not be substantial.

The motor road is also designed to have 720 mm round-shaped metal culverts which serve the environmental purposes (i.e. enable migration of smaller animals). Migration of animals will not be impeded by the pipeline in any way due to the fact almost all of the pipelines lie underground. (See Annex J for plan and profile engineering drawings of the crossing)

The first alternative of road construction along the Lake shore and across the entrance to the bay is the better choice from the point of view of minimizing impact on the birds nesting at the small lakes and marshes found along the second route. Fragmentation of nesting areas of such species as Marbled Teal, Ferruginous Duck, Mute Swan, Red-crested Pochard, Pygmy Cormorant and other species of birds (see Figure 4) is less with the first route option since these species do not nest at the main lakescape of Dengizkul Lake. When young birds are able to fly and pod with adult birds, they visit the main lakescape, but prefer to stay at their small lakes. These species are found at the main lakescape mostly during migration and wintering period. It must be remembered that fidelity of nesting birds to certain areas is very high.

Migrating and wintering birds have greater mobility and if necessary they adapt to relocation to new territories with greater ease. Species migrating and wintering at Dengizkul mostly concentrate near the main lakescape and lakeshore in the north part of the lake. The road will have a certain impact on them. In order to reduce this impact it is necessary to limit operation traffic speed to 20-30 km/h, and use warning signs.

From the point of view of ecological safety the selection of the first variant of road construction through the strait is justified, first of all, by the fact that there will be little or no fragmentation of nesting area of the species, including globally threatened Marbled Teal and Ferruginous Duck, nesting at shallow lakes, overgrown with rush typical of the second road option. Secondly, habitat of plants and animals, dwellers of natural ecological system of sand desert around the lake, overgrown with rush, is neither destroyed, nor reduced including habitat for 6 bird species inhabiting in biome "Eurasian Deserts and Semideserts".

The shallow-water habitat situation for shore birds changes very fast depending on Lake water level. Within the last ten dry years water levels went down and the area of reeds

decreased. During the first year of abundant precipitation the water level in the Lake will increase and marshes and reeds will be restored. As a result distance from breeding area of the species inhabiting reeds and designed road will decrease. So, if the second option were implemented the project impact of fragmentation of nesting habitats (reed) of birds will increase – that is, the disturbance level will increase. This supports the selection of the first option of road route. The maps shown in Figure 4 are at present conceptual ones (based on over 10 years of field work by Dr. Lanovenko, but to be enhanced through this year's field work and the EBMP). Current nesting areas of high priority bird species will be mapped in greater detail during field study to be conducted in 2012.

In summary, the selected alternative with construction of crossing through the strait of the lake is considered the more acceptable, because in this case nesting area will not be fragmented, road length is shorter resulting in bird habitat being reduced by smaller area and the disturbance factor also influences less territory as shown in Figure 3. Reduced road length also results in lower level of bird mortality, caused by collision with moving vehicles and electrical distribution lines. From an engineering perspective, the shorter road is also more cost-effective.

Although this option may lead to some adverse ecological impacts, LUOC is committed to mitigating impacts so as not to contribute to significant adverse effects on bird populations or cause significant adverse impacts to critical habitat. This mitigation will be achieved through the development and implementation of the EBMP and an adaptive management paradigm.

4.2.3 Measures to Minimize Environmental Impact

Road Crossing

Analysis of the crossing section identified that construction and further operation of the crossing over the water barriers is one of the most complicated engineering issues. The selection of place and configuration of the crossing over the strait was made strictly in accordance with the norms and rules applicable in Uzbekistan. When selecting the road route, not only costs of construction, maintenance, repair and operation were taken into account, but also the expenses associated with conservation of environment, safety, and time period available for construction.

Cutting-edge technologies will be used in construction of the road crossing, including gabion structures and geomaterials. The measures included into the design are aimed at minimizing environmental impact. In addition, the design provides for a number of measures aimed at protection of existing and currently designed facilities of Khauzak and Shady from flooding with Dengizkul water, which will significantly reduce the risk of emergencies.

The research done by OOO "UZGIP" reveals that the preferred option provides for reconstruction of the off-take channel and assumes that the maximum elevation of water in Dengizkul will be 182.2 m. This option is the most environmentally friendly, for it rules out any direct impact on Dengizkul's ecosystem (both in the course of construction, and operation of the channels). What's more, stable elevation of water and Dengizkul's area at 181 to 182.2 m as proposed by the Government will enable preservation of Dengizkul's biocenosis that formed in the recent years with lake water at those levels.

Implementation of the recommended measures to prevent flooding of the existing and planned facilities on the Khauzak and Shady Blocks of Dengizkul gas condensate field will considerably reduce the risk of occurrence of possible accidents caused by flooding with Dengizkul's water, and, consequently, eliminate possible adverse impact upon the environmental media.

Wells

The project provides for the following technical solutions for wells (No. 1034, 1031, 1037, 1043, and 1045), whose wellheads are located within the water protection zone of Dengizkul with the maximum elevation of water being 182.2 m:

- preparation works being performed at such wells, including environmental screening, must make locations of the wellheads and drilling sites more specific and ensure that the sludge pit is located at the longest distance possible off the water edge;
- temporary near-well sludge pits must have enhanced water-proof protection of their bottom and walls made up of a film material, be fully diked and enclosed;
- it is during this stage that given the actual location of the wellhead, a site for construction of the additional water-proof sludge pit outside of the water-protection zone of Dengizkul will be selected (with its capacity exceeding the designed one by 20%);
- following commencement of well development and upon completion of its construction, construction of an additional water-proof sludge pit outside of the water-protection zone of Dengizkul will take place (with its capacity exceeding the designed one by 20%);
- at the final stage, following construction and completion of the well, drilling wastewater will be subject to treatment in the near-well sludge pit as required by the Regulations and fed for reuse at the next wells;
- upon treatment and pumping of drilling wastewater out of the near-well pit, the drilling cuttings and used drilling muds will be completely transported in specialized vehicles into an additional sludge pit located outside of the water protection zone of Dengizkul. Further, the location of this sludge pit will be screened so as to minimize environmental impacts;
- drilling cuttings and used drilling muds will be recycled in the additional sludge pit as required by the Regulations;
- following its recycling, drilling waste will be buried in an additional sludge pit located outside of the water protection zone of Dengizkul;
- the final stage of work at the drilling sites includes elimination of near-well and additional sludge pits, complete technical and ecological reclamation of land and purification of the drilling site and the area adjacent to the additional sludge pit.

Implementation of the foregoing scheme at wells whose wellheads lie within the water-protection zone will help minimize adverse impact on the lakeside area of Dengizkul, is in conformance with the applicable legal framework of the Republic of Uzbekistan, and has been given a positive opinion by the State Environmental Examination Committee under the Statement of Environmental Impact of construction of producers on the Shady Block (No. 18/860z of 11/30/2010).

Over the last decade the volume of water flowing into Dengizkul has tended to decrease, which, therefore, results in lower absolute elevations of water. Nonetheless, vertically the wells are designed with a tolerance of 1 m of the maximum amount of water in Dengizkul, with the absolute elevation of water assumed at 182.2 m, i.e. to the elevation of 183.2 m. In consideration of the foregoing, any wells that are below such level must be dyked so as to reach the level of 183.2 m. There is only one such well, i.e. No. 1036. Well No. 305 is located at the maximum level of 183.2 m. Two drilled wells No. 305 and 306 are completed at the relevant elevation levels, and well No. 305 uses a dam for protection against surface water and a water-proof well site surface of the well and internal slopes of the dam against groundwater.

During construction of wells there will be one mud pit for temporary storage of drilling wastes. Around the whole mud pit there will be diking and fencing with markers. Temporary mud pit is made in close vicinity to the drilling unit, which is a local source of noise and vibration. The presence of external disturbance factors results in the absence of birds in the

area near the drilling unit during well construction; during the same period the presence of carrion in the immediate vicinity of the well is not expected. Upon completion of well construction all wastes are removed to be disposed of in special places, temporary mud pits are removed, and the whole area of the drilling site is reclaimed. During operation of wells in their territory there will be no sewage or waste ponds, in this connection bird mortality and carrion formation are also not expected.

At Khauzak and Shady sections due to the presence of hydrogen sulfide in the composition of well product all gas, vented through safety valves, by process equipment, and during operating procedures, is subject to mandatory burning in flare, gas discharge without burning is strictly forbidden. This circumstance is strictly specified in the Guidelines on Safety of Oil and Gas Industry of the Republic of Uzbekistan. Discharge of sulfurous gas to flare in accordance with existing technology is conducted regularly, for a short period of time and is meant to prevent emergencies related to change of internal pressure in the process system. To ensure proper burning, the gas flares are equipped with pilot-light burners, working continuously with the minimum volume of fuel gas. Taking into account that there is always flame at flare tips, use of flare stack by birds as perch is not possible, and death of birds caused by gas burning at flares in day time, is uncharacteristic, as heat of working pilot-light burners prevents the approach of birds to flare stack.

Power Distribution Lines

A 10 kV overhead line runs across the State fund's land that is not used for agricultural purposes. Its route has received approval from land owners and other corporate stakeholders.

Collisions with Distribution Lines

Considerable research has been undertaken in Uzbekistan regarding the issue of bird collisions with power lines.¹⁵ Three bird migration routes go through Uzbekistan. Migrating

¹⁵ Information about bird collisions in Uzbekistan is available from the following sources:

- Abdunazarov B.B. Prevention of Bird Mortality at Power Lines in Uzbekistan // Advisory No 411. Tashkent, Fan, 1987. 11 p.
- Lanovenko E.N., Shernazarov E.Sh., Filatov A.K., Filatova E.A. Regarding necessity to survey impact of high voltage power transmission lines on migrating birds in order to improve ecological safety in the Republic of Uzbekistan // Vital Issues of Uzbekistan Fauna Survey and Preservation. Materials of Republican Scientific Conference. Tashkent 2011.
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birds cross the territory of the republic in spring, mostly from south-west to north-east, and in autumn, in the opposite direction. During the flight they face various threats, including possible collisions with power distribution lines. If a distribution line is at right angle to the direction of bird movement it is of greater danger to them than if it were parallel to their route. The project's designed distribution line to the Shady area is located along Dengizkul banks, i.e. at right angle to the predominant direction of migrating bird movement, so it represents some danger. Some of the birds die of mechanical collision with the lines during the flight, more often in case of low visibility at night or adverse weather conditions. Avoiding collision with the lines is especially difficult for large birds with poor mobility or flying at high speed. In Uzbekistan cases are known for different species and in different regions. A Demoiselle Crane was found dead after an apparent collision with electric power line 6-36 kW near the territory of Bukhara Center for Breeding Rare Animals in spring 2010 (personal information of Dr. N. Soldatova, staff of Bukhara Center). Four Black-bellied sand grouse were found dead after collision with a 110 KW power line not far from Tuyabuguz water reservoir (Lanovenko E.N., 1988). Nazarov A.P. and Zagrebin S.V. (1988) have reported regular collisions by quail inside Tashkent. Quail with hematoma on the high part of chest was found also under 500 kW line in the foothills of Zarafshan ridge near settlement Urgut in Samarkand region (Lanovenko, personal information). A Corncrake was found in Tashkent near distribution line (Lanovenko, personal information).

Although not as frequent, power line collisions may also occur with small birds from Passeriformes (lark, warbler, booted warbler, Acrocephalus warbler) (Information bulletin of the IBA project in Uzbekistan, 2007). Transmission and distribution lines located near water bodies are of special danger as water bodies are places of waterfowl concentration. In 2001-2005 during winter observation there were found some dead Dalmatian Pelicans under a 110 kW power line near Tudakul water reservoir, which is situated not far from Bukhara (Lanovenko, 2008).

In the project area under study, in the places regularly crossed by birds during flights between resting places or nesting and feeding places it is necessary to put visual markers, for instance, in the form of large balls noticeable from distance, painted luminescent, which will warn the birds of danger and signal that flight height or direction must be changed, preventing collision of the birds with lines. At the project site marker installation is required at the sections of distribution lines above the crossing and near it, along peninsula situated north of the crossing as birds regularly fly through the section from the bay and adjacent cut-off lakes to the main water area.

A variety of line marking devices, including hanging markers and coils will be considered and applied.¹⁶ In the process of monitoring there will be defined places with increased risk and recommendations for installation of additional markers will be formed. The exact type of markers will be chosen, based on climatic conditions of the region and types of birds to be protected, including cranes and other species with high wing loading (so called "poor fliers"), for which power line collision risk may be the biggest risk issue. Analysis of marker efficiency will be incorporated into monitoring plan (within the framework of monitoring of birds mortality, caused by collision with power distribution lines)

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¹⁶Additional general information on bird collisions with power lines is found at <http://www.aplic.org/Collisions.php>

Electrocution Risk

It has been determined that bird mortality as result of electrocution at low voltage line is higher than at high voltage line. Death of birds is caused by electric shock, if the bird, sitting on power transmission pole, touches the line and itself becomes conductor of electricity. In Uzbekistan such species are large and middle size birds of prey from Falconiformes (harrier, eagle, buzzard, falcon, etc.), which use distribution poles as perches, especially in open landscapes, without tree vegetation. Often electric shock also kills eagle owls, kestrels, desert ravens, rollers. Sometimes electric shock may kill flocks of small, but closely sitting birds, for example, starlings. In order to prevent such situations special insulators must be installed to provide maximum protection of birds from electric shock.

Figure 7 Typical power distribution line pole at Khauzak

The project provides for use of Raychem cases¹⁷ to prevent birds from getting dangerously close to the top live part of the insulators installed on reinforced concrete poles of 10 kV overhead lines and provide corrosion protection of the steel works of the overhead lines against bird droppings (see). The selected route and design of the overhead lines are consistent with the environmental requirements and fundamental land management principles of Uzbek law.

Water and Wastewater

Operations of the cluster sites and the linear part of the gas pipeline do not include consumption of water for household and drinking purposes due to the fact that the facilities are unmanned. No water is intended to be used for production or fire-suppression purposes during the operation of the facilities under review. The facilities under review are not going to produce any wastewater. Given the absence of permanent staff at the sites, there will be no generation of solid domestic waste. Secondary development is not likely to occur in the Khauzak Shady area due to its remoteness and lack of infrastructure.

Khauzak and Shady sections are developed on the basis of state licenses and rights, as discussed in the Introduction Chapter of the Shady EIS. Soil of work site under investigation and adjacent territories are zones of natural infertility. Based on the analysis of soil in the area, affected by the facilities, it may be concluded that construction is implemented on lands non-arable due to their infertility (chapter 3.4, Shady EIS). LUOC does not have information about plans of other business activity in the territory of Khauzak-Shady.

Land Use

¹⁷ Casings BCIC 3313 are developed by Raichem company for protection of birds and animals from dangerously close approach to alive insulators or upper parts of insulators, installed on concrete or metal supports. Multipurpose design allows to install casings on any types of insulators with voltage up to 24 kV. Casing is made of flexible polymer with high resistance to UV rays, tracking resistance and resistance to adverse weather conditions. Casing for protection of birds was designed in accordance with the requirements of birds protection, specified in clause 8.10 of DIN VDE 0210/12.85 standard. Flexible material of casing is suitable also for curved insulators, for instance design for two insulators (double level of protection) is possible.



The area of the permanent allotment of land is insignificant and will be around 3 ha. The area of land to be allotted on a temporary basis should be at least 91 ha, which will be subsequently subject to reclamation and returned to its owner. Land lots located in the pipelines' protection areas shall not be subject to withdrawal from land users and shall be used for agricultural and other activities in strict conformity with the safety requirements. The soils of the area and adjacent territories constitute a naturally low fertility zone. Soils are the most exposed to gas pipeline laying activities (flow lines, gas collecting main, fuel gas pipeline). Construction of the facilities being designed will result in disturbance of the soil layer. The project includes technical and biological reclamation activities which will reduce the adverse impact on the soil cover. Reclamation activities will promote restoration to the initial state of the biogeocenosis. The entire scope of construction activities will be done only within the allotted area to eliminate any uncontrolled disturbances of soil and vegetation. No vehicles are allowed to travel off-road. To eliminate contamination of soil and vegetation, fueling activities and storage of fuels and lubes will only be allowed in special hard-surfaced and fully diked locations.

After the construction is completed, flora along the road will be restored and the animals that were disturbed during the construction will return to their habitats.

Camps

Khauzak-Shady currently employs approximately 200 workers who are housed at full service camps. Camp conditions are acceptable and are considered above national average. The facilities being designed are intended to operate as unmanned ones, however the number of personnel engaged in construction activities will be 108 people. The labor force requirement is planned to be met by construction companies' personnel and free employment of personnel, including from residents of settlements which are the closest to the construction site. The facilities being designed are located in Alat District, where the level employment is low due to the district's focus on agricultural activities. As the official statistics have it, about 44% of the labor pool is employed. The major part of the unemployed are youths and women. Creation of new jobs, even for the time of construction, is a positive social contribution into the district's life.

Analysis of the environmental impact in the area of the construction site reveals that any adverse impact on the health of personnel resulting from operation of the wells, cluster sites, flow lines and gas mains is not expected. The operations and safety plan associated with the proposed development treats worker safety issues, planning, and preparation in detail.

It should be noted that from the republic-wide perspective, performance of the construction activities and additional production of gas and gas condensate belong to measures aimed at creating a sustainable rawstock base, thus providing the population and industry with fuels and petroleum products in the planned quantities. Therefore the beneficial social and economic effect of the project being reviewed is evident.

Taking the proposed environmental measures along with those aimed at protection of existing and currently designed facilities of Khauzak and Shady from flooding with Dengizkul water will ensure safe operation of surface facilities at Shady Block and help significantly improve environmental performance.

4.3 Wetland Impacts

Dengizkul lake formed in the 1950's. Its area is about 45,000 ha. During the last decades the hydrological regime of the lake was very unstable. In the past the lake was filled with water from Bolshoy Paralelniy, Amu-Bukhara and Amu-Karakul canals. From 1996 due to diversion of field wastes inflow of water into the lake ceased, as a result within several years

lake water salinity started to increase sharply and the shallow part dried, forming vast salt marshes. The Lake area decreased by 15,000 ha, and water salinity increased to a level exceeding 30 ppm. This caused deterioration of habitats of the birds nesting in the shallow waters and reeds. Species composition and quantity of nesting waterfowl decreased. Migrating and wintering bird species lost rich shallow water forage lands. However, being located along Central Asian migration route the lake was still attractive for migrating waterfowl, but its importance decreased.

In the last years water inflow into Dengizkul Lake started again and the process of wetland ecosystems restoration began. This means that in the immediate future wetlands will become even more valuable as wintering, nesting and resting place for migrating birds.

Stabilization of hydrological regime is one of the most important requirements to ensure implementation of the project under study. Hydrological regime is a determinant abiotic factor for ensuring the stability of the Dengizkul wetland ecosystems. That is why efforts made by LUOC to reach agreement with the Ministry of Agriculture and Water Resources about partial stabilization of hydrological regime (water level will not rise above 182.2 m) should be positively evaluated. It will improve condition of bird habitats, including nesting and feeding places at the whole water body.

Construction of facilities (roads, distribution lines, pipelines, bridge), flood control dams, required building premises, and other surface facilities of Khauzak and Shady fields will undoubtedly cause some decrease of habitat area and territorial redistribution of animals inhabiting riparian area and adjacent to the project sites, and be a factor in the increased disturbance in bird nesting, resting and feeding places, located at or near the project site.

Impact on birds inhabiting Dengizkul Lake and their habitats during Khauzak-Shady field construction and development, as well as operation, will be locally limited to the project site. This will allow mitigation of its adverse consequences, using recommendations offered in the BAP and summarized in Tables 3 and 4, below.

Compensation measures for increasing of wetland areas were considered, but not proposed at this time. As Dengizkul Lake is located in an arid zone near south-west edge of Kyzyl-Kum desert (Sundukly sands) increase of wetland area in any proportions may cause the following undesirable consequences:

1. As a result of flooding:

- decrease of domestic animal pasture areas;
- decrease of habitat of wild terrestrial vertebrates, including mammals, birds, reptiles and amphibians. The following mammals would suffer: rodents, tolai hare, *Vulpes vulpes caragan*, dog fox, desert cat and Goitered Gazelle (*Gazella subgutturosa ssp. subgutturosa*) – decrease of species registered in Red Data Book of the Republic of Uzbekistan as vulnerable, mosaically distributed species, and in the Red List of IUCN; birds: land-nesting larks, Houbara bustard (the species is registered in National Red Data Book and IUCN Red List of Threatened Species) and inhabitants of flooded riparian vegetation; reptiles: snakes and lizards, species registered in National Red Data Book: Desert Monitor (*Varanus griseus*) and *Naja oxiana*.
- flooding of habitats of characteristic complex of waterfowl and riparian birds, nesting in shallow places and at the banks of Dengizkul Lake, among them there are some species of ducks, sandpipers, gulls, terns and pratincoles.
- direct extinction of small mammals (rodents), lizards, snakes, clutches and chicks of waterfowl and other birds, nesting on the land in close vicinity to the water body (if flooding coincides with time with nesting period).

2. In arid climate of Uzbekistan due to lack of water resources, high level of natural transpiration, predetermined by hot climate, recurrent draught years and unstable hydrological regime shallowing may start that will result in:

- creation of vast new salinized territories and concurrent loss of habitats by the birds already adapted to new nesting conditions.
- shallowing is also dangerous as it increases possibility that land carnivores (foxes, cats, marbled polecats) will get access to nests of birds, which they take.

In spite of these constraints, development of carefully planned wetland areas may be proposed in the future as part of the adaptive management of the Lake habitats if proven necessary and if they are done without producing the negative impacts mentioned above.

4.4 Consultation with Stakeholders

In the design stage of the Khauzak and Shady site development, all technical particulars of the project, as well as industrial and ecological safety measures were specified for the project, including actions for minimization of impact on biotic components of environment and conservation of species diversity. All this information was submitted to stakeholders for review. A mandatory condition of further project implementation is approval of technical solutions under the project and specified actions by authorized representatives of stakeholders.

This procedure is implemented in the process of land allocation for the purposes of construction and operation of field surface facilities. Taking into account remoteness of the Khauzak - Shady field surface facilities from populated areas, consultations must be held with and technical solutions under the project must be approved by the representatives of the following stakeholders:

- District Agriculture and Water Resources Department;
- District Department of Land Resources and Stat Cadastre;
- District Land-Utilization, Registration and Real Estate Cadastre Service;
- Chief District Architect;
- Head Doctor of District Sanitary-Epidemiological Agency;
- Nature Conservation Interdistrict Inspectorate;
- District Land Allocation Inspectorate;
- District Forestry

Upon approval of technical solutions under the project by the stated stakeholders District Khokim's Decision about allocation of lands for designed facilities is issued, and then this Decision is approved by Region Khokim. In Annex H there are copies of corresponding documents, drawn up and approved in the process of consultations and agreement under the Shady project.

In addition, all technical and process components of the project are going through mandatory ecological and other public examination (see Annex G).

4.5 Summary of Impacts and Mitigation

The importance of the Dengizkul Lake Ramsar site requires the identification of impacts to bird species of national, regional or global significance, together with an identification of the mitigation measures that will be required and applied by LUOC. These are summarized in Table 5, Table 6 and Table 7.

For high or top priority (1, 2 and 3 groups in Table 5) nesting species¹⁸, as a result of a considerable change of hydrological regime it is possible that nests will be flooded and clutches will be destroyed. In case of excessive decrease of water level, degradation of riparian vegetation and decrease of nesting areas will occur. Deterioration of shallow lakes and their riparian vegetation providing protection, required for rest and recreation of migrating birds, may also have serious consequences for Dalmatian Pelican (2nd priority), White Pelican and Whooper Swan (3rd priority).

Breeding areas of hydrophilic species, mentioned above, mostly located in the bay and at shallow lakes Djedikul, are not expected to experience significant fragmentation, as discussed in Section 4.2.2. Such impact is reduced by selection of the route option friendliest to birds for road and power distribution line. However, both road and power transmission line may pose a certain threat to those nesting species which regularly make night feeding flights from shallow lakes and bay to the shore of Dengizkul Lake. Among them there are also high priority species — Ferruginous Duck (1st priority), Spoonbill, and Little Egret (3rd priority). Construction works and traffic may disturb birds nesting in the part of the bay adjacent to the lake, especially near the strait. In order to minimize disturbance it is necessary to observe special rules, limiting possibility of adverse impact on birds and their habitats (such as execution of works during the period optimum for birds, observance of main and temporary road utilization rules, and careful and well-maintained use of the area near the wells). Management, as well as construction workers and personnel attending the field will be informed of these restrictions. Large quantities of dust, generated during construction also have negative impact on birds, especially nesting ones. This impact may be considerable for adult birds, for example, if they are hatching sets, and for chicks. In order to minimize such impact construction sites must be dampened. During field operation roads located near bird breeding areas shall be regularly watered.

Some bird disturbance is possible as a result of monitoring the water level in the lake, during routine maintenance or repair works conducted in the wells, pipelines or other field facilities. This disturbance, if it occurs, is considered an minimal impact unless significant works are being carried out. For migrating and wintering bird species the road and power distribution line are dangerous obstacles in their movement between feeding and rest areas. During migration period species composition of birds subject to such threat is especially diverse. For all top priority species there is possibility of mortality caused by collision with power distribution lines.

Neither species of cranes (Common and Demoiselle) were noted by ornithologists. Only rangers reported rarely observing them near the lake (Lanovenko 2011).

Proposed mitigation measures include:

- hydrological regime control: control over adherence to agreed water level (not more than 182.2 masl)¹⁹.
- along the road there will be speed limit signs for traffic to slow down to 20-30km/h near nesting areas and places where birds frequently cross the road, moving between nesting, resting and feeding areas (near the bay).
- on the power distribution lines there will be installed markers, ensuring its visibility, in known areas - at the crossing across the lake strait and for some distance north and south of the crossing (the main location with high risk of collision)²⁰.

¹⁸ Marbled Teal, Ferruginous Duck, White Headed Duck – 1st priority; Spoonbill, Pygmy Cormorant, Mute Swan – 3rd priority

¹⁹ Although the control of water level is not its responsibility, LUOC has obtained an agreement with Government to not exceed this agreed level (see Annex L).

²⁰ The 2012 field work may identify other locations where markers are needed, and these will be added.

- Restriction of LUOC and contractor workers' access to bird habitats.
- Monitoring surveys during operation will allow implementation of required adverse impact mitigation measures in due time. In order to find additional places with high risk of bird mortality on power distribution line special observations will be continued. When new places are detected actual measures will be taken to decrease risk of bird mortality.
- Regular damping of the territory for dust suppression for summer time.

To assess changes in general condition of environment at Khauzak-Shady section LUOC has used the following tools. Before the beginning of activity (2004) there was conducted an initial ecological audit of the area and initial status was recorded not only in the territory of Khauzak-Shady section, but also near it (background stations). Then in the process of activity LUOC conducts systematic ecological monitoring in Khauzak-Shady area with engagement of independent specialized analytical control laboratory of State Nature Protection Committee of the Republic of Uzbekistan. Monitoring results and analysis of laboratory research of air, surface and underground water, soils, biotic components quality, and radiation environment allow the definition of level of changes in the environment in Khauzak-Shady area, caused both by LUOC facilities and other facilities (at background stations outside the boundaries of contract area). At present in Khauzak-Shady area no serious changes have been detected indicating that the general environmental situation is stable. In general, the expected direct environmental impact of LUOC facilities at Khauzak - Shady section will be moderate and local, not going beyond the boundaries of production sites. It is expected that anthropogenic impacts will not exceed the self-regeneration potential of affected ecosystems. The current standard operation of Khauzak Shady facilities, including implementation of conservation measures specified by design solutions, results in low ecological impacts as confirmed by the favorable conclusion of State Ecological Inspectorate. This will be verified through the development and implementation of the EBMP and an adaptive approach to this action plan.

Table 5 presents a summary of impacts and mitigations (based on normal operating circumstances) for the Project. The table provides an assessment of the impacts according to when they occur (construction or operation of the Project), and whether they are direct or indirect.

Table 5 Project-related ecological impact priorities, as determined by conservation significance and impact likelihood

Taxon	Priority	Conservation Status Criterion			Ecogeographic significance criterion (E.s) Global significance (G.s) of L. Dengizkul. population	Likelihood of significant impact from project criterion WITHOUT MITIGATION Threats to population (G- Global, E – local Ecological)
		IUCN status	Uzbek red book status	Global population trend		
Globally threatened species:						
White-headed Duck <i>Oxyura leucocephala</i>	1	EN	EN	decreasing	Till 34,2(G.s.)	High (G). Habitat loss. Reduction of feeding and roosting habitats in north-western part of the lake due to disturbance. Loss of unique key site of wintering population in Central Asian region and in Uzbekistan, where till 34% of world population were presented.
Marbled Teal <i>Anas angustirostris</i>	1	VU	EN	decreasing	Breeding 0,3 Wintering 2,4(G.s.)	High (G). Habitat loss. Disrupted reproduction due to disturbance near nesting habitat in the bay and reduction of feeding and roosting habitats in the north-western part of lake due to disturbance out of breeding season. Loss of breeding and wintering sites in Dengizkul lake and reduction of breeding population.
Ferruginous Duck <i>Aythya nyroca</i>	1	NT	NT	decreasing	TBD	High (G). Habitat loss. Disrupted reproduction due to disturbance near nesting habitat in the bay and reduction of feeding and resting habitats in the north-western part of lake due to disturbance out of breeding seasons. Loss breeding and wintering sites in Dengizkul lake and reduction of breeding population.
Dalmatian Pelican <i>Pelecanus crispus</i>	2	VU	VU	decreasing	TBD	High. Habitat loss. Loss of stopover site on the migrating route due to reduction of feeding and roosting habitats in the north-western part of lake as result of disturbance and power line collision
Pallid Harrier <i>Circus macrourus</i>	2	NT	NT	decreasing	TBD	Low (rarely occur individual birds). Mortality as result of power line collision or electrocution.
Pallas' Sea Eagle <i>Haliaeetus leucoryphus</i>	2	VU	EN	decreasing	TBD	Low (extremely rare, occasional occurrences) Habitat loss. Reduction of feeding and resting

Taxon	Priority	Conservation Status Criterion			Ecogeographic significance criterion (E.s) Global significance (G.s) of L. Dengizkul. population	Likelihood of significant impact from project criterion WITHOUT MITIGATION Threats to population (G- Global, E – local Ecological)
		IUCN status	Uzbek red book status	Global population trend		
						areas in north-western part of the lake. Mortality as result of power line collision or electrocution.
Egyptian Vulture <i>Neophron percnopterus</i>	2	EN	none	decreasing	TBD	Low (rare species). Habitat loss. Reduction of feeding and resting areas. Mortality as result of power line collision or electrocution.
Saker Falcon <i>Falco cherrug</i>	2	EN	NT	decreasing	TBD	Low (rare species). Habitat loss. Reduction of feeding and resting areas. Mortality as result of power line collision or electrocution
Great Bustard <i>Otis tarda</i>	2	VU	CR	decreasing	TBD	Low (extremely rare species). Power line collision Habitat loss due to disturbance.
Houbara Bustard <i>Chlamydotis undulata</i>	2	VU	VU	decreasing	TBD	Low (of rare occurrence). Powerline collision Habitat loss due to disturbance.
Little Bustard <i>Tetrax tetrax</i>	2	NT	VU		TBD	Low (rare). Powerline collision Habitat loss due to disturbance.
Eurasian curlew <i>Numenius arquata</i>	2	NT	none	decreasing	TBD	Low (scarce species). Habitat loss. Loss of stopover site on the migrating route due to reduction of feeding and roosting habitats as result of disturbance.
Black-winged Pratincole <i>Glareola nordmanni</i>	2	NT	VU	decreasing	TBD	Low (extremely rare species). Habitat loss. Loss of stopover site on the migrating route due to reduction of feeding and roosting habitats as result of disturbance.s
Eurasian Roller <i>Coracias garrulus</i>	2	NT	none	decreasing	TBD	Low. Habitat loss. Reduction of nesting and feeding habitat, fragmentation and nesting disruption. Mortality as result of power line collision or electrocution
Species listed only in the national Red Data Book (not in IUCN):						
Spoonbill <i>Platalea leucorodia</i>	3	none	VU	stable	TBD	High. Habitat loss. Loss of stopover site on the migrating route due to reduction of feeding and roosting habitats as result of disturbance.
Glossy Ibis <i>Plegadis falcinellus</i>	3	none	VU	decreasing	TBD	High. Habitat loss. Loss of stopover site on the migrating route due to reduction of feeding and

Taxon	Priority	Conservation Status Criterion			Ecogeographic significance criterion (E.s) Global significance (G.s) of L. Dengizkul. population	Likelihood of significant impact from project criterion WITHOUT MITIGATION Threats to population (G- Global, E – local Ecological)
		IUCN status	Uzbek red book status	Global population trend		
						roosting habitats as result of disturbance.
White Pelican <i>Pelecanus onocrotalus</i>	3	none	VU	decreasing	TBD	High. Habitat loss. Loss of stopover site on the migrating route due to reduction of feeding and roosting habitats as result of disturbance.
Pygmy Cormorant <i>Phalacrocorax pygmaeus</i>	3	none	NT	TBD	Till 1,0 (E.s.)	High. Habitat loss. Disrupted reproduction due to disturbance near nesting habitat and reduction of feeding and resting habitats due to disturbance.
Little Egret <i>Egretta garzetta</i>	3	none	VU	TBD	TBD	High. Habitat loss. Disrupted reproduction due to disturbance near nesting habitat and reduction of feeding and resting habitats due to disturbance.
Mute Swan <i>Cygnus olor</i>	3	none	NT	Increasing	1,0-3,0 (E.s.)	High . Habitat loss. Disrupted reproduction due to disturbance near nesting habitat and reduction of feeding and resting habitats due to disturbance
Whooper Swan <i>Cygnus cygnus</i>	3	none	VU	decreasing	Till 1,0 (E.s.)	High. Habitat loss. Reduction of feeding and resting areas during migration and in winter.
Osprey <i>Pandion haliaetus</i>	3	none	VU	TBD	TBD	Low (rare species). Habitat loss. Mortality as result of power line collision or electrocution
Golden Eagle <i>Aquila chrysaetos</i>	3	none	VU	TBD	TBD	Low (scarce species). Habitat loss. Mortality as result of power line collision or electrocution
Steppe Eagle <i>Aquila rapax</i>	3	none	NT	TBD	TBD	Low (scarce species). Habitat loss. Mortality as result of power line collision or electrocution
White-tailed Sea Eagle <i>Haliaeetus albicilla</i>	3	none	VU	TBD	TBD	Low (alights predominantly on the ground). Mortality as result of power line collision or electrocution
Other waterfowl including species represented more than 1% biogeographical populations:						
Eurasian Crane <i>Grus grus</i>	4	none	none	TBD	TBD	TBD
Demoiselle Crane <i>Anthropoides virgo</i>	4	none	none	increasing	TBD	TBD

Taxon	Priority	Conservation Status Criterion			Ecogeographic significance criterion (E.s) Global significance (G.s) of L. Dengizkul. population	Likelihood of significant impact from project criterion WITHOUT MITIGATION Threats to population (G- Global, E – local Ecological)
		IUCN status	Uzbek red book status	Global population trend		
Mallard <i>Anas platyrhynchos</i>	4	none	none	TBD	1,22 (E.s.)	High. Habitat loss. Reduction of feeding and resting areas during migration and in winter as result of disturbance.
Red-crested Pochard <i>Netta rufina</i>	4	none	none	stable	1,84 (E.s.)	High . Habitat loss. Reduction of feeding and resting areas during migration and in winter as result of disturbance. Reduction of population
Pochard <i>Aythya ferina</i>	4	none	none	decreasing	Till 8,3 (E.s.)	High . Habitat loss. Reduction of feeding and resting areas during migration and in winter as result of disturbance. Perhaps wintering population move to other site.
Smew <i>Mergelus albellus</i>	4	none	none	TBD	Till 1,2 (E.s.)	High. Habitat loss. Reduction of feeding and resting areas during migration and in winter as result of disturbance. Perhaps wintering population move to other site.
Coot <i>Fulica atra</i>	4	none	none	TBD	Till 10,0 (E.s.)	High. Habitat loss. Reduction of feeding and resting areas during migration and in winter as result of disturbance. Disrupted reproduction due to disturbance near nesting habitat in breeding season
Species restricted of biome "Eurasian Deserts and Semideserts":						
Egyptian Nightjar <i>Caprimulgus aegyptius</i>	5	none	none	TBD	TBD	High (E). Habitat loss. Reduction and destruction of nesting and feeding habitat, fragmentation and disruption of reproduction due to disturbance near nesting habitat. Mortality as result of vehicle accidents
Southern Booted Warbler <i>Hippolais rama</i>	5	none	none	TBD	TBD	High (E). Habitat loss. Reduction and destruction of nesting and feeding habitat, fragmentation and disruption of reproduction due to disturbance near nesting habitat.
Brown-necked Raven <i>Corvus ruficollis</i>	5	none	none	TBD	TBD	Low (scarce species). Habitat loss. Reduction of feeding and resting areas during migration. Mortality as result of power line collision or electrocution

Taxon	Priority	Conservation Status Criterion			Ecogeographic significance criterion (E.s) Global significance (G.s) of L. Dengizkul. population	Likelihood of significant impact from project criterion WITHOUT MITIGATION Threats to population (G- Global, E – local Ecological)
		IUCN status	Uzbek red book status	Global population trend		
Desert Warbler <i>Sylvia nana</i>	5	none	none	TBD	TBD	Low (rare species). Habitat loss. Reduction of nesting and feeding habitat, fragmentation and disruption of reproduction due to disturbance near nesting habitat.
Scotocerca <i>Scotocerca inquieta</i>	5	none	none	TBD	TBD	Low (scarce species). Habitat loss. Reduction of nesting and feeding habitat, fragmentation and disruption of reproduction due to disturbance near nesting habitat.
Turkestan Tit <i>Parus bokharensis</i>	5	none	none	TBD	TBD	Low (scarce species). Habitat loss. Reduction of nesting and feeding habitat, fragmentation and disruption of reproduction due to disturbance near nesting habitat.
Other non-listed waterfowl	5	none	none			High. Habitat loss. Loss of stopover site on the migrating route due to reduction of feeding and roosting habitats in the north-western part of lake as result of disturbance and power line collision
other non-listed raptors	5	none	none			High. Habitat loss. Loss of stopover site on the migrating route due to reduction of feeding and roosting habitats in the north-western part of lake as result of disturbance. Power line collision and electrocution.
other non-listed shorebirds	5	none	none			High. Habitat loss. Reduction of nesting and feeding habitat, fragmentation and disruption of reproduction due to disturbance near nesting habitat. Reduction of stopover phases
Other non-listed songbird species	5	none	none			High. Habitat loss. Reduction of nesting and feeding habitat, fragmentation and disruption of reproduction due to disturbance near nesting habitat.

NOTES for Table 5

- Top priority species:
- 1 - Globally threatened species, considerable part of whose world population is found at the lake;
 - 2 - other globally threatened species
 - 3 - species listed in the Red Data Book of the Republic of Uzbekistan (not International Union for Conservation of Nature and Natural Resources)
 - 4 - species, for which the lake is of ecogeographical importance,
 - 5 - distribution is restricted by "Eurasian Deserts and Near-deserts" biome, affected by the project.
- Threats to population:
- 1 - G - High Global threats;
 - 2 - E - High Local Ecological threats from project-related activities;
 - 3 - High threats (not any changes in structure of habitat, but there is high level of disturbance from project-related activities);
 - 4 - Low threats (not any changes in structure of habitat, low level of disturbance from project-related activities).
- Required monitoring season: W - wintering, B - nesting, M - migration.

TBD – "to be determined". The absence of data to score ecogeographic criterion underscores the lack of current scientific understanding of the basic ecology and population biology of bird species in this region, and thus the uncertainty related to the likelihood of project-generated risks from this specific project. This uncertainty will be addressed through appropriate monitoring.

"Till" means maximum number of birds (not regularly), supported by the lake in different seasons.

The categories of globally endangered species correspond to version IUCN 2011 (www.iucnredlist.org).

The criteria of ecogeographic value of species - habitation on the project territory is over 1% species of biogeographic population in accordance with "Waterbird Population Estimates" (Fourth Edition. Wetlands International. 2006).

The criteria and list of species included only into the Red Book of Republic of Uzbekistan are given only according to "The Red Book of Republic of Uzbekistan", 2009.

In order to define top priority species, which shall be receive main attention during monitoring, we established 5 priorities in accordance with the following criteria:

- first priority - globally threatened species, considerable part of whose world population is found at the lake during some or other period of their life cycles;
- second priority - other globally threatened species;
- third priority - species with national nature preservation status (included in the Red Data Book of Uzbekistan);
- fourth priority - species, for which Dengizkul lake is of ecogeographical importance, i.e. their population at the lake exceeds 1% of ecogeographical population,
- fifth priority - species which distribution is restricted by "Eurasian Deserts and Neardeserts" biome.

The first priority group includes three globally threatened species White-headed Duck, Marbled Teal and Ferruginous Duck. Impact of the project on the population of the species may prove critical. Though these species do not inhabit the lake permanently the lake is of vital importance for maintaining populations of these species during different periods of their life cycle. For White-headed Duck these are migration and wintering, but not every year, for Marbled Teal and Ferruginous Duck – mainly in nesting and migration periods but not every year for Marbled Teal. The main part of populations of Marbled Teal and Ferruginous Duck leave Uzbekistan and wintering southward. Small quantity of Marbled Teal and Ferruginous Duck sometimes stay in winter time in southern part of Uzbekistan and in Dengizkul lake too.

For White-headed Duck and Marbled Teal the size of their biogeographic population is defined ("Water bird Population Estimates". Forth Edition. Wetlands International. 2006). Populations of these species, inhabiting in Uzbekistan are not stable.

Up to now the biogeographic population of Ferruginous Duck, habiting the territory of Central Asian is not defined..In "International Single species Action plan for the Conservation of the Ferruginous Duck *Aythya nyroca*"(CMS Technical Series No.12/ AEW Technical series No.7. June 2006) the quantity of world population is evaluated in 100000 individuals, and habiting Uzbekistan over 7 000 individuals. In "Hunting-game species register reference book" (1992) on the basis of the winter aerial census it was indicated 7 000 individuals for wintering of birds on the pools of the Bukhara region in eighties. BirdLife International (2011) evaluates the population in SW Asia And NE Africa 25,000-100,000 (based on counts in 1990s of 9,000 in Azerbaijan, 21,000 in Turkmenistan and 7,000 in Uzbekistan. Moreover, in accordance with the materials of the report of Tashkent State University in 1986-89 the quantity of the wintering birds on Dengizkul Lake reached 7086 birds, and nest birds in 1989 – 10. In 2003-2005 in

Uzbekistan at carrying out of average winter surveys it was registered 89-103 Ferruginous Duck¹. At the same time in region of Caucasus and Central Asia the quantity of species was reduced from 9733 down to 605 individuals, in countries of Central Asia (including Kazakhstan) from 5 516 in 2002 and 6122 in 2003 down to 428 in 2005. Thus the analysis of materials demonstrates that the dynamics of recession of quantity for Caucasus and Central Asia are similar. As the result of average winter surveys of 2000-2005 the population of wintering birds on the pools of Central and South Uzbekistan was reduced from 911 updown to 89 birds² due to the slump of population in the region and in Uzbekistan.

The second priority group includes other 11 globally threatened species: Dalmatian Pelican, Pallid Harrier, Pallas' Sea Eagle, Egyptian Vulture, Saker Falcon, Great Bustard, Houbara Bustard, Little Bustard, Eurasian curlew, Black-winged Pratincole, Eurasian Roller. 8 of them are included in the national Red Data Book: Dalmatian Pelican, Pallid Harrier, Pallas' Sea Eagle, Saker Falcon, Great Bustard, Houbara Bustard, Little Bustard, Black-winged Pratincole. Globally threatened species listed in this priority characterized by low number and irregular inhabiting in the lake (not every year), except one species –Eurasian Roller. So, impact of the project for them will be low, but Dalmatian Pelican, Eurasian curlew and Black-winged Pratincole can lose their stopover on the migration route.

The third priority group includes 11 species included only in the Red Data Book of Uzbekistan (not IUCN) inhabiting the lake in different seasons: White Pelican, Pygmy Cormorant, Spoonbill, Glossy Ibis, Little Egret, Mute Swan, Whooper Swan, Osprey, Golden Eagle, Steppe Eagle, White-tailed Sea Eagle. Species included only in the Red Data Book of Uzbekistan are more common. Threats for 5 breeding species (Pygmy Cormorant, Spoonbill, Glossy Ibis, Little Egret, Mute Swan) will be significant due to cumulative effect of transport and human activity disturbance, transmission line collision, and barrier of road and power line on the way to feeding places. Project impact for 6 non breeding species listed in the Red Data Book of Uzbekistan (White Pelican, Whooper Swan, Osprey, Golden Eagle, Steppe Eagle, White-tailed Sea Eagle) is different. White Pelican and Whooper Swan can lose their stopover on the migration route. Threat of dead or cripple as result of collision with power line is real for big raptors (Osprey, Golden Eagle, Steppe Eagle, White-tailed Sea Eagle). Electro cutting is real too, if isolation of power transmission pole will not effective.

The fourth priority group includes 5 species: Mallard, Red-crested Pochard, Pochard, Smew, and Coot. Dengizkul Lake is a refugium for survival of a considerable part of these species population in winter. Impact of the project on the populations may be significant. Their wellbeing depends on condition of lake ecological systems and man impact on the birds: disturbance, direct extermination, decrease of habitats, etc. For them ecological systems of the lake are of special importance during migration and wintering.

The fifth priority group includes 6 species, which distribution is restricted by “Eurasian Deserts and Semideserts” biome: Egyptian Nightjar, Brown-necked Raven, Southern Booted Warbler, Desert Warbler, Scotocerca, Turkestan Tit. All these species are breeding in the territory of gas field. They will lose part of their habitat (breeding area) as result of its reduction and destruction in process of construction wells and of surface facilities, road, distribution line, building for personal and others. Road and power line is also threat for them. Only insignificant part of their populations inhabits in the project area. Desert habitats presents wide in the territory adjacent to the lake Dengizkul. So project impact for these species will be not critical.

¹⁷ Solokha A. Results from the International Waterbird Census in Central Asia and the Caucasus 2003-2005. Wetlands International, Moscow, Russia. 2006.

¹⁸ Lanovenko E.N., Filatov A.K., Kashkarov D.Y., Zagrebin S.A., Shernazarov E., Filatova E.A. 2007. Monitoring of wintering of hydrophilic birds on the pools of Uzbekistan// Biodiversity of Uzbekistan – Monitoring and use. Tashkent. p.98-109.

Table 6 Summary of Impacts and Mitigations

№	Activity	Period	Biodiversity impact analysis and proposed mitigation measures	
			direct	indirect
1.	Road in water protection zone and outside the zone	Construction	<p>Impact: Disturbance and fragmentation of habitats directly in the road area and in adjacent temporary construction area, where it crosses the isthmus. Disturbance in birds nesting and rest areas: noise and dust from construction machinery and vehicles, constant presence of people. Impact is expected in summer, 2012. Impact will be considerable, as near the place there nest and concentrate for feeding nesting birds and early migrants, arriving in the second half of summer (sandpipers). Greatest impact will be produced on the birds, inhabiting coastline (ducks, sandpipers, gulls, terns, etc.) and it will cause their territorial redistribution to other shallow places of the lake or nearby shallow water bodies. Among affected species there will be globally threatened: nesting species - Marbled Teal and Ferruginous Duck (first priority), migrating species - Dalmatian pelican (second priority). Mitigation measures: Construction will start after breeding season is over, when nesting activity of birds and other fauna is insignificant (summer). During construction dust suppression (dampening) and noise restriction are implemented. Construction of facilities is implemented outside water protection zone. In future it is necessary to circulate manual on behavior of personnel near nesting places. After finishing road construction it is necessary to make restoration of soils and vegetation along the road.</p>	<p>Impact: Potential temporary reduction of population of rare and other species of birds because of disturbance due to their redistribution to other parts of the lake or other nearby water bodies. Mitigation measures: Restriction of construction workers access to bird habitats. LUOC will conduct information campaign regarding conservation of lake biota and will mount warning signs.</p>
		Operation	<p>Impact: Fragmentation of sandpipers and songbird species habitats by the road, crossing lake bay. Potential mortality of birds and other animals caused by collision with vehicles. Disturbance of nesting and resting birds caused by dust and noise from vehicles passing along the road. Impact is insignificant, as in construction stage birds redistribute from this territory or partially adapt to disturbance factors. Note that the project does not include any road lighting. Transportation of hazardous substances by designed road is not provided for and is not necessary, as hazardous substances are not used in the process of Shady section operation. Commercial output is transported only through pipelines. Mitigation measures: Road users will be required to control noise and dust, limit speed and warning signs will be mounted.</p>	<p>Impact: Continuous disturbance will cause partial adaptation of species. Number of species and number of birds will be below the optimum. Mitigation measures: Noise and dust control, speed limit and installation of warning signs will promote adaptation of species to disturbance factor of moving traffic.</p>
2	Distribution lines	Construction	Impact:	Impact:

№	Activity	Period	Biodiversity impact analysis and proposed mitigation measures	
			direct	indirect
	inside and outside water protection zone		<p>Distribution lines are constructed in the same corridor as the road, so impact on habitats will be similar to road construction. Specific hazard of bird collision with lines, accompanied by death or injuries to birds, occurs as soon as lines are fixed on the poles. This mostly threatens species leading night life, when they travel between lake sections or from land to the lake, both during nesting and in other seasons (herons, ducks, sandpipers, some small passerine birds) and sand grouses arriving in day time to drink. The threat is actual for migrating flocks of ducks (possible first priority), geese, pelicans (first and second priority), cranes, bald-coots (forth priority) resting on the water. It depends on many local factors, so its quantitative evaluation is impossible at present. Raptors also are under high risk.</p> <p>Mitigation measures: Measures are taken for visual marking of distribution lines for example with standard diverters inside water protection zone. These will be monitored and replaced as needed if affected by vandalism.</p>	<p>It is possible that birds will move from optimum feeding places to safe ones.</p> <p>Mitigation measures: Not required before construction of conductors</p>
		Operation	<p>Impact: Hazard of physical collision of birds with lines stays. Specific hazard of bird collision with lines, accompanied by death or injuries to birds, occurs as soon as lines are fixed on the poles. This mostly threatens species leading night life, when they travel between lake sections or from land to the lake, both during nesting and in other seasons (herons, ducks, sandpipers, some small passerine birds) and sand grouses arriving in day time to drink. The threat is actual for migrating flocks of ducks (first and second priority), geese, pelicans (first and second priority), cranes, bald-coots resting on the water. It depends on many local factors, so its quantitative evaluation is impossible at present but will be addressed as part of the EBMP. When distribution lines are connected to power supply there will be hazard of birds mortality caused by electric shock, if they use distribution line poles for nesting or rest.</p> <p>Mitigation measures: Measures are taken for visual marking of distribution lines with appropriate standard diverters inside water protection zone. LUOC provided for use of protective frames, preventing electrocution of birds sitting on pole; in future it is necessary to establish control over integrity of installed insulation.</p>	<p>Impact: It is possible that birds will move from optimum feeding places to safe ones.</p> <p>Mitigation measures: Not required</p>
3	Pipelines in water protection zone	Construction	<p>Impact: It is provide that the pipeline will be laid by the method of drilling under the bottom of lake isthmus. Threat that coastline and adjacent bird habitats will be changed with the soil extracted in the process of drilling and by used machinery is minimum. Hydrological regime is supposed to be stabilized that will positively influence vegetation, and improve quality of waterbird and riparian bird habitat. Dust contamination and disturbance of birds by</p>	<p>Impact: Birds inhabiting the isthmus and adjacent lake part will move to other parts or other nearby shallow water bodies.</p> <p>Mitigation measures: Restoration of disturbed soils</p>

№	Activity	Period	Biodiversity impact analysis and proposed mitigation measures	
			direct	indirect
			<p>presence of people and machinery during construction.</p> <p>Mitigation measures: Disposal of drilling mud, restricted use of machinery in the territory to minimize impact on adjacent habitats. Regular damping of the territory for dust suppression</p>	
		Operation	<p>Impact: Not expected. Gas pipeline will be placed under ground at the depth of at least 1.0 m from the ground surface to the top of the pipe. Taking this circumstance into account noise impact during pipeline operation, including implementation of operating procedures of cathodic protection and pipeline interior cleaning, is not expected. Natural level of noise at the site under survey (winds, drifting of sand) is much higher than potential noise impact of processes inside the pipe, taking place under the ground surface. Measure, described above, is one of the main measures for mitigation of accident consequences at the lake. The project also provides for automatic system of emergency protection, corrosion monitoring and nondestructive control along the entire length of the pipe.</p> <p>Mitigation measures: Not required</p>	<p>Impact: Not expected Mitigation measures: Not required</p>
4	Pipelines outside water protection zone	Construction	<p>Impact: Disturbance of habitats caused by pipeline laying. Disturbance caused by presence of working machinery and people. Dust contamination of adjacent territory.</p> <p>Mitigation measures: Strict control over observation of design requirements to the width of construction site. Regular damping of the territory for dust suppression. Restoration of disturbed soils.</p>	<p>Impact: Depression of the species, whose distribution is related to coastline (sandpipers, ducks, etc.).</p> <p>Mitigation measures: Educational campaign for construction workers regarding biodiversity conservation</p>
		Operation	<p>Impact: Not expected, except for emergency.</p> <p>Mitigation measures: Not required</p>	<p>Impact: Not expected Mitigation measures: Not required</p>
5	Existing wells	Construction	<p>Impact: As wells are existing ones construction impact is out of the question. The water level of Dengizkul Lake is controlled by the Government of Uzbekistan, and activities related to this project are not anticipated to affect water levels of the Lake. During construction of wells and surface facilities at the Shady site, the service water source will be groundwater (through specially equipped temporary water supply wells). Groundwater is more than 300 meters deep and extraction of groundwater will not affect the water balance of Dengizkul Lake. During operation of facilities on the Shady site, there is no need for water supply.</p> <p>The project provides for outdoor lighting of multiple well platform and well</p>	<p>Impact: As wells are existing ones construction impact is out of the question Mitigation measures: Not required</p>

№	Activity	Period	Biodiversity impact analysis and proposed mitigation measures	
			direct	indirect
			<p>site. The site is lighted by two searchlights, mounted on concrete lightning rod at the height of 8 m. All power lines to lighting fixtures are safely insulated and laid in special ducts. So electrocution of birds, sitting on poles, is out of the question. Design of searchlights prevents direct contact with lamp with help of transparent protective cover, accordingly heat effect on birds is also out of the question.</p> <p>Mitigation measures: Not required</p>	
		Operation	<p>Impact: Well flooding caused by water level increase will influence lake water quality and biota as a result of developing erosion that may cause loss of well structures sealing. Impact on birds from flaring is not expected, for reasons described in Section 4.2.3.</p> <p>Mitigation measures: In the process of the project together with state bodies maximum lake water level was defined, which corresponds to the regime in which biota of the lake was formed during the last years, and ensures safe operation of existing wells. The existing wells operate in automatic regime with minimum set of surface equipment (Christmas tree), that ensures their fail safe operation. There are no sources of environment pollution at well sites.</p>	<p>Impact: Not expected</p> <p>Mitigation measures: Not required</p>
6	New wells	Construction	<p>Impact: Decreased area and fragmentation of habitats in the places where wells are drilled and temporary mud pits are located. Disturbance of animals caused by presence of machinery and people in the territory adjacent to the well.</p> <p>Mitigation measures: Observation of design requirements to use of temporary roads. Waterproofing of mud pits. Prompt disposal of liquid and solid drilling wastes upon completion of well construction. Restoration of disturbed soils in and around construction sites.</p>	<p>Impact: Moving from disturbed and adjacent territory to other parts of the lake or nearby water bodies. Potential death of small animals in mud pits and presence of carnivores attracted by carrion.</p> <p>Mitigation measures: Mud pits fencing. Use of recycled mud as construction material will allow to minimize adverse impact.</p>
		Operation	<p>Impact: As wells will operate in automatic regime with the minimum set of surface equipment (Christmas tree) adverse impact on riparian biota is not expected. There are no sources of environment pollution at well sites, including oil wastes.</p> <p>Mitigation measures: Not required.</p>	<p>Impact: Not expected</p> <p>Mitigation measures: Not required</p>
7	Waste water disposal	Construction	<p>Impact: New construction is not provided for.</p> <p>Mitigation measures: Not required .</p>	<p>Impact: New construction is not provided for.</p> <p>Mitigation measures: Not required</p>

№	Activity	Period	Biodiversity impact analysis and proposed mitigation measures	
			direct	indirect
		Operation	<p>Impact: Through sewers waste water gets to the site of treatment facilities (outside water protection zone), after treatment it is directed to leakproof evaporating ponds. Then treated water is used for watering of green belt. Impact on biota is minimum.</p> <p>Mitigation measures: Strict observation of industrial zone boundaries and implementation of the current LUOC environment protection plans.</p>	<p>Impact: Not expected</p> <p>Mitigation measures: Not required</p>
8	Disposal of solid wastes	Construction	<p>Impact: New construction is not provided for.</p> <p>Mitigation measures: Not required</p>	<p>Impact: New construction is not provided for.</p> <p>Mitigation measures: Not required</p>
		Operation	<p>Impact: All kinds of solid wastes are subject to regular removal to special landfills of Bukhara province (outside Khauzak-Shady sections). Wastes are temporarily stored in metallic containers in dedicated leakproof site. Impact on biota is minimum.</p> <p>Mitigation measures: Strict observation of industrial area boundaries and implementation of the current LUOC environment protection plans. Timely disposal of solid wastes.</p>	<p>Impact: Not expected</p> <p>Mitigation measures: Not required</p>
9	Residential and auxiliary facilities	Construction	<p>Impact: New construction is not provided for.</p> <p>Mitigation measures: Not required</p>	<p>Impact: New construction is not provided for.</p> <p>Mitigation measures: Not required</p>
		Operation	<p>Impact: Pollution of the territory with domestic waste is possible. Disturbance of animals in the adjacent territory caused by presence of people and machinery (auto vehicles).</p> <p>Mitigation measures: Strict observation of industrial area boundaries and implementation of the current LUOC environment protection plans. Timely disposal of domestic wastes. Minimization of noise impact. Use of constructed roads only.</p>	<p>Impact: Reduction of quantity and species composition of desert species. Penetration to the territory of invasive specie, myna.</p> <p>Mitigation measures: Not required</p>

4.6 Cumulative Biodiversity Impacts and Mitigation

Cumulative impact is caused by all project facilities and could result in adverse impact on biodiversity in the protected area of Dengizkul Lake, including decrease of populations and species composition of birds. In order to decrease level of cumulative impact, protective measures are developed under the present BAP. The main measure is establishment of an extended adaptive program of ornithological monitoring, including the development and implementation of actual specialists' mitigation recommendations based on monitoring results.

The cumulative impacts of the proposed Shady Development by LUOC were assessed covering a temporal dimension of year 2015 to 2039 (from the expected year of start operations to the time the Khauzak-Shady Development ends operation under the PSA) and a geographic/spatial dimension based on the area that expects to have potential physical influences from the Khauzak-Shady Development and likely developments that could generate and/or receive cumulative effects.

The project and adjacent areas are dry, low-hilled plains with prevalent desertification effects of drifting sand and no history of irrigation. The nearest water bodies are the Amudarya River and Dengizkul Lake. Cumulative effects to surface water and groundwater are assessed to be insignificant to non-existent, considering water is fully recycled by the Project and no water will be returned to surface or groundwater. Further, the drilling mud water is from saline wells instead of any irrigation or domestic water sources. Water quality monitoring stations set up by State Committee for Nature Protection and the EBMP will be useful to reconfirm this during the construction and operation phases.

Additionally, there is no other development existing or planned in the vicinity of the Khauzak-Shady development except for an existing well belonging to NHC Uzbekneftegaz in the southern part of Dengizkul Lake. The nearest town is Alat, located 60 km to the north-west; 8-10 km to the north of the field there is a small homonymous Dengizkul settlement; and 60 kilometers to the north-west there is a Regional Center, Mubarek. Other facilities located more than 20 km from the Project area are listed in Section 3.4.

The only area of potential ecological concern is the Dengizkul Lake Ramsar site and Protected Area. Other than the Uzbekneftegaz well mentioned above, therefore, cumulative impacts will largely be limited to the impacts of the Project and not other developments. Mitigation to these impacts are described earlier in Section 4, and an EBMP developed and applied (see Section 6) to ensure that the mitigation measures are both implemented and effective. Overall, the cumulative biodiversity impacts are assessed to be minor and manageable assuming that the mitigation measures are implemented. LUOC has committed to providing the budget and staff resources for implementing these mitigation measures.

5. BAP Objectives, Targets, and Responsibilities

5.1 BAP Objectives and Priorities

This Biodiversity Action Plan demonstrates LUOC's commitment to biodiversity conservation in the vicinity of Dengizkul Lake and in other areas where its activities might affect valuable habitats.

From a corporate perspective, biodiversity conservation is:

- An integral component of the environmental planning and monitoring LUOC conducts to assess the impacts of our operations.
- Basic to our commitment to continually improve our environmental performance.
- Built into the planning that goes into deciding the most suitable approach for reclamation or rehabilitation of sites when we have completed our operations.
- One of the many factors we consider when we evaluate the sources of materials we purchase to run our business.

It is recognized that biodiversity is a complex subject and that there are many potential external activities (such as other development activities or uncontrolled public use of the area), events (such as the effects of climate change), and management actions (such as changing Government regulations or management of surface waters feeding Dengizkul Lake) that can seriously affect biodiversity. Many or most of these are beyond the control of LUOC. Further, there is no guarantee that particular BAP actions will always have the desired effect given the multitude of cause and effect relationships that affect biodiversity.

For that reason, this BAP has been designed to be adapted to changing conditions and to the results of the monitoring program. Periodic updates will be developed and implemented to ensure that LUOC will take all feasible measures within its power to protect the biodiversity of Dengizkul Lake.

5.2 Indicators

Indicators are used in an attempt to present complex information in a clear manner that can be used by decision makers. In the case of this BAP, the guidance presented by The energy and Biodiversity Initiative (Conservation International) has been followed in general, but adapted to the specific situation of the Shady site, and mindful of the fact that monitoring of certain indicators has been going on for some years. An attempt has been made to make sure that these indicators are: simple and understandable by decision makers; aimed at addressing a need (in this case the ability to use accumulated knowledge to adapt and enhance the BAP); and, able to differentiate between long-term background changes and those changes arising from the presence of LUOC's gas operations. As proposed in the guidance, it is anticipated that the indicators will reflect information about species, habitats, LUOC and Government management of the Dengizkul area, and technology and industrial processes. The indicators themselves may need to change as the BAP evolves in order to achieve these goals.

In order to monitor and define possible project impact on Dengizkul lake avifauna (species composition, quantity, territorial distribution of birds) and bird habitats condition it is necessary to control the whole territory of the lake. Survey of species composition and quantity of birds in all habitats of Dengizkul reserve will allow to find out general trends of changes in current lake avifauna and bird habitats condition and single out local changes taking place at the project site under influence of project activities. In this connection the general and local indicators shown in Table 7 shall be used.

Table 7 Indicators

Indicators	Methods of getting results	Executor in charge of getting result
Stability of hydrological regime	Lake water level control	Information is provided by the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan
All species with emphasis on globally threatened species and listed in the Republican Red Data Book, species representing more than 1% of ecogeographic population and registered in the Republican Red Data Book	Annual middle-winter count (IWC) of waterbird at the lake (once a year in the middle of January). List of species, quantity and territorial distribution of wintering birds at Dengizkul lake. Stock taking of birds at the lakescape and along the coastline of the entire lake - method of stock taking of waterbird at water bodies from dominating elevation or other convenient position (Howes J., Bakewell D., 1989) at permanent monitoring points, which will be distributed along the lake shore and will cover different stations. Points of concentration will be defined with help of GPS and mapped with use of Google. Minutes with survey results will be drawn up. Outline map of wintering bird geographical distribution at the lake will be prepared.	LUOC and expert ornithologist of Zoology Institute of Academy of Sciences of the Republic of Uzbekistan
All species with emphasis on globally threatened species, listed in the Republican Red Data Book, and whose distribution area is limited by "Eurasian Deserts and Neardeserts". Also Red-crested Pochard, Bald Coot	Annual Ornithological survey of the lake in order to record birds nesting at the lake (in the first half of May) and define if nesting is successful (at the end of June). List of the birds, nesting at the lake, will be prepared - lakescape and lakeshore will be surveyed at specified observation points and accounting at transect in different stations will be conducted. Search for nesting couples, their nesting places, chickens at the project site and shallow lake, overgrown with rush. Nesting places in north-west part of the lake will be mapped. Minutes with survey results will be drawn up. Outline map of bird nesting places at the lake will be prepared.	LUOC and expert ornithologist of Zoology Institute of Academy of Sciences of the Republic of Uzbekistan
All species with emphasis on globally threatened species, species representing more	Point of migrating bird concentration will be defined. Stock taking of birds at the	LUOC and expert ornithologist of Zoology Institute of Academy of Sciences of the Republic of

Indicators	Methods of getting results	Executor in charge of getting result
than 1% of ecogeographic population and registered in the Republican Red Data Book Species composition, quantity and territorial distribution of migrating birds at Dengizkul lake	lakescape and along the coastline of the entire lake. (April, autumn - at the beginning of September and October). Concentration points will be mapped. Minutes with survey results will be drawn up. Outline map of migrating bird geographical distribution at the lake will be prepared.	Uzbekistan
Habitats	Types of habitats (stations) will be defined. Description of vegetation (geobotanical method of research) and soil (forage lands and animal hide) condition. Marking of sites and definition of boundaries with indication of geographic coordinates. Control over impact on lake habitats and project site (control of occupied area and quality), conducted in different seasons at the same time with above activities. Minutes with survey results will be drawn up. Outline map of lake habitats will be prepared with use of satellite images of the territory (Google), seasonal aspect.	LUOC and expert ornithologist of Zoology Institute of Academy of Sciences of the Republic of Uzbekistan
Control over project activity impact on linear facilities avifauna (road, gas pipeline, distribution line)	Ornithological survey of the territory near linear facilities in order to find out possible cases of bird mortality (conducted in different seasons at the same time with above activities). Minutes with survey results will be drawn up.	LUOC and expert ornithologist of Zoology Institute of Academy of Sciences of the Republic of Uzbekistan

Note: Names of globally threatened species, listed in the Republican Red Data Book, representing more than 1% of ecogeographic population and whose distribution area is limited by "Eurasian Deserts and Neardeserts" biome are given in other sections of BAP.

Globally threatened species: Dalmatian Pelican, Marbled Teal, Ferruginous Duck, White-headed Duck, Pallas's Sea Eagle. Pale Harrier, Neophron, Saker Falcon, Bustard, Ruffed Bustard, Little Bustard, Eurasian Curlew, Black-winged Pratincole, Roller.

The species, registered in the Red Data Book of the Republic of Uzbekistan: European White Pelican, Dalmatian Pelican *Pelicanus crispus*, Little Cormorant, Little Egret, Spoonbill, Glossy Ibis, Mute Swan, Whooper Swan, Marbled Teal *Marmaronetta angustirostris*, White-eyed Pochard White-headed Duck, Fish-Hawk, Pallas' Sea Eagle, White-tailed Eagle, Golden Eagle, Steppe Eagle, Pale Harrier, Saker Falcon, Bustard, Ruffed Bustard, Little Bustard, Black-winged Pratincole.

The species, representing 1% or more of ecogeographic population: Dalmatian Pelican, Marbled Teal, Ferruginous Duck, White-headed Duck, Mallard Duck, Red-crested Pochard *Netta rufina*, Pochard *Aythya ferina*, Smew *Mergellus Albellus*, Coot *Fulica atra*.

The species, whose area of distribution is limited by biome "Eurasian Deserts and Neardeserts": Egyptian Nightjar, Brown-necked Raven, Wabler *Hippolais rama*, Wabler *Sylvia nana*, *Scotocerca inquieta*, Tit *Parus bokharensis*.

This table uses recommendations of "Biodiversity Indicators for Monitoring Impacts and Conservation Actions. The Energy & Biodiversity Initiative"

5.3 Biodiversity Conservation Actions

LUOC's actions for conservation of biodiversity in the Dengizkul area can be divided into three categories: (1) actions already being implemented by LUOC, (2) new conservation-related activities specific to Dengizkul, and (3) general actions on biodiversity conservation.

5.3.1 Conservation Actions Already Implemented by LUOC

Table 8 shows a list of **current and ongoing** activities that are implemented by LUOC in the Khauzak-Shady project areas. These are particularly important for biodiversity protection at the transportation corridor crossing of the narrow part of the lake,

Table 8 List of LUOC Current and Completed Conservation Activities

No	Description of activities	Results	Supporting document
1	Mandatory ecological examination of project technical solutions	Ecological feasibility of technical and process components of the project, development of actual nature protection actions in the stage of facilities designing	Expert Opinion of SEE №18/257 ₃ dated 31/03/11
2	Determination of the maximum water level in Dengizkul Lake and its approval by State Ministry for Nature Protection and Ministry of Agriculture and Water Resources of the Republic of Uzbekistan. Development of measures for control of water level in the lake with due consideration of accepted maximum level (182.2 m)	Conservation of existing biological systems at and near Dengizkul lake. Clear boundary of water protection zone was defined (500 m) with consideration of maximum possible water level at Dengizkul lake.	Letter of SMNP Ruz №02-621 dated 29/03/10. Letter of UzGIP ²³ №027-283 dated 28/10/10.
3	Design and construction of all facilities outside the established water protection zone (with exception of the facilities that cannot be shifted). Development of specific technical mitigation actions for the facilities within the established water protection zone.	Minimization of impact on the existing biological systems of Dengizkul lake through construction of industrial facilities at a considerable distance, removal of possible sources of contamination from the water protection zone.	Letter of SMNP RUz №18-2042 dated 25/10/10. Expert Opinion of SEE №18/860 ₃ dated 30/11/10. Expert Opinion of SEE №18/257 ₃ dated 31/03/11.
4	Construction of crossing through the lake strait in the narrowest part. Construction of the crossing with culverts, with use of ecologically safe materials (geotextile, gabion structures)	Minimization of impact on the biological system of Dengizkul Lake strait. Preservation of lake water balance (volumes of water flowing through the strait), prevention of stagnant areas formation, reduction of the necessity to work with heavy equipment	Incorporated into EIS for Shady construction

²³ UzGIP stands for Scientific-Research and Design Institute of the Ministry of Agriculture and Water Resources

№	Description of activities	Results	Supporting document
5	Execution of construction works in water protection area in summer time	Minimization of impact on the existing biological systems of Dengizkul Lake through execution of works during the period of minimum activity of fauna and absence of migrating birds	Incorporated into EIS for Shady construction
6	Using in the crossing section pipes with thick walls and heavy-duty corrosion resistant coating, equipping cathodic protection , automatic control and corrosion monitoring	Prevention of accidents and destruction of aquatic forms of life that can be caused by pipeline rupture	Incorporated into EIS for Shady construction
7	Protect Bird Life from Accidental Electrocutation on Power Lines	Power transmitted to and within the Shady and Khauzak sites is and will be on power lines that are fitted with specialized insulators (protective cases) to protect raptors that rest on power poles.	Incorporated into EIS for Shady construction

5.3.2 New Actions Specific to Dengizkul

As a result of the development of this BAP, a number of new actions are proposed. Most important will be the development in 2012 and implementation of the Enhanced Biodiversity Monitoring Plan (EBMP) which is described in Section 6. The BAP will specify the process and schedule for developing the EBMP (based on the upcoming 2012 field work), and will commit to carrying this out as well as adapting mitigation measures as needed during construction and operation.

In addition, the following specific measures are proposed:

Den-1: Protect the Lake from Access by LUOC or Contractors' Personnel -

LUOC policy is that no company or contractor personnel are to approach within 500 meters of the Lake shore, except with specific permission from State Committee for Nature Protection of the Republic of Uzbekistan. This regulation is meant to protect the lake habitats from disturbance. Further, LUOC will post visible signs on all roads approaching the lake to inform people of the biological sensitivity of the lake and limit access to it.

Den-2: Train LUOC and Contractor Personnel on the types of sensitive flora and fauna that need to be protected near the Lake

LUOC has developed an illustrated manual that depicts the sensitive species of flora and fauna (see Annex C). Within the framework of present BAP implementation LUOC has started work for putting into practice an existing manual about rare flora and fauna species. The manual will include all species, registered in new version of Red Data Book of Uzbekistan, and habitats will be described. In LUOC there exists procedure that all newly hired personnel shall get familiar with the manual and manual is disseminated among contracting agencies, the manual is available and accessible in all offices and production subdivisions of LUOC.

Den-3: Carry out Annual Review of the Operations in the Khauzak and Shady sites to Review Potential Negative Impacts to Biodiversity at Dengizkul and Implement Appropriate Corrective Actions

The EBMP will provide information to LUOC on potential impacts to biodiversity. LUOC will retain national knowledgeable biodiversity and ornithological experts who will review the monitoring data at least annually and determine whether there are specific actions that LUOC needs to implement to reduce or avoid identified impacts. LUOC will review the feasibility of these recommendations from a technical and financial perspective. All feasible mitigation actions will be implemented. Where analysis shows that a particular recommended mitigation is not feasible LUOC will seek additional expert advice from international experts and will endeavor to develop an approach that will reduce identified impacts to a less-than-significant level.

Den-4: Provide bird diverters on distribution lines near the Lake to reduce bird mortality due to collisions, and perch deterrents on poles.

LUOC will apply a variety of line marking devices as appropriate, including hanging markers, coils, or other standard bird diverters to all LUOC distribution lines within the water protection zone (within 500 meters of the Lake shore at 182.2 m elevation). Perch deterrents for raptors will be installed on poles. The EBMP process may identify other areas north and south of the strait crossing where these measures are needed, and they will be applied.

Den-5: LUOC will implement all mitigation measures identified in Tables 5 and 6 of this BAP.

LUOC will apply a variety of mitigation measures as specified in this BAP. These mitigation measures aim at reducing or eliminating residual ecological impacts that could occur as a result of the Project's implementation. The EBMP process may identify other impacts and mitigation measures that are required, and they will be applied.

5.3.3 New General BAP Actions

In addition to the measures specific to the Dengizkul area discussed above, the following specific measures are proposed:

Gen-1: Provide Outreach Workshops for Local Communities on Biodiversity Conservation

In its corporate social responsibility program LUOC will provide for awareness-raising for local residents on the need for conservation, particularly in the Dengizkul Lake area. Besides under the plan LUOC provides for conducting of annual presentations on the issues of biodiversity conservation among population, living near Dengizkul lake. Workshops and handout materials will be made available at least yearly in Alat district and other communities close to Dengizkul. Age-appropriate materials on conservation will be made available to local schools.

The LUOC Biodiversity Conservation Outreach Workshops (Program) will support and expand on ongoing efforts for effective biodiversity conservation in the Dengizkul Lake area. The Program will use the BAP as the information basis for a series of outreach activities in the Project region to promote biodiversity conservation. The program will be designed according to the following principles²⁴.

Threats-based: LUOC will use the mitigation and monitoring program described in this BAP to clearly identify the threats to biodiversity in the Dengizkul area and delineate a threat abatement plan. The plan will identify activities that reduce, eliminate or mitigate threats and their underlying root causes. LUOC will implement

²⁴ Based on the approach in "Biodiversity Conservation: A Guide For USAID Staff and Partners" September 2005

the activities that fall within its authority and responsibility (as described in this section of the BAP), and will encourage local authorities and others to carry out those activities that are their responsibility.

Adaptive: The initial design of these conservation activities are sound, based on the information available as of this writing. However conservation needs are complex and constantly evolving. The LUOC Conservation Program is structured so as to monitor effects of the Project, generate timely information for management, and adapt the program as needed.

Focus on priority sites: The LUOC BAP is based on a prioritization of local biodiversity needs as they may be affected by the Project, but also supports global, regional, and national²⁵ priorities as appropriate.

Results-oriented: This BAP explains the underlying assumptions, rationale, and methods for achieving planned conservation results as relevant to the Project, and describes how Project impacts on biodiversity will be measured and monitored. Efforts by others (whose activities may impact biodiversity) to effectively measure habitat quantity or quality will be described and encouraged.

Sustainable: The Program will focus on how conservation achievements in the region will be sustainable beyond the end of the Project.

Participatory: The outreach Program will incorporate the active involvement of all stakeholders in its implementation.

Include a learning component and disseminate lessons learned. Analysis of BAP results and dissemination of lessons learned will be part of program activities (see Gen-2, below).

Gen-2: Continue to Enhance the Country’s Knowledge Base on Biodiversity in the Khauzak and Shady areas surrounding Dengizkul Lake.

As part of this BAP, LUOC will enhance its ongoing monitoring program to provide quarterly data on biodiversity (see Section 6). The data will be reported to the State Committee for Nature Protection, and will be made available to scientific researchers.

In addition, LUOC will take an active part in national conferences on biodiversity. For instance, LUOC is already taking part in one of state programs – “Integration of Biodiversity Conservation Principles into Oil and Gas Sector of the Republic of Uzbekistan”.

5.4 Indicative Schedule

Table 9 describes the schedule for the BAP Actions. LUOC has established an adequate budget for these activities, and subsequent year budgets will be established as part of the BAP update process. At a minimum, future budgets will include funding for an uninterrupted monitoring program.

Table 9 Schedule Summary for BAP Implementation

Action	Description	Schedule
BAP	Develop and Implement BAP	Completion in early 2012
Update	Perform Annual Evaluation and Update of the BAP	Every year prior to completion of the

²⁵ including the “Republic of Uzbekistan Biodiversity Conservation National Strategy and Action Plan” Tashkent, 1998

Action	Description	Schedule
		LUOC Annual Operations Plan
1	Mandatory ecological examination of project technical solutions. Final stage. (At the final stage of environment impact assessment Ecological Consequences Statement shall be developed, where norms of emissions, discharges and waste disposal are set for construction and operation of West Shady section field facilities. At present this work is completed and positive conclusion of State Ecological Examination has been received.)	September 2011
2	Determination of the maximum water level in Dengizkul Lake and its approval by State Ministry for Nature Protection and Ministry of Agriculture and Water Resources of the Republic of Uzbekistan. Development of measures for control of water level in the lake with due consideration of accepted maximum level (182.2 m)	Completed
3	Design and construction of all facilities outside the established water protection zone (with exception of the facilities that cannot be shifted). Development of specific technical mitigation actions for the facilities within the established water protection zone.	Ongoing
4	Construction of crossing through the lake strait in the narrowest part. Construction of the crossing with culverts, with use of ecologically safe materials (geotextile, gabion structures)	To be completed in Summer 2012
5	Execution of construction works in water protection area in summer time	Ongoing
6	Using in the crossing section pipes with thick walls and heavy-duty corrosion resistant coating, equipping cathodic protection, automatic control and corrosion monitoring	To be completed in Summer 2012
7	Protect Bird Life from Accidental Electrocution on Power Lines	Ongoing
EBMP	Development of the EBMP based on the field work to be done during 2012. Implementation of the monitoring program and review and enhancement of the mitigation measures based on the results of the field work and the EBMP protocols	By end 2012
Den-1	Protect the Lake from Access by LUOC or Contractors' Personnel	Ongoing
Den-2	Train LUOC and Contractor Personnel on the types of sensitive flora and fauna that need to be protected near the Lake	Training to workers on inception, then annual reviews
Den-3	Carry out Annual Review of the Operations in the Khauzak and Shady sites to Review Potential Negative Impacts to Biodiversity at Dengizkul and Implement Appropriate Corrective Actions	Annually as part of the BAP update
Den-4	Provide markers on distribution lines near the Lake to reduce bird mortality due to collisions.	As part of construction of distribution lines to new site
Den-5	LUOC will implement all mitigation measures described in detail in Tables 5, 6, and 7 of this BAP	Ongoing
Gen-1	Provide/support Outreach Workshops for Local Communities on Conservation	2012, then annual reviews
Gen-2	Continue to Enhance the Country's Knowledge Base on Biodiversity in the Khauzak and Shady areas surrounding Dengizkul Lake	Ongoing

5.5 Responsibilities for BAP Implementation

Table 11 indicates the various actions committed to in this BAP, together with information on the responsibilities of various stakeholders.

5.6 Capacity and Training

The LUOC Ecological Division is responsible for implementing and maintaining the BAP, although other officials may also have certain responsibilities (see Annex B). LUOC will appoint or provide training for additional qualified staff to implement these guidelines. This group conducts preparation of information materials on the issues of biodiversity conservation for local population and takes part in workshops and presentations.

To achieve and maintain the level of expertise required for the implementation of this BAP, LUOC will appoint high-level employees to perform additional tasks in accordance with these manuals.

When necessary, LUOC will appoint expert consultants in the environmental and/or social fields to review the monitoring work and help update the BAP. The consultants will be available to:

- perform potential additional studies, as required, and also provide advice to LUOC related to the complexity of biodiversity issues.
- assist LUOC officers to evaluate environmental documents addressing biodiversity submitted by contractors,
- participate in site visits, and reviewing environmental performance, especially for the aspects of the Project that generally could have significant negative impact to biodiversity.

Table 10 Summary of Responsibilities for BAP Implementation

Action	Description	LUOC	SCNP	MIGA	SEE	Environmental Inspection	Local Authorities	Public	MAWR
BAP	Develop and Implement BAP	P	R	A		R	R	R	
Update	Perform Annual Evaluation and Update of the BAP	P	X	A	X	X	X, R	X	
EBMP	Develop and Implement the EBMP	P	X	A					
Existing Conservation Actions									
1	Mandatory ecological examination of project technical solutions	P	A	R	A		A		A
2	Determination of the maximum water level in Dengizkul Lake and its approval by State Ministry for Nature Protection and Ministry of Agriculture and Water Resources of the Republic of Uzbekistan. Development of measures for control of water level in the lake with due consideration of accepted maximum level (182.2 m)	P	A		A		X, R		X, A
3	Design and construction of all facilities outside the established water protection zone (with exception of the facilities that cannot be shifted). Development of specific technical mitigation actions for the facilities within the established water protection zone.	P	A		A		X		A
4	Construction of crossing through the lake strait in the narrowest part. Construction of the crossing with culverts, with use of ecologically safe materials (geotextile, gabion structures)	P	A		A		A		A
5	Execution of construction works in water protection area in summer time	P	A		A		A		
6	Using in the crossing section pipes with thick walls and heavy-duty corrosion resistant coating, equipping cathodic protection, automatic control and corrosion monitoring	P	A		A		A		

Action	Description	LUOC	SCNP	MIGA	SEE	Environmental Inspection	Local Authorities	Public	MAWR
7	Protect Bird Life from Accidental Electrocution and Collisions on Power Lines	P	A		A		A		
New Dengizkul Actions									
Den-1	Protect the Lake from Access by LUOC or Contractors' Personnel	P	R		R	P	R	X	
Den-2	Train LUOC and Contractor Personnel on the types of sensitive flora and fauna that need to be protected near the Lake	P	X		X		X		
Den-3	Carry out Annual Review of the Operations in the Khauzak and Shady sites to Review Potential Negative Impacts to Biodiversity at Dengizkul and Implement Appropriate Corrective Actions	P	X, A	R	X	A	X	X	
New General Actions									
Gen-1	Provide Outreach Workshops for Local Communities on Conservation	P	R	R	R	X	X	X	
Gen-2	Continue to Enhance the Country's Knowledge Base on Biodiversity in the Khauzak and Shady areas surrounding Dengizkul Lake	X	P	R	P	X	X		

Notes:

P = Primary responsibility for product

X = Provides input

R = Reviews

A = Reviews and Approves

LUOC

MAWR

MIGA

SCNP

SEE

LUKOIL Uzbekistan Operating Company LLC

Ministry of Agriculture and Water Resources

Multilateral Investment Guarantee Agency (World Bank Group)

State Committee for Nature Protection of the Republic of Uzbekistan

State Ecological Expertise

6. Monitoring and Reporting

6.1 Existing Monitoring Plan

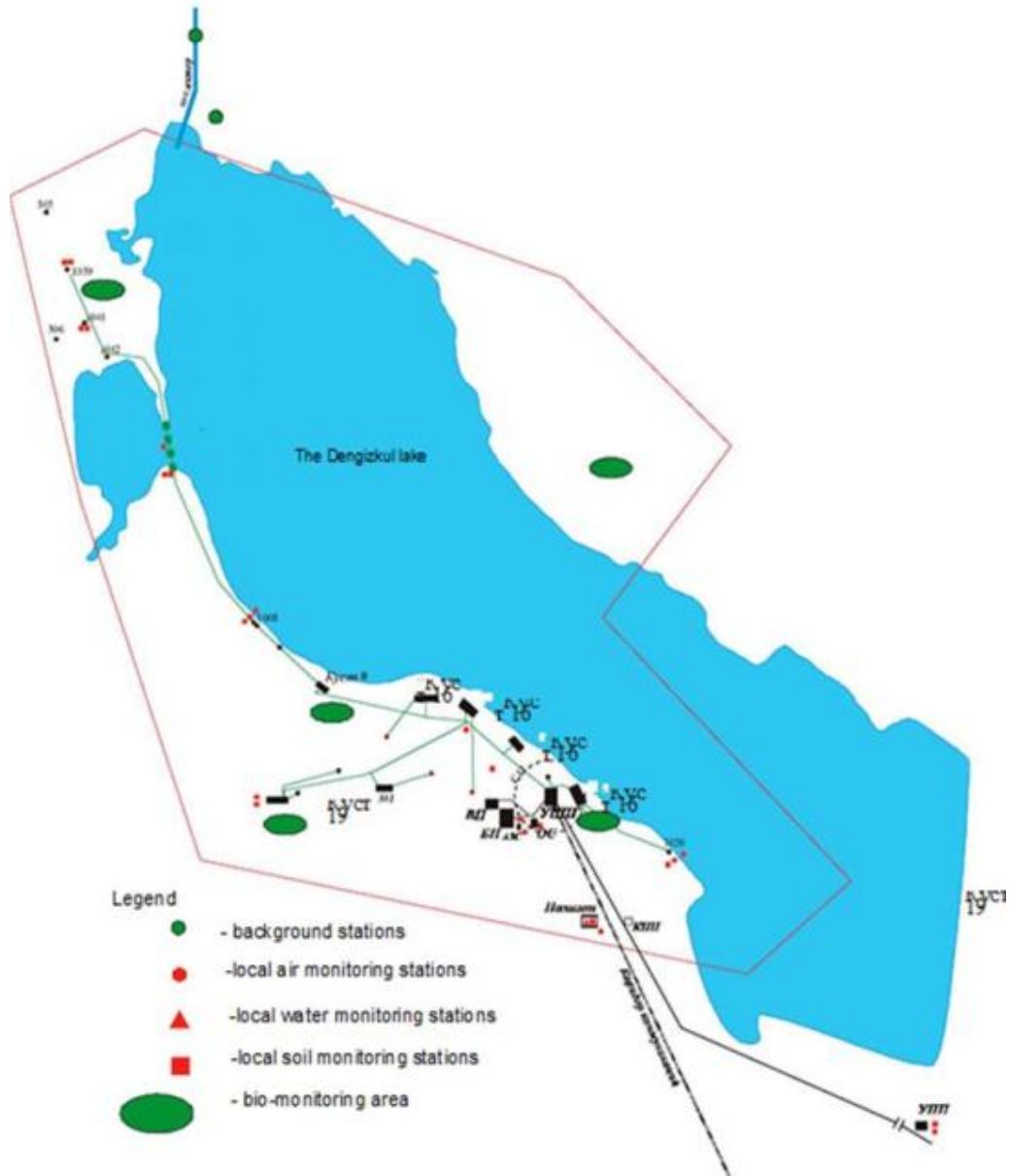
Monitoring of biodiversity condition at Khauzak and Shady section, including Dengizkul lake, has been conducted from 2005. The object of monitoring is flora and fauna. Observations are conducted twice a year – in spring and in autumn. The existing monitoring plan includes monitoring of the following indicators:

- number and species content of fauna. It is defined through inventory of animals, aimed at defining to what species they belong. The number of found species is defined in the process of visual observations by the method of route stock-taking and compared to the existing data regarding studied indicator in a certain season. Based on the analysis of the number of found species an expert opinion is prepared regarding the presence/absence of impact;
- condition of flora and fauna population. In the process of visual observations it is defined if there are evident signs of disease, depression, or other anomalies. Based on the analysis of detected changes an expert opinion is prepared regarding the presence/absence of impact;
- physical factors (chemical and physical pollution, disturbance, destruction of habitat, etc.), having impact on the condition of flora and fauna. Possible factors, influencing biotic components, are defined based on laboratory analysis of environmental quality (air, soil, surface and subsurface water). Based on the analysis of detected factors an expert opinion is prepared regarding the presence/absence of impact;
- biochemical characteristic is conducted in order to define presence and quantity of heavy metals in the organs and tissues of animals and plants. Based on laboratory analyses and comparison to the existing data an expert opinion is prepared regarding the presence/absence of impact;
- histological characteristic is conducted in order to find a pathology, related to the activity of oil and gas company. Based on laboratory analyses and comparison to the existing data an expert opinion is prepared regarding the presence/absence of impact.;
- presence of pesticides is defined based on laboratory analysis. Based on laboratory analyses and comparison to the existing data an expert opinion is prepared regarding the presence/absence of impact.

All above studies are conducted in accordance with the guidelines and regulations existing in the Republic of Uzbekistan. The scheme of biotic monitoring, specified by the existing program is quite sufficient; the only way to make it more efficient is to increase frequency of observations and conduct them in all seasons. In order to make monitoring more efficient it is also required to define jointly with State Biological Control permanent stations of biotic control at Khauzak and Shady sections, including the territories planned to be developed.

Please note that this section refers to the **existing** monitoring that has been done for Khauzak and Shady and that it is being **enhanced** as described in the next section through the development and implementation of the EBMP. The BAP indicates that this **existing** monitoring program is not sufficient with respect to the requirements of the BAP for the following reasons: (1) priorities have not been developed, it is not clear what needs to be monitored; (2) monitoring protocols and study designs are not presented in sufficient detail to assess what is, or isn't being monitored; and, (3) the sampling frequencies that are used (semiannual bird data gathering in spring and fall) are insufficient for monitoring any of the issues that may be important for the project relating to breeding success of various species, or wintering distributions of birds on the lake and surrounding habitats.

Figure 8 Location of Existing Bio-monitoring Stations (2011)



6.2 Preliminary Description of Some Enhanced Biodiversity Monitoring Plan Characteristics

The Enhanced Biodiversity Monitoring Plan will be developed to provide for specific study of the birds inhabiting the lake and adjacent territory that can be influenced by Project implementation. An annotated outline of the EBMP is provided in Annex N, and some specific procedures to be used are listed in Table 11. Monitoring locations are shown on Figure 4, but these will be revised based on the EBMP and the field work to be carried out in 2012. The effectiveness of the mitigation measures is discussed in Section 6.3.

Characteristics of the enhanced monitoring program are as follows:

- Provides information on species composition of birds, population quantity and territorial distribution of the species inhabiting the lake. This must be conducted in different seasons (nesting, migration, winter), as seasonal aspects of lake avifauna change annually, and must cover the whole territory of the lake, because birds fly within its boundaries from nesting places to feeding areas to places of rest (migrating and wintering birds), etc. To get data for comparison permanent monitoring stations must be used and record keeping must be conducted at the same routes in all seasons;
- In the biological cycle of bird life nesting and wintering periods are characterized by territorial attachment. So in order to define project influence on birds and their habitats monitoring must be, first of all, conducted in these seasons. The reed area in the north-west part of the lake (area of West Shady and to the south) is a very important nesting place of waterfowl. Wintering waterfowl use practically the whole lakescape. Main feeding places of wintering birds are located in shallow water in north-west and north-east parts of the lake.
- As Dengizkul lake is internationally important as place of migrating and wintering waterfowl concentration, besides monitoring of nesting and wintering birds annual monitoring of migrating waterfowl and their habitats at the water body, including feeding and rest places, must be conducted;
- Optimum survey period for nesting season is May – July. As birds migration period in the territory of Uzbekistan is very lengthy it is reasonable to conduct survey of migrating species: in spring, end of April, May, in autumn, beginning of September, October. It is reasonable to combine lake waterfowl winter survey period with international middle-winter census of waterfowl, which is conducted in the middle of January. This will allow to prevent mistakes in defining local impact of the project on the birds against the background of global changes (refer to Table 9);
- Special attention in the process of monitoring (control of presence, population and habitats condition) must be paid to the species whose habitation at the lake predetermines its global importance. Among such species there are globally threatened species (Marbled Teal *Marmaronetta angustirostris*, Ferruginous Duck *Aythya nyroca*, White-headed Duck *Oxyura leucocephala*, Dalmatian Pelican *Pelicanus crispus*, Pallas's Sea Eagle *Haliaeetus leucoryphus*), among them there are species representing more than 1% of ecogeographic population (White-headed Duck *Oxyura leucocephala*, Marbled Teal *Marmaronetta angustirostris*);
- Same attention will be given to species listed in Red Book of Republic of Uzbekistan, who use habitations at the lake as refugium (Spoonbill, Glossy Ibis, White Pelican, Pygmy Cormorant, Mute Swan);
- Wetlands near Dengizkul are also important as refugium for wintering populations of Mallard *Anas platyrhynchos*, Red-crested Pochard *Netta rufina*, Pochard *Aythya ferina*, Smew *Mergellus Albellus*, Coot *Fulica atra*) because there are good ecological conditions (habitats, feeding resources) for wintering and species create big aggregations;

- Control of species composition of birds, population quantity and territorial distribution of the species, living in close vicinity to the lake (in water protection zone and riparian of the lake), must be conducted in different seasons with special emphasis on the species, whose area of distribution is limited by biome " Eurasian Semideserts and Neardeserts" (Egyptian Nightjar *Caprimulgus aegyptius*, Brown-necked Raven *Corvus ruficollis*, Wabler *Hippolais rama*, Wabler *Sylvia nana*, *Scotocerca inquieta*, Tit *Parus bokharensis*);
- Field survey report is drawn up based on the results of ornithological survey. The report must contain names of surveyed stations, their condition (disturbed landscape, soil and vegetation must be noted), numbers and coordinates of monitoring stations or routes along the linear facilities (pipeline, road, distribution lines) and coastline, species and number of observed birds, presence of disturbance factors, detection of injured or dead birds and possible reasons of their death;
- Upon completion of field survey conclusion about impact of the project on species condition, bird population and their habitats at the lake and in the adjacent territory is drawn up, using the following indicators: change of stations conditions including Lake levels, change of species composition (presence or absence of individual species), change of individual species number, change of territorial distribution within the boundaries. Special attention is paid to globally threatened bird species, registered in national Red Data Book, representing more than 1% of ecogeographic population, species whose area of distribution is limited by biome ". Eurasian Deserts and Semi-deserts", impact of disturbance factor. If dead birds are found special conclusion is made about the reason of their death.

Table 11 List of Techniques for Monitoring Biodiversity at the Khauzak-Shady Site

No	Unit analyzed	Season	Indicator	Measurement techniques and/or testing methods
1	Birds <u>Species of first priority</u> Globally threatened species presented more than 1% of biogeographical population:		Presence of species at the water body (seasonal aspect), degree of species abundance, change of territorial distribution, confirmation of successful nesting for Marbled Teal and Ferruginous Duck. Finding or not of dead birds.	Ornithological survey of the entire lakescape and lakeshore with overlook at specified points with use of telescope, binocular, GPS and vehicle. Taking stock of total number of birds (Howes, Bakewell, 1989). Registration of the spots where birds were observed or places of their concentration and nesting with help of GPS "Garmin" and their mapping at existing satellite images ("Google"). Special transect account will be done along the new road and distribution electro line to look for birds crossing road and power line and for birds which die due to vehicular accidents and electrocution and collisions. Protocols, report and recommendation (if need) preparation.
	White-headed Duck	Migration and winter		
	Marbled Teal	All year around		
	Ferruginous Duck	All year around		
2	<u>Species of second priority</u> Other globally threatened species		Presence of species at the water body and at the territory adjacent to the	Ornithological survey of the entire lakescape and lakeshore with overlook at specified points with use of telescope, binocular, GPS
	Dalmatian Pelican	Migration		

No	Unit analyzed	Season	Indicator	Measurement techniques and/or testing methods
	Pallid Harrier	Migration	water body (seasonal aspect), degree of species abundance, Change of territorial distribution, confirmation of successful nesting for Eurasian Roller. Finding or not of dead birds.	and vehicle. Taking stock of total number of birds (Kashkarov, Pavlenko, 1975; Bibby, Johns, Marsden, 2000). Registration of the spots where birds were observed or places of their concentration with help of GPS "Garmin" and their mapping at existing satellite images ("Google"). Special transect account will be done along the new road and distribution electro line to look for birds dead in course of vehicle accidentals and electrocution and collisions. Protocols and report preparation.
	Pallas' Sea Eagle	Migration and winter		
	Egyptian Vulture	Migration		
	Saker Falcon	All year around		
	Great Bustard	Migration		
	Houbara Bustard	Migration		
	Little Bustard	Migration		
	Eurasian curlew	Migration		
	Black-winged Pratincole	Migration		
	Eurasian Roller	Breeding		
3	<u>Species of third priority</u> Species listed in the Red Data Book of the Republic of Uzbekistan:		Presence of species at the water body and at the territory adjacent to the water body (seasonal aspect), degree of species abundance, change of territorial distribution, confirmation of successful nesting for Pygmy Cormorant, Little Egret, Spoonbill, Glossy Ibis, Mute Swan. Finding or not of dead birds.	Ornithological survey of the entire lakescape and lakeshore with overlook at specified points with use of telescope, binocular, GPS and vehicle. Taking stock of total number of birds (Kashkarov, Pavlenko, 1975; Bibby, Johns, Marsden, 2000). Registration of the spots where birds were observed or places of their concentration with help of GPS "Garmin" and their mapping at existing satellite images ("Google"). Special transect account will be done along the new road and distribution electro line to look for birds dead in case of vehicle accidents and electrocution and collisions. Protocols and report preparation.
	White Pelican	Migration		
	Pygmy Cormorant	All year around		
	Little Egret	Breeding		
	Spoonbill	Breeding		
	Glossy Ibis	Breeding		
	Mute Swan	Breeding and winter		
	Whooper Swan	Winter		
	Osprey	Migration		
	White-tailed Sea Eagle	Winter		
	Golden Eagle	Migration		
	Steppe Eagle	Migration		
4	<u>Species of fourth priority</u> Other waterbird species presented more than 1% of biogeographical population:		Presence of species at the water body (seasonal aspect), degree of species abundance, change of territorial distribution. Finding or not of dead birds.	Ornithological survey of the entire lakescape and lakeshore with overlook at specified points with use of telescope, binocular, GPS and vehicle. Taking stock of total number of birds (Kashkarov, Pavlenko, 1975; Bibby, Johns, Marsden, 2000). Registration of the spots where birds were observed or places of their concentration with help of GPS "Garmin" and their mapping at existing satellite
	Mallard	migration and winter		
	Red-crested Pochard	migration and winter		
	Pochard	migration and winter		
	Smew	migration and winter		

No	Unit analyzed	Season	Indicator	Measurement techniques and/or testing methods
	Coot	migration and winter		images ("Google"). Special transect account will be done along the new road and distribution electro line to look for birds dead in course of vehical accidentals and electrocution and collisions. Protocols and report preparation.
5	<u>Species of fifth priority</u> Species restricted of biom "Eurasian Deserts and semideserts":		Presence of species inhabiting in neighboring desert at the territory adjacent to the water body (seasonal aspect), degree of species abundance.	Ornithological survey of sand desert in and near (control transect) the project territory by methods of transect count and overlook at specified points with use of telescope, binocular (Kashkarov, Pavlenko, 1975; Bibby, Johns, Marsden, 2000). Registration of the spots where birds were observed and nesting with help of GPS "Garmin" and their mapping at existing satellite images ("Google"). Special of transect count will be done along the new road and distribution electro line to look for birds dead in course of vehicle accidentals and electrocution and collisions. Protocols and report preparation.
	Egyptian Nightjar	Breeding	confirmation of succesul nesting for these species (Egyptian Nightjar, Brown-necked Raven, Southern Booted Warbler, Desert Warbler, Scotocerca, Turkestan Tit. Finding or not of dead birds.	
	Brown-necked Raven	All year around		
	Southern Booted Warbler	Breeding		
	Desert Warbler	Breeding		
	Scotocerca	All year around		
	Turkestan Tit	All year around		
4	Mammals <u>Species registered in the Red Data Book of the Republic of Uzbekistan:</u> Goitered Gazelle <i>Gazella subgutturosa</i> , Brandt's Hedgehog <i>Hemiechinus hypomelas</i> . <u>Characteristic dwellers of sand desert:</u> White-Toothed Shrew <i>Crocidura</i> , Long-eared (Desert) Hedgehog <i>Hemiechinus auritus</i> , Tolai Hare <i>Lepus tolai</i> , Long-clawed Ground Squirrel <i>Spermophilopsis</i> , Libyan Jird <i>Meriones libycus</i> , Karagan Fox <i>Vulpes vulpes caragan</i> .		Presence of species at the territory of sand desert adjacent to the water body (seasonal aspect) degree of species abundance, change of territorial distribution, confirmation of succesul breeding	Methods of transect count taking, search for signs of animal life activity (Novikov, 1949; Kashkarov, Zakirov, 1971; Techniques to record numbers of game animals, 2002).

No	Unit analyzed	Season	Indicator	Measurement techniques and/or testing methods
5	Reptiles <u>Globally threatened reptile species:</u> Steppe Tortoise <i>Agrionemys horsfieldi</i> <u>Species registered in the Red Data Book of the Republic of Uzbekistan:</u> Desert Monitor <i>Varanus griseus</i> , Asp <i>Naja</i> . <u>Characteristic dwellers of sand desert:</u> Agama <i>Agama</i> , Toad Agama <i>Phrynocephalus</i> , Plate-tailed Gecko <i>Teratoscincus</i> , Desert Lacerta, Steppe Ribbon Racer <i>Psammophis lineolatus</i> .		Presence of species at the territory of sand desert adjacent to the water body (seasonal aspect) degree of species abundance, change of territorial distribution, confirmation of successful breeding	Methods of transect count taking (Novikov, 1949).
6	Fish European Carp <i>Cyprinus carpio</i> , Redeye <i>Scardinius erythrophthalmus</i> , European Pike-perch <i>Stizostedion lucioperca</i>		Presence of species in the water body, degree of species abundance,	Test fishing – obtaining data of State Biological Control
7	Habitat condition <u>Lakescape and lakeshore</u> Soil Vegetation <u>Shallow filled lakes</u> <u>Sand desert</u> Soil Vegetation <u>Saline basins</u> Soil		Definition of water level Detection of disturbed soil. Species composition, condition of population, density of stand. Definition of water level Species composition and state of emergent and submergent vegetation Detection of disturbed soil. Species	Obtaining data at hydrological station. Visual inspection Geobotanical methods By installed metering pole. Visual description of morphologic condition and definition of stand density, (Tikhomolov, 1985). Visual inspection. Geobotanical methods, (Tikhomolov, 1985). Visual inspection

No	Unit analyzed	Season	Indicator	Measurement techniques and/or testing methods
	Vegetation		composition, condition of population, density of stand. Detection of disturbed soil. Species composition, condition of population, density of stand	Geobotanical methods
	Mortality of animals (fish, reptiles, birds, mammals) in the project territory, caused by project implementation		Dead animals, taken and destroyed burrows, nests, dead clutches, chicks.	Visual inspection of project territory at monitoring points.

Source: Colin Bibby, Martin Johns, Stuart Marsden "Methods of Field Expeditionary Survey." "Survey and Taking Stock of Birds". Moscow, 2000. 186 c.

Avifauna monitoring will be conducted in accordance with the basic biological cycles in yearly life of birds: migrations, breeding and wintering. It will reflect changes in faunistic composition, population, geographical distribution and successful breeding of birds in the project and adjacent territory. Monitoring stations will be distributed along the coast of Dengizkul lakescape, in order to cover lakescape adjacent to the coast, bay in north-west part of the lake. Transects will be located along the road and power distribution line, as well as in the territory of sand desert adjacent to the field. Such approach will allow control of the changes that take place and project impact on avifauna.

During monitoring main attention will be focused on globally threatened species, species registered in the Red Data Book of the Republic of Uzbekistan, species that represent at the lake a considerable part of ecogeographic populations and species, whose distribution is restricted by "Eurasian deserts and semideserts" biome. At that we will use the approach, when top priority species are defined. As it has been already noted we chose five priorities (Table 11).

Field studies will be carried out in 2012 to provide the information needed for the EBMP and to confirm that the impacts and mitigation measures presented in this BAP are appropriate. An outline of the specific activities planned can be found in Annex O. The times for field studies are chosen in such a way to cover all seasons of the year. In order to choose optimal time of field operations the special calendar of biological cycles of indicator species is made (Table 12). Transect surveys will be made at the same time as the above-mentioned activities.

Winter survey will be carried out in the period when steady wintering will be fully formed (January). In the course of winter survey the basic information will be received for monitoring of species of first (White-headed Duck, Marbled Teal and Ferruginous Duck), Some species of second priority that include the other globally endangered species (Dalmatian Pelican, Pallas' Sea Eagle), third priority - species included into Red Book of Uzbekistan (White Pelican, Pygmy Cormorant, Mute Swan, Whooper Swan, White-tailed Sea Eagle) and fourth priority – numerous common waterbirds (Mallard, Red-crested Pochard, Pochard, Smew, Coot). Species composition, population, places of concentration (rest, feeding) of these

species will be defined on the Dengizkul Lake. As the result of the completed survey a schematic map of territorial distribution of wintering birds will be prepared on the basis of “GoogleEarth” maps and mapping data with the help of GPS.

A transect along the road and power distribution line with length approximately 20 km will also be studied. This transect is situated in the area of Khauzak-Shady field. The width of the transect will be 50 m. During the transect survey by foot, registration of the species composition and encountered frequency of birds will be documented. The possible influence of power distribution lines, the frequency of crossing the roads and power distribution lines by birds will be registered, including the height and direction of their flight and use of power distribution lines as roost sites. Depending on the acquired results the recommendations on mitigation of the project for the birds wintering on the lake will be provided.

The period of seasonal migration of birds in Uzbekistan is very long-lasting. In spring the migration movement of birds, as a rule, begins at the end of February – beginning of March and lasts mainly until the middle of May. In autumn the migration movement starts at the end of August and lasts mainly until the end of November. Thus carrying out of field operations during migration season will be done due to the migration times of high priority species, during spring in March and May, and in autumn in September and October. The same survey will be carried out as during the winter period. Thus the same research methods will be used and additional recommendations will be given if necessary. The objects of survey will be the species of first priority, and also the species of second priority - Dalmatian Pelican, Pallid Harrier, Pallas' Sea Eagle, Egyptian Vulture, Saker Falcon, Great Bustard, Houbara Bustard, Little Bustard and third priority - White Pelican, Pygmy Cormorant, Mute Swan, Whooper Swan, Osprey, White-tailed Sea Eagle, Golden Eagle, Steppe Eagle. The monitoring about possible influence of power distribution lines, roads and other objects is carried out also.

Table 12 Calendar of biological cycles of high priority bird species inhabiting Dengizkul Lake

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
First priority												
WHD												
Marbled Teal												
Ferruginous Duck												
Second priority												
Dalmatian Pelican												
Pallid Harrier												
Pallas' Sea Eagle												
Egyptian Vulture												
Saker Falcon												
Great Bustard												
Houbara Bustard												
Little Bustard												
Eurasian curlew												
Black-winged Pratincole												
Eurasian Roller												
Third priority												
White Pelican												
Pygmy Cormorant												
Little Egret												
Spoonbill												
Glossy Ibis												
Mute Swan												

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Whooper Swan												
Osprey												
White-tailed Sea Eagle												
Golden Eagle												
Steppe Eagle												
Forth priority												
Mallard												
Red-crested Pochard												
Pochard												
Smew												
Coot												
Fifth priority												
Egyptian Nightjar												
Brown-necked Raven												
Southern Booted Warbler												
Desert Warbler												
Scotocerca												
Turkestan Tit												

Note:

Blue – wintering, green – spring and autumn migration, yellow – reproduction.
 The periods optimal for carrying out of the monitoring of priority species are marked with red.

In order to define the influence of the project on nesting species, the field operations will be carried out in two stages: in the beginning of the period of reproduction, in order to make sure the availability of species and their readiness for reproduction, and at the end, in order to trace the success of their reproduction (availability of nestlings and young birds). It is preferred to carry out the first investigation of nestling birds in the beginning of May. . At this time the later migrants could be met: Eurasian curlew, Black-winged Pratincole. Test subjects having the first priority - Marbled Teal and Ferruginous Duck, second – Eurasian Roller, third -, Pygmy Cormorant, Little Egret, Spoonbill, Glossy Ibis, Mute Swan, forth - Mallard, Red-crested Pochard, Pochard, Coot and fifth - Egyptian Nightjar, Brown-necked Raven, Southern Booted Warbler, Desert Warbler, Scotocerca, Turkestan Tit.

At this time almost all species are at the places of their reproduction and they are distributed on nestling areas. It is necessary to carry out the investigation of the coast of the whole lake, rushy creeks and transect, to carry out registration of species composition and frequency of encountering birds. In the north part of the lake, in the creek and in the area of transect it is necessary to carry out monitoring for birds behaviour in order to register the nesting characteristics of these species (consort behavior, protection of nestling areas, nest-building, brooding, feeding, etc.). Founded pairs, nestling areas and nests are mapped. The monitoring of possible influence of power distribution line, road and other objects on birds is carried out in May.

At the end of June-July the investigations will cover the same areas as in May. The registration is made on the lake, in creek and transect area. Attention is directed to behaviour of the birds, indicating the availability of nests, nestlings and young birds, indicating the success of reproduction. Founded nests and nestlings are mapped. In the course of office analysis the comparison is made with the materials on population in May. The monitoring of possible influence of power distribution line and road is carried out.

The whole lake, creek and transect investigation is carried out again in September. The species composition, population and territorial distribution of birds (places of concentration)

are defined. The results of population of the nestling species are compared with summer results in order to define population growth. The monitoring of possible influence of power distribution lines, roads and other objects on birds is carried out.

After each field investigation reports are made which will reflect the scope, terms and the results of completed field operations. As the result of office analysis of the acquired data the analytical reports are provided. They will contain cartographic materials and photos. Recommendations on mitigation of negative influence of the project on birds and places they inhabit are provided in reports as necessary.

Within 2012 LUOC will work out the issue of extended field research and monitoring of Dengizkul Lake environs in order to define/substantiate all geographic ranges of top priority avifauna species distribution, and substantiate possible routes of accounting and schedule of ornithologic monitoring. All these issues will be resolved within 2012. A group of ornithology specialists, headed by Dr. Lavonenko, will go to the field and prepare further detailed recommendations and suggestions.

6.3 BAP Updating

There is a lack of long-term detailed monitoring that has taken place at the project areas, leading to a degree of uncertainty about the existing conditions, trends, and threats to biodiversity. Hence, it is necessary to institute an adaptive management approach to impact mitigation. The BAP has been designed to be updated as necessary after annual reviews based on the monitoring results specified in the EBMP. The update will include:

- new specific measures designed to address problems discovered during the monitoring that have not been adequately mitigated with the measures in the existing plan,
- a review of the overall efficacy of the general BAP measures, and appropriate adjustments to these to improve them
- a review the allocated budgets for each of the measures, both existing and proposed.
- A review of the capacity of LUOC and contractor personnel to carry out the existing and updated BAP, together with appropriate measures to improve the capacity where needed.

The BAP update will occur at a time in LUOC's annual operations planning cycle so that its results can be used to inform the overall operations plan.

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Annex A: Acronyms/Abbreviations

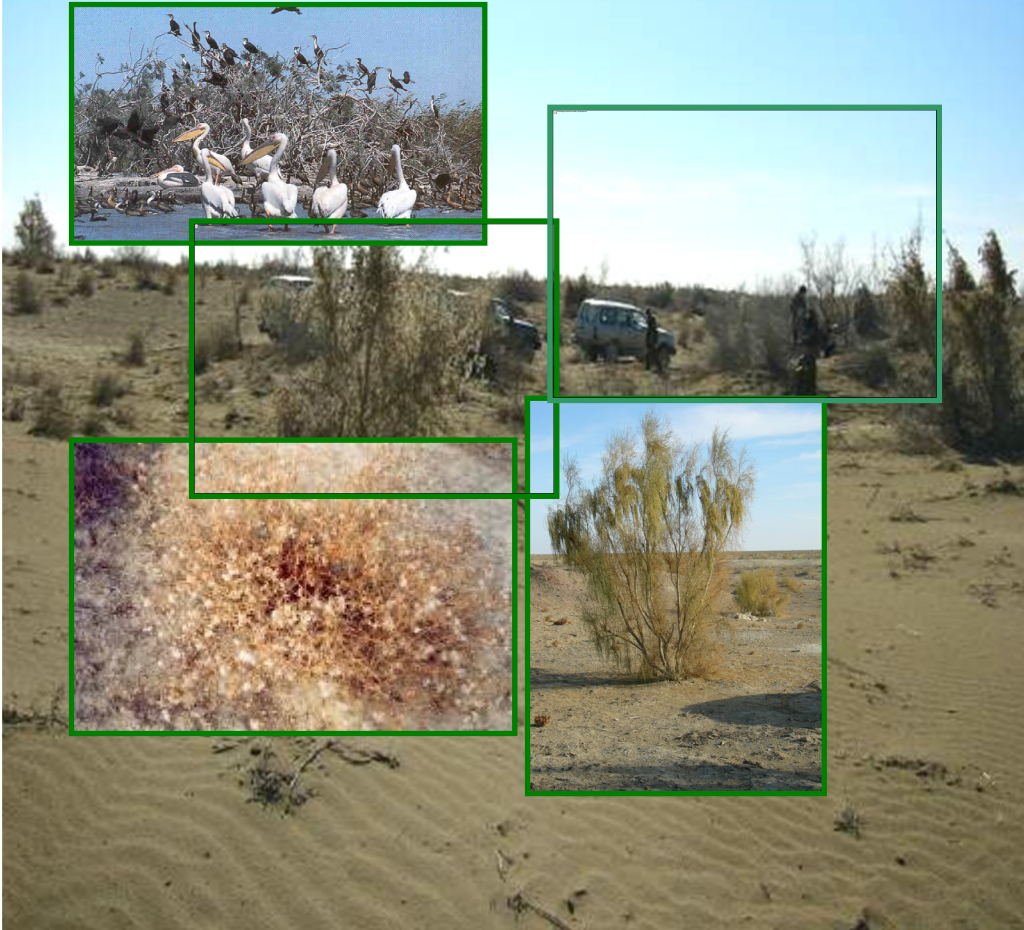
BAP	Biodiversity Action Plan
CBD	Convention on Biological Diversity
EBMP	Enhanced Biodiversity Monitoring Plan
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
IBA	Important Bird Area
IFC	The International Finance Corporation (World Bank Group)
IUCN	International Union for Conservation of Nature
GOST	State Standards (<i>gosudarstvennyy standart</i>)
LUKOIL	LUKOIL
LUOC	LUKOIL Uzbekistan Operating Company LLC
MAWR	Ministry of Agriculture and Water Resources
MIGA	Multilateral Investment Guarantee Agency (World Bank Group)
MPC	Maximum Pollutant Concentration
PSA	Production Sharing Agreement
RUz	Republic of Uzbekistan
SCNP	State Committee for Nature Protection of the Republic of Uzbekistan
SEE	State Ecological Expertise
UNCED	United Nations Conference on Environment and Development
UzGIP	Scientific-Research and Design Institute of the Ministry of Agriculture and Water Resources

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Annex C: Protected Species in the Project Vicinity (LUOC Brochure)

**Handbook
of the existing rare and endemic species of plants and
animals in Khauzak-Shady and Kandym Group of
Fields (Bukhara region)**



The territory of **sites of Khauzak-Shady and Kandym** Group of Fields situated in Alat and Karakul Districts, Bukhara Region, represents mainly semi-stabilized and sand ridges and dunes.



The nature of the soil and its moisture retention degree determine the development of vegetation mantle due to which the sandy territories of these Contract Areas are poor in terms of plant life. Haloxylon (picture 1), several kinds of suzerain and kandym are widely spread on sandy parts with cherkez, sandhill wattle, astragalus added.

The plant life of sites of Khauzak-Shady and Kandym Group of Fields represents 13 endemic and 14 rare and 19 low population plants of which 3 species are entered in the Red Data Book of the Republic of Uzbekistan:

- **Calligonum palefzkianum,**
- **Calligonum molle,**
- **Calligonum matteianum.**

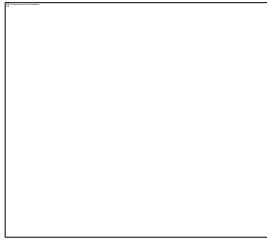
All of them come under the genus Calligonum – Jezgun (Pic. 2).



Pic. 2 **Jezgun**

The animal life of the areas of Khauzak-Shady and Kandym Group of Fields represents 27 species of mammals, 17 species of reptiles, over 160 species of birds.

Out of the listed species: **3 species of mammals** (pic. 3), **24 species of birds, 2 species of reptiles and 7 species of arthropods are entered in the Red Data Book of the Republic of Uzbekistan.**



The long-legged hedgehog(bald)



The free-tailed barbastelle



The goitered gazelle

Pic. 3. The mammals entered in the Red Data Book of the Republic of Uzbekistan

It has to be specifically noted that **the goitered gazelle (*Gazella subgutturosa*)** previously widely inhabited the deserts of the Contract Area. The intensive development of the desert lands and livestock breeding as well as poachers resulted in the situation where the goitered gazelle has become the rare species and been entered in the Red Data Book of the Republic of Uzbekistan.

Some mammals widely inhabiting the Contract Area come under **the low population and rare species** (Pic. 4).



The Liechtenstein jerboa



The comb-toed jerboa



The swamp lynx or chaus

Pic. 4 Low population and rare species

During the migration seasons, the birds entered in **the Red Data Book, the IUCN Red List, in Annexes I and II of Convention on international trade in endangered species of wild flora and fauna (CITES)** are observed in the Denghizkul Lake, of which are:



The European pelican, close to the vulnerable, small population bird of passage entered in the Red Data Book.



The little egret entered in the Red Data Book of the Republic of Uzbekistan.



The Dalmatian pelican, the rare low population species entered in the Red Data Book of the Republic of Uzbekistan and in the CITES Annex I.



The little cormorant, the vulnerable visitant bird, a nesting species entered in the Red Data Book of the Republic of Uzbekistan, and in the IUCN Red List.



The mute swan, the visitant bird entered in the Red Data Book of the Republic of Uzbekistan.



The whooping swan, a visitant species entered in the Red Data Book of the Republic of Uzbekistan.



The lesser white-fronted goose, a rare visitant species entered in the Red Data Book of the Republic of Uzbekistan.



The spoonbill, a vulnerable, - decreasing species, entered in the Red Data Book of the Republic of Uzbekistan and in CITES Annex II.

The red-breasted goose, a rare visitant species entered in the Red Data Book of the Republic of Uzbekistan.



The white-headed duck, an endangered species, entered in the Red Data Book of the Republic of Uzbekistan, in the IUCN Red List, CITES Annex II.

The marbled duck, an endangered visitant species entered in the Red Data Book of the Republic of Uzbekistan, in the IUCN Red List.



The white-tailed eagle, a rare visitant species entered in the Red Data Book of the Republic of Uzbekistan, in the IUCN Red List, in CITES Annex I.



The pale harrier a vulnerable visitant species entered in the Red Data Book of the Republic of Uzbekistan, in the IUCN Red List, in CITES Annex II.

The saker falcon, a vulnerable nesting visitant species entered in CITES Annex II.



Migratory birds are also observed:

- **The white-eyed pochard**, entered in the Red Data Book of the Republic of Uzbekistan, in the IUCN Red List;
- **The Pallas' sea eagle**, an endangered migratory bird entered in the Red Data Book of the Republic of Uzbekistan, in the IUCN Red List, in CITES Annex II;

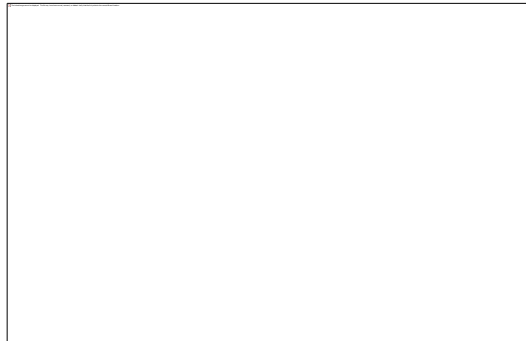
Khauzak-Shady Biodiversity Action Plan

- **The steppe eagle**, a vulnerable visitant species entered in the Red Data Book of the Republic of Uzbekistan, in CITES Annex II;
- **The imperial eagle**, a vulnerable, visitant bird entered in the Red Data Book and in CITES Annex II;
- **Mac-Queen's bustard**, entered in the Red Data Book of the Republic of Uzbekistan;

and **non-migratory species**:

- **The asiatic white crane**, entered in the Red Data Book of the Republic of Uzbekistan, in the IUCN Red List;
- **The Zarafshan pheasant**, a non-migratory subspecies entered in the Red Data Book of the Republic of Uzbekistan;
- **The pin-tailed sand grouse**, a rare nesting species entered in the Red Data Book.

Entered in the **Red Data Book of the Republic of Uzbekistan and the CITES Annexes** are such previously widely spread reptiles as the **Central Asian tortoise, the sand toad agama, the desert monitor** (Pic. 5), the **Central Asia cobra**.



Pic. 5. **The desert monitor**

On the territories of the Contract Areas, there is **one environmentally protected site: Denghizkul state wildlife sanctuary**, in which, as per their status, wildlife and their habitat are under protection.

Under the Law of the Republic of Uzbekistan re: “The Protected Wildlife Territories”, the state wildlife sanctuaries are protected territories on which **all types of human activities are prohibited**, but researches, recreation activities, environmental monitoring, as well as farming for the citizens’ needs residing in these areas which may cause damage to certain nature sites and complexes.



Khauzak-Shady Biodiversity A

The Denghizkul Wild Bird Life Sanctuary (Khauzak-Shady Contract Area) has been created to protect and to provide for breeding of migratory water fowl. On the territory of the sanctuary, every year, hundreds of thousands of water and semi-aquatic fowl, including the species entered in the Red Data Book of the Republic of Uzbekistan take rest, viz.: pelicans, spoonbills, little cormorants, etc. The Denghizkul Lake is the largest wintering site of water fowl in the Republic of Uzbekistan. The main species wintering here are bald-coots and diving-ducks.

Any human activity that may alter the Denghizkul Lake environment and ecosystem and the adjacent territories is prohibited.

The Republic of Uzbekistan has joined a number of international Conventions on protection and rational use of bio-resources, viz.: The Convention on Bio-Diversity, Convention on the Wetlands of International Importance Especially as Wildlife Habitat (Ramsar); Convention on Protection of Migratory Animals (Bonn); Agreement on Protection of Afro-Asian Migratory Wetland Fowl; the Convention on International Trade in Endangered Species of World Fauna and Flora (CITES).

All these documents declare the need to maintain the population and species diversity of animal and plant life for further sustainable development of the planets' ecosystem.

It has to be kept in mind that according to the laws of the Republic of Uzbekistan:

«... the plant and animal life shall be the public assets – the national wealth and subject to rational exploitation and protected by the state ...»;

«... it shall be prohibited to harvest and collect rare and endangered species of plants and animals entered in the Red Data Book of the Republic of Uzbekistan ...»;

«... unlawfully hunted components of the animal life, products made from them, weapons and means of hunting including vehicles shall be subject to seizure or confiscation in the manner stipulated in the laws ... in case it is impossible to recover the unlawfully hunted animals and products made from them, the culprits shall be fined the value in the amounts and in the manner stipulated by the laws ...»;

Khauzak-Shady Biodiversity Action Plan

«... any person found in breach of the laws of nature conservation and exploitation of plant and animal life shall be duly liable. ...»;

«... legal entities and individuals are bound to compensate for the damage caused by violating ... compensation for damage shall not exempt from liability ...»

Remember that we all bear the great responsibility of handing down to our generations the natural heritage as diverse and sustainable ecosystem.

Annex D: Summary of the National Biodiversity Action Plan of the Republic of Uzbekistan

DECREE OF THE CABINET OF MINISTERS OF THE REPUBLIC OF UZBEKISTAN of 18.09.2008 No 211

ON THE PROGRAM OF ACTIONS FOR CONSERVATION OF THE NATURE OF THE REPUBLIC OF UZBEKISTAN FOR 2008 - 2012 YEARS

Appendix No 1 To the Decree of CM RUz dated 19.09.2008 No 212

PROGRAM of Actions for Conservation of Nature of the Republic of Uzbekistan for 2008 - 2012 years

(Fragmented)

Program of Actions for Conservation of Nature of the Republic of Uzbekistan for 2008 - 2012 years (hereafter the Program), continuing Program of Nature Conservation Actions for 1999-2005 years, approved by the Decree of the Cabinet of Ministers of the Republic of Uzbekistan, dated October 20, 1999 No 469, is based on the same principles, which are to promote and to provide ecological support of the reforms, implemented in the Republic of Uzbekistan, and its basic provisions shall be taken into account during development and implementation of social and economic development programs and projects.

II. BASIC AREAS OF THE PROGRAM IMPLEMENTATION

The present Program provides for implementation of actions in the following four basic areas:

- nature preservation and ensuring ecological safety;
- rational use of natural resources and introduction of environmental methods of management;
- enhancement of regulatory framework and development of ecological science, environmental education of population;
- international cooperation and regional ecological safety.

III. PROCEDURE OF THE PROGRAM IMPLEMENTATION

Implementation of the Program actions is monitored by State Committee for Nature Protection of the Republic of Uzbekistan, as well as other relevant state regulatory bodies, ministries, institutions and organizations.

State Committee for Nature Protection coordinates management and control over implementation of the Program actions

MEASURES
for implementation of Program of Actions for Conservation of Nature
of the Republic of Uzbekistan for 2008 - 2012 years

(Fragmented)

N n/n	Description of measures	Timetable	Executors in charge	Sources of financing	Expected results
II. RATIONAL USE OF NATURAL RESOURCES AND INTRODUCTION OF ENVIRONMENTAL METHODS OF MANAGEMENT					
2.1	<p>Implementation of National Biodiversity Conservation Strategy and Action Program of the Republic of Uzbekistan:</p> <p>development of draft decree of the Cabinet of Ministers of the Republic of Uzbekistan on establishment of the network of conservation areas;</p> <p>development of biological resources sustainable use program;</p> <p>designing of fish-protection works</p>	<p>2009-2010</p> <p>2009-2010</p> <p>2008-2010</p>	<p>State Committee for Nature Protection, Zoology institute of the Academy of Sciences, Ministry of Agriculture and Water resources</p> <p>State Committee for Nature Protection, Zoology institute of the Academy of Sciences, Ministry of Agriculture and Water resources</p> <p>State Committee for Nature Protection, Zoology institute of the Academy of Sciences, Ministry of Agriculture and</p>	<p>State Committee for Nature Protection</p> <p>State Committee for Nature Protection, Conservation Foundation, State Biological Control, 10 mln. sum</p> <p>State Committee for Nature Protection, Conservation Foundation, State Biological Control,</p>	<p>Enhancement of conservation areas management system</p> <p>Ensuring rational use and reproduction of biological resources.</p> <p>Preservation and increase of fish stock in water bodies of the Republic.</p>

N п/п	Description of measures	Timetable	Executors in charge	Sources of financing	Expected results
			Water resources	50 mln. sum	
2.2	<p>Expansion and enhancement of conservation areas:</p> <p>expansion and development of Ecological Center "Djeiran" (Persian gazelle);</p> <p>implementation of measures for development of Gissar State Preserve.</p>	<p>2008-2010</p> <p>2010-2012</p>	<p>State Committee for Nature Protection, Bukhara region Khokimiyat (local authorities), Zoology institute of the Academy of Sciences</p> <p>State Committee for Nature Protection, Zoology institute of the Academy of Sciences</p>	<p>State Committee for Nature Protection, Conservation Foundation, State Biological Control</p> <p>State Committee for Nature Protection, Conservation Foundation, State Biological Control (donations), 20 mln. sum</p>	<p>Expansion of the area by 24 thou. ha. Increase of Persian gazelle population.</p> <p>Optimization and improvement of preserve flora and fauna genebank</p>
2.3	Publication of "Set of Rules for Use of Medicinal, Food and Industrial Plants".	2009	State Biological Control	Conservation Foundation, State Biological Control, 10 mln. sum	Provision of plant world conservation specialist, as well as general users of natural resources with normative legal documents.
2.4	<p>Conducting biodiversity research and assessment:</p> <p>research of Usyurt Persian gazelle population in order to develop actions for Persian gazelle population and habitat preservation;</p>	2008-2012	State Committee for Nature Protection of the Republic of Karakalpakstan, State Biological Control, Zoology institute and "Botanika" Scientific-Production	Conservation Foundation, State Biological Control, 20 mln. sum	Ensuring preservation of Persian gazelle and its habitat, involvement of users of natural resources, oil and gas

N n/n	Description of measures	Timetable	Executors in charge	Sources of financing	Expected results
	<p>assessment of common licorice (<i>Glycyrrhiza glabra</i>) stock (roots) in the Republic of Karkalpakstan;</p> <p>preservation of riparian forest of the Syrdarya river in the territory of "Saykhun" forestry;</p> <p>land productivity and its economical assessment;</p> <p>certification of the most important fishery water bodies of the Republic of Uzbekistan as element of ecological monitoring.</p>	<p>2009</p> <p>2008-2009</p> <p>2008-2009</p> <p>2009-2010</p>	<p>Association of the Academy of Sciences, Institute of Natural Sciences of the Republic of Karkalpakstan</p> <p>State Biological Control and "Botanika" Scientific-Production Association of the Academy of Sciences</p> <p>State Committee for Nature Protection, Zoology institute of the Academy of Sciences</p> <p>State Biological Control, Zoology institute and "Botanika" Scientific-Production Association of the Academy of Sciences, National University of Uzbekistan named after M. Ulugbek</p> <p>Ministry of Agriculture and Water resources, State Biological Control, Zoology institute and Water Problems institute of the Academy of Sciences</p>	<p>Conservation Foundation, State Biological Control, 15 mln. sum</p> <p>Conservation Foundation, State Biological Control, 15 mln. sum</p> <p>Conservation Foundation, State Biological Control, 15 mln. sum</p> <p>Conservation Foundation, State Biological Control, 100 mln. sum</p>	<p>companies, developing fields at Ustyurt Plateau, in preservation.</p> <p>Solution of the problem of rational and sparing use of crude drug - licorice root.</p> <p>Implementation of preservation and restoration actions for conservation of riparian forest in the Syrdarya river flood-plain through.</p> <p>Introduction of standard criteria for assessment of productivity and methods of economical land productiveness estimation.</p> <p>Assessment of water bodies ecological status for rational use of biological resources of the water bodies and development of biologically reasonable recommendations to</p>

N п/п	Description of measures	Timetable	Executors in charge	Sources of financing	Expected results
					increase their fish capacity.
4.3	Preparation of materials for ratification of Cartagena Protocol on Biosafety to the Convention on Biological Diversity	2008-2009	State Committee for Nature Protection, Ministry of Foreign Affaires, relevant agencies	State Committee for Nature Protection	Ensuring an adequate level of protection in the field of the safe transfer, handling and use of 'living modified organisms resulting from modern biotechnology' that may have adverse effects on the conservation and sustainable use of biological diversity.

Annex E: List of Key Legislation Relating to Biodiversity

1. Law of the Republic of Uzbekistan “On Nature Protection”, 1992.
2. Law of the Republic of Uzbekistan “On State Sanitary Supervision”, 1992.
3. Law of the Republic of Uzbekistan “On Water and Water Use”, 1993.
4. Law of the Republic of Uzbekistan “On Subsoil”, 2002.
5. Law of the Republic of Uzbekistan “On Atmospheric Air Protection”, 1996.
6. Law of the Republic of Uzbekistan “On Protection of Citizens’ Health”, 1996.
7. Law of the Republic of Uzbekistan “On Rational Use of Energy” of 1997.
8. Law of the Republic of Uzbekistan “On Protection and Use of Flora”, 1997.
9. Law of the Republic of Uzbekistan “On Protection and Use of Fauna”, 1997.
10. Land Code of the Republic of Uzbekistan, 1998.
11. Law of the Republic of Uzbekistan “On Forest”, 1999.
12. Law of the Republic of Uzbekistan “On Protection of Population and Area from Natural and Man-Caused Emergencies”, 1999.
13. Law of the Republic of Uzbekistan “On Radiation Safety”, 2000.
14. Law of the Republic of Uzbekistan “On Environmental Expert Review”, 2000.
15. Law of the Republic of Uzbekistan “On Wastes”, 2002.
16. Law of the Republic of Uzbekistan “On Protected Natural Areas”, 2004.

Annex F: List of Government and Conservation Resources

1. Official site of State Committee for Nature Protection of the Republic of Uzbekistan – www.uznature.uz.
2. Site of State Inspectorate for Conservation and Rational Flora and Fauna Use (State Biological Control) – www.cbd.uz
3. Magazine “Ecological Bulletin of Uzbekistan” - www.econews.uz

Annex G: Expert Opinion on Dengizkul field Shady section construction EIA



http: [//www.uznature.uz](http://www.uznature.uz) e-mail: info@uznature.uz

2011 March 31

ref. No 18/2573

re №1619 dated 23.02.2011r.

EXPERT OPINION

of State Ecological Expertise

Regarding project: Dengizkul field Shady section construction EIA
Customer: LUKOIL Uzbekistan Operating Company LLC
Developer: «Elegant Engineering» LLC

Attention Director General
LUKOIL Uzbekistan Operating Company LLC
Chiloyants E.A.

Copies: Chairman of Bukhara Province
Committee for Nature Protection
Niyazov A.B.

Director of “Elegant Engineering” LLC
Tsoy I. A.

Data of the second stage of environmental impact assessment for construction of Shady section of Dengizkul field, located in the territory of Alat district, Bukhara region, was submitted for examination by state ecological expertise.

The closest to the territory of the field settlement is Dengizkul village (8 km north of the site in question). Town Mubarek is located 60 km to the north-east. The field section under examination has been in the area of oil and gas production industry activity for several decades. Within a radius of 20-35 km from the designed area there are oil and gas condensate producing fields Urta bulak, North Dengizkul, etc. Taking into account remoteness of neighboring producing fields, human-induced load at the section of designed works is insignificant.

In close vicinity of Shady section there is a network of sewers and field wastewater manifolds, the largest of them is South Dengizkul manifold, feeding field wastewater to Dengizkul lake. Area and depth of the lake constantly change, depending on precipitation, evaporation from the lake surface. The lake is an ornithological reserve, as it is habitat of waterfowl and more than 100 species of avifauna use the lake as migration route in spring and in autumn. Within a radius of 500 m around the lake there is a water protection area, construction of any facilities within the area is limited. Maximum water level in Dengizkul lake, approved by State Committee for Nature Protection of the Republic of Uzbekistan, is 182.2 m.

Aquifers are characterized by high content of minerals (up to 80 g/l) of chlorine-sulphate type and high content of phenols (up to 1.7 MPC). Near lakes and manifolds ground water depth level is 0.8 – 1.5 m, in the distance it is down to 30 m.

In the region under examination most hydrocarbon deposits are found in Upper and Middle Jurassic carbonate sediments. Based on the results of exploratory drilling it was concluded that Shady and Khauzak sections are large single gas condensate field. Prospective gas resources at Shady section make 1.57 bln.m³ per year with content of condensate of 15.08 g/m³; weight content of hydrogen sulphide is 3.19%. At present in the territory of the section there are two temporarily abandoned wells (№№ 305 and 306).

Within the framework of Dengizkul field Shady section construction the project provides for putting abandoned wells into commission and construction of 12 wells with wellhead sites, two multiple well platforms, gas collecting lines and manifold from multiple well platforms to Khauzak Gas Primary Treatment Facility.

Survey conducted by OJSC “UZLITIneftegaz” showed that 4 of 12 designed wells (№№ 1034, 1031, 1037 и 1043) are located within the water protection area of Dengizkul lake. Location of the wells within the water protection area (500 m) was approved at the earlier stage of their construction environmental impact assessment on condition that there will be implemented activities, meant to prevent pollution of Dengizkul lake and shoreline.

As location of production wells is predetermined by the conditions of minerals occurrence, the project provides for construction of mud pits outside the water protection area in order to minimize environmental impact. It is planned to construct temporary mud pits with double layer of waterproof coating with subsequent restoration of sites. Upon completion of drilling and testing the well head is equipped with shut off and control valves, instrumentation, tie-in points for injection compressor units and fencing, made of lattice panels.

For 1036 well with mouth, located at reference point of 182.87 m, the project provides for grading of wellhead site with filling to the reference point of 183,2 m in order to make 1 m margin from the maximum volume of Dengizkul lake filling (182.2 m). Mouth of 305 well, located at the maximum level of 182,2 m will be protected from possible underflooding with a dam and waterproof coating of internal site and dam slopes.

According to provided data actual outline of underflooding in case of maximum possible water level will be below the design one, as there are natural barriers and undulating land, i.e. flooding of wellhead sites is unlikely.

For gas transportation it is planned to arrange designed production wells in 2 clusters, 7 wells in each cluster. Gas will be transported through gas collecting lines to multiple well platforms and then through gas pipeline manifold to Khauzak Gas Primary Treatment Facility. It is planned to locate both multiple well platforms outside Dengizkul lake water protection area. At multiple well platforms there will be control rooms of cabinet type, instrumentation and flare for burning of raw gas during wells blowing out.

Gas pipeline – manifold 21,5 km long with operating pressure of 7,5 MPa and volume of transported gas of 4,76 mln.m³/day is planned to be made of the pipe with diameter of 426 mm with wall thickness of 16 mm. Fuel gas pipeline 57 mm in diameter will be laid parallel to gas pipeline – manifold. The most serious ecological risk during construction of the manifold is related to construction of 260 m long underwater crossing through Dengizkul lake bay isthmus, as disturbance of hydrodynamic regime will endanger natural habitat of waterfowl and riparian birds.

Gas pipeline – manifold will be laid underground at the depth of 1 m on the shore and from 2,0 to 2,5 m from the existing bottom of the bay isthmus. Accepted manifold wall thickness at underwater crossing section will be 20 mm. In order to prevent vertical and profile deformation of underwater crossing foundation it is planned to be made of gabion, filled with quarry stone. It is provided to construct temporary dam for the construction period of gas pipeline crossing through the strait; after completion of the construction works it will be dismantled. During construction of underwater section of gas pipeline special attention shall be paid to the protection of surface and groundwater and soils from contamination with oil products, maintenance and parking of machinery, as well as location of tanks with oil products within the boundaries of the bay shall be prohibited.

In order to provide access to all facilities and sites the project provides for a network of internal site roads with hard surface. Two routes of an access road from existing cluster K9 to 305 well are considered by the project.

First route is 15,8 km long and it provides for construction of bay isthmus crossing parallel to gas pipeline manifold route at the distance of 500 m from Dengizkul lakefront. Second route, 24,07 km long and located at the distance of 2 km from the lakefront, provides for construction of the road around the bay, at that it will cross two manifolds and channel between the lakes. Implementation of the second variant provides for construction of crossings through the channel between the lakes and two manifolds and does not exclude construction of access to the site of gas pipeline crossing through the strait, i.e. it will require allotment of greater land territories for long-term use and will not reduce adverse environmental impact. Based on the above the first variant of access road is more preferable.

In order to maintain hydrologic communication and level regime of the bay and the lake the project provides for construction of dam with concrete culverts with total inside dimension of 162.24 m² and capacity of 54.56 m³/sec.

Airborne emissions of pollutants take place during well blowing outs, when gas is vented to continuous flares of multiple well platforms, and at the linear part of the gas pipeline during injection and receiving of pigs. Calculation of maximum pollutant concentrations, formed by emissions outside the territory of Shady section multiple well platforms and pig launcher, did not show any excess of established norms.

Ecological examination of provided materials showed that accepted by the project method of gas pipeline and access roads construction will allow to minimize adverse impact of designed production on environment. **At the next stage of design it is necessary to develop ecological consequences statement, containing the following information:**

- **Ecological norms for all kinds of environmental impacts of designed production;**
- **detailed drawing of gas pipeline crossing through strait with method of underwater section cleaning from condensate and mechanical impurities;**
- **detailed plan of designed works site with indication of sludge receiving pit at pigging facilities;**
- **plan of restoration for disturbed lands and environmental quality monitoring.**

State Ecological Expertise **approves** Environmental Impact Statement for construction of Dengizkul field Shady section. Draft Ecological Consequences Statement shall be submitted for examination by State Ecological Expertise in the legally prescribed manner.

Bukhara Region Committee for Nature Protection shall take under its control location of production wells outside the water protection area of Dengizkul lake (500m), provision of water proof coating at temporary mud pits near wells №№ 1034, 1031, 1037 and 1043.

Chairman



N. Umarov

Khudaybergenov T.T.
tel. 239-16-88

Annex H: Approval Documents for Shady project use of land by Khokim District and Region

**EMBLEM OF THE REPUBLIC OF UZBEKISTAN
BUKHARA REGION**

DECISION

of

Alat District Khokim

14.02.2010

Alat town

No 86

Regarding allocation of grazing lands, situated in the territory of Alat forestry, to “LUKOIL Uzbekistan Operating Company” LLC for gathering line of №1030, 1031, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043 wells and construction of access road to the wells

Based on articles 6 and 23 of “Land Code” of the Republic of Uzbekistan and minutes of the District Committee for Review of Land Plots Allocation (Sale) Issues, as well as submitted documents

I DECIDE:

1. Approve minutes No 05, dated January 10, 2011, (minutes are enclosed) of the District Committee for Review of Land Plots Allocation (Sale) Issues regarding allocation of grazing lands, located in the territory of Alat forestry, with the total area of 66.8 ha, where 4.32 ha are for permanent use and 62.48 ha are for temporary use (for the period of 3 years) for gathering line of №№ 1030, 1031, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043 wells and construction of access road to the wells.

2. Oblige the customer to transfer to the following settlement accounts means to the amount of 41,259,073 (forty one million two hundred and fifty nine thousand seventy three) sum prior to the commencement of construction:

- means to the amount of 265,110 (two hundred sixty five thousand one hundred and ten) sum for allocation of 4.32 (four point thirty two) ha of grazing lands for permanent use to the settlement account of Bukhara region Department of Land Resources and State Cadastre, 20204000200568403002 in Agrobank of Bukhara town;

-based on minutes No 1 dated January 10, 2011 of Alat forestry general meeting, transfer means to the amount of 40,993,963 (forty million nine hundred and ninety three thousand nine hundred and sixty three) sum to settlement account 23402000400100001006 in MBBEKhKMM of the Treasury of the Ministry of Finance of the Republic of Uzbekistan, Tashkent city, code 00014, TIN 201122319, b/a 4001100620495014210001 TIN 201365814 of Alat forestry to compensate damage caused by allocation of 66.80 (sixty six point eighty) ha of grazing lands.

3. Oblige the customer to restore top fertile soil layer upon completion of construction works and hand over land plots in the condition appropriate for farming to the forestry in the prescribed manner.

4. Take execution of this decision under my own control.
5. Send this Decision to Region Khokim for approval.

*Translation of round stamp
The Republic of Uzbekistan
Bukhara region
Alat District Khokimiyat*

District Khokim

I.Khujaev

**REPORT
OF DISTRICT COMMITTEE FOR REVIEW OF LAND PLOTS
ALLOCATION (SALE) ISSUES**

January 10, 2011

Alat town

№05

Regarding allocation of grazing lands, situated in the territory of Alat forestry, to “LUKOIL Uzbekistan Operating Company” LLC for gathering line of №1030, 1031, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043 wells and construction of access road to the wells

We, undersigned:

- | | |
|---------------------------|---|
| 1. I.Khujaev | District Khokim, Chairman of the Committee |
| 2. S.Kodirov | First Deputy of District Khokim for Capital Construction, Utilities and Improvement Issues; |
| 3. B.Boboev | I-st category Specialist of District Khokimiyat |
| COMMITTEE MEMBERS: | |
| 4. Sh.Arshimov | Head of District Agriculture and Water Resources Department |
| 5. I.Vafoev | Head of District Department of Land Resources and State Cadastre |
| 6. A.Rakhimov | Head of District Land-Utilization, Registration and Real Estate Cadastre Service |
| 7. B.Atamuradov | Chief District Architect |
| 8. I.Yoriyev | Head Doctor of District Sanitary-Epidemiological Agency |
| 9. K.Mamatov | Acting Head of Nature Conservation Interdistrict Inspectorate |
| 10. A.Ergashov | Engineer of District Inspectorate for Land Lots Allocation |
| 11. E.A.Chiloyants | Director General of “LUKOIL Uzbekistan Operating Company” LLC |
| 12. V.N.Kurmishhev | Chief Surveyor of “LUKOIL Uzbekistan Operating Company” LLC |
| 13. D.Sotlikov | Chairman of Alat forestry |

drew up the present report that the management of “LUKOIL Uzbekistan Operating Company” LLC applied to District Khokim by letter No 1570 dated December 24, 2010 with request to allocate land plots at Shady section of Dengizkul block for gathering line of wells and construction of access road to the wells.

Having studied the facts, stated in the letter, the District Committee for Review of Land Plots Allocation (Sale) Issues found out that for construction of gathering line of №№ 1031, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043 wells and access road to the wells it is indeed required to allocate at Shady section of Dengizkul block grazing lands, located in the territory of Alat forestry, with total area of 66.80 (sixty six point eight) ha, where: 4.32 (four point thirty two) ha are for permanent use and 62.48 (sixty two point forty eight) ha are for temporary use.

Based on the above it was considered advisable to allocate for construction of gathering line of №№ 1031, 1034, 1035, 1036, 1037, 1038, 1039, 1040, 1041, 1042, 1043 wells and access road to the wells at Shady section of Dengizkul block grazing lands, located in the territory of Alat forestry, with total area of 66.80 (sixty six point eight) ha, where: 4.32 (four point thirty two) ha are for permanent use and 62.48 (sixty two point forty eight) ha are for temporary use (for the period of 3 years).

This report must be sent to Region Khokim for approval.

I.Khujaev	<i>Signature</i>
S.Kodirov	<i>Signature</i>
B.Boboev	<i>Signature</i>
I.Vafoev	<i>Signature</i>
B.Atamuradov	<i>Signature</i>
I.Yoriyev	<i>Signature</i>

K.Mamatov	<i>Signature</i>
A.Rakhimov	<i>Signature</i>
Sh.Arshimov	<i>Signature</i>
A.Ergashov	<i>Signature</i>
E.A.Chiloyants	<i>Signature</i>
V.N.Kurmishev	<i>Signature</i>
D.Sotnikov	<i>Signature</i>

Translation of round stamp

*Ministry of Health of the Republic of Uzbekistan
Bukhara region
Alat district
Center of State Sanitary-Epidemiological Supervision*

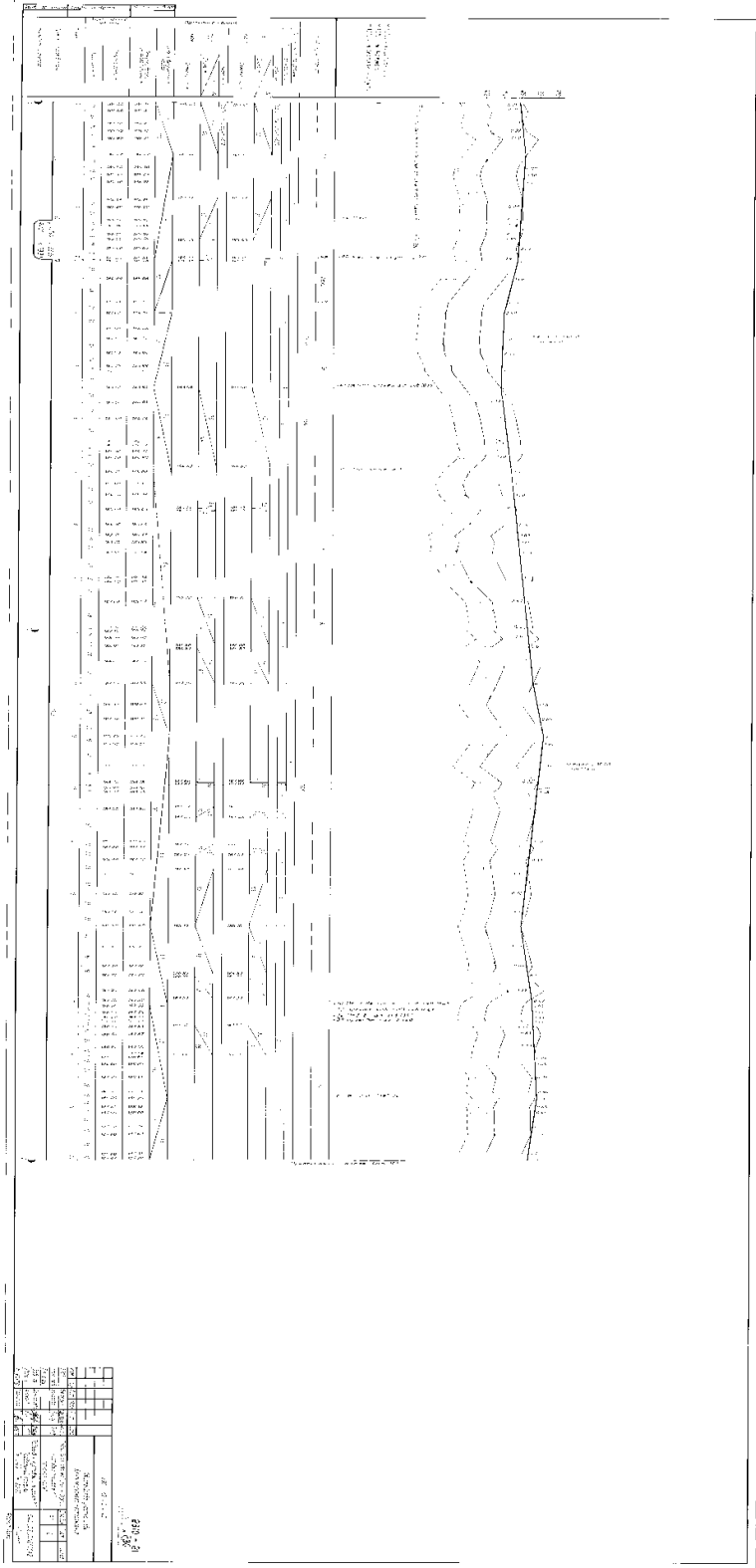
*The Republic of Uzbekistan
Bukhara region
District Architecture Department*

*The Republic of Uzbekistan
State Forestry of Bukhara region
State Forestry of Alat district*

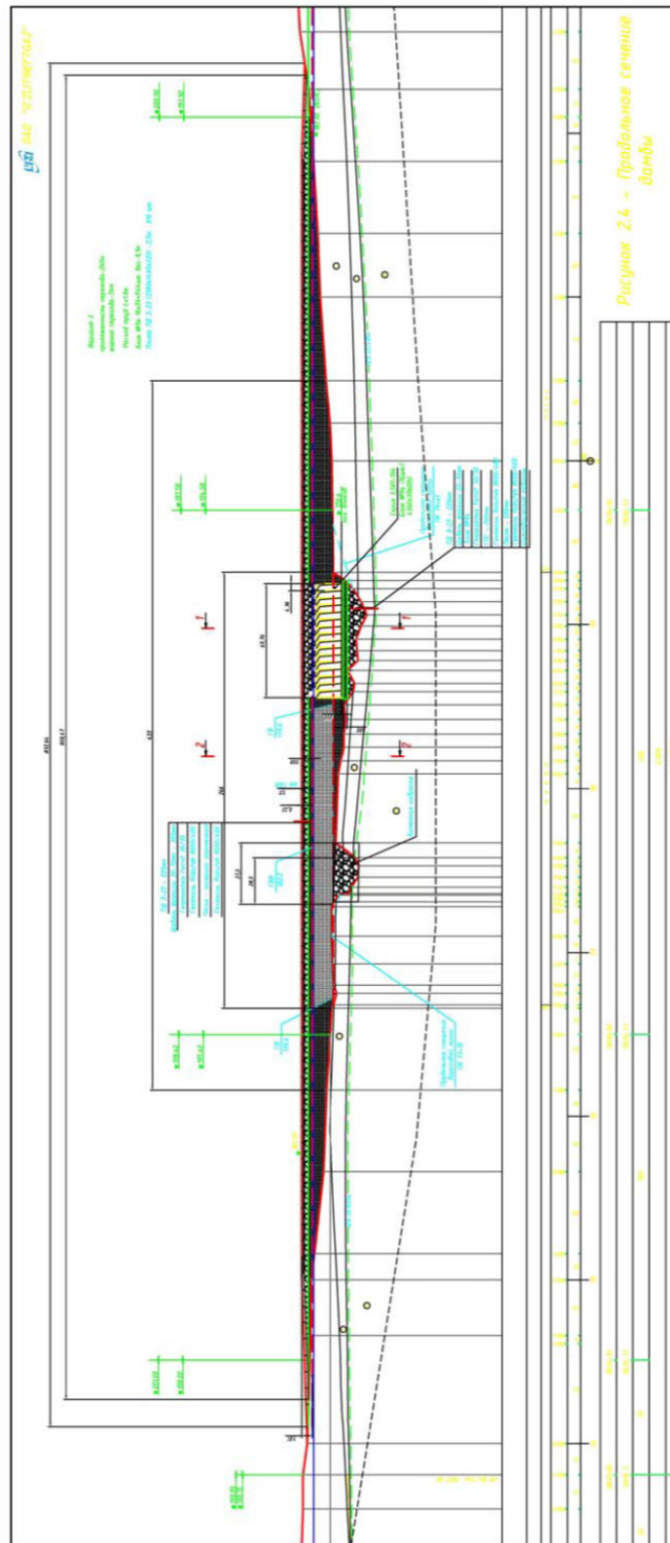
*The Republic of Uzbekistan
Bukhara region Department
of Land Resources and State Cadastre*

*The Republic of Uzbekistan
Bukhara region
Alat district
District Land-Utilization,
Registration and Real Estate Cadastre Service*

—illegible—



Section of the Road Causeway Across the Lake Showing the Culvert Location



Annex J: Information Sheet on Ramsar Wetlands (RIS) [for Dengizkul Lake]

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

1. Date this sheet was completed/updated:
20 January 2003

2. Country: The Republic of Uzbekistan

3. Name of wetland: Lake Dengizkul

4. Geographical coordinates: N 39.07 E 64.10

5. Elevation: (average and/or max. & min.) average 183.1 m 6. Area: (in hectares) 31,300 ha

7. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

This largest saline wastewater closed waterbody in SW part of the Kysylkum desert lies in a natural depression 70 km SSW of the city the Bukhara and 35 km SE of Alat town on the border of Uzbekistan and Turkmenistan, with typical ecological conditions of natural lakes situated in the deserts of Central Asia. This lake is of special value as a site of concentration on the route of migrating birds and wintering of hydrophilous birds. It is also notable for high biodiversity and large number of endemic fishes. There is a significant fish stock in this lake. Besides, this area is the habitat of some rare animal species.

8. Wetland Type (please circle the applicable codes for wetland types; in the present document, the "Ramsar Classification System for Wetland Type" is found on page 9)

marine-coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

inland: L • M • N • O • P • Q • R • Sp • Ss • Tp
Ts • U • Va • Vt • W • Xf • Xp • Y • Zg • Zk(b)

human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

Please now rank these wetland types by listing them from the most to the least dominant: Q

9. Ramsar Criteria: (please circle the applicable Criteria; the *Criteria for Identifying Wetlands of International Importance* are reprinted beginning on page 11 of this document.)

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8

Please specify the most significant criterion applicable to the site: 3

10. Map of site included? Please tick yes - or- no

(Please refer to the *Explanatory Note and Guidelines* document for information regarding desirable map traits).

Map scale: 1:200000

11. Name and address of the compiler of this form:

The Republican State Inspection of Fauna, Flora and Nature Reserve (Gosbiocontrol),
Chashtepinskaya 21a, Tashkent 7000149, Uzbekistan.

Tel.: 500121, 504268;

Fax: +(998712) 504467, 413990, 415633;

e-mail: filatov@comuz.uz

FOR OFFICE USE ONLY.

DD	MM	YY							
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Designation date Site Reference Number

Please provide additional information on each of the following categories by attaching extra pages (please limit extra pages to no more than 10):

12. Justification of the criteria selected under point 9, on previous page. (Please refer to the *Criteria for Identifying Wetlands of International Importance* appended to this document)

Criterion 1.

This Lake is the largest saline wastewater closed waterbody in SW part of the Kysylkum desert, with typical ecological conditions of natural lakes situated in the deserts of Central Asia.

Criterion 2:

Wetland supports endangered and vulnerable species as follows:

- endangered species: Bastard Sturgeon (*Acipenser nudiventris*), Large Amu-dar Shovelnose (*Pseudoscaphirhynchus kaufmanni*), White headed Duck (*Oxyura leucocephala Scop.*)
- vulnerable species: Central Asian tortoise *Agrionemys horsfieldi Gray*, Central Asian desert monitor *Varanus griseus Daud*, Geoffroy's Bat (*Myotis emarginatus E.G.*), Marbled Teal (*Marmaronetta angustirostris Menetr.*)

Criterion 3:

The lake is important for maintaining a biodiversity of wetland-dependent species in an otherwise largely arid region, including twenty-four fish species having been recorded in Lake Dengizkul, which constitutes 28,9% of the total fish fauna of Uzbekistan; 2 amphibian species (Marsh Frog, *Rana ridibunda Pall* and Green Toad, *Bufo viridis Laurenti*); 24 reptile species inhabiting in the vicinity of Lake Dengizkul; 35 mammal species (35,7% of the total species composition in Uzbekistan); all the *Felidae* species presenting to be included with Annex II of CITES and 120 bird species.

(Details of the species are presented under No.18.)

Criterion 4:

Lake Dengizkul is of crucial importance for migrating and wintering waterfowl, as it is situated on the route of bird migrations from Western Siberia and Kazakhstan to Indo-Pakistani wintering ground. It is a resting site for many waterbirds, and a wintering site for over 27 bird species.

Coot *Fulica atra* and Red-crested Pochard *Netta rufina* . dominate in winter and Mallard *Anas platyrhynchos* and Teal *Anas crecca* are common. Of rare birds, Mute Swan *Cygnus olor*, Whiteheaded

Duck *Oxiura leucocephala*, Pygmy Cormorant *Phalacrocorax pygmeus*, and Whitetailed Eagle *Haliaeetus albicilla* winter there. Among many migrating bird species staying on Dengizkul, the most important are White Pelican *Pelecanus onocrotalus*, Common Crane *Grus grus* and Demoiselle Crane *Anthropoides virgo*, Dalmatian Pelican *Pelecanus crispus* is rare.

Criterion 5:

It regularly maintains over 20,000 waterfowl (up to 500,000 in autumn and 47-286,000 in winter). 54.5-92.9% are Coots and about 6.5-42.6% are bay ducks.

Annual survey of autumn numbers are 114,604(1986), 499,359(1987) and 139,287(1988). In winter, total number varied between 47,729 and 286,634 in few years between 1997 and 2000.

Criterion 6:

The lake supports more than 1% of the world population of the endangered White-headed Duck. The population of the White-headed Duck was 1,107 (9.6%) in January 2000 and 185 (1.6%) in March 2000. Coot also regularly exceed the 1% threshold for the population.

Criterion 7:

Twenty-four fish species have been recorded in Lake Dengizkul, which constitutes 28,9% of the total fish fauna of Uzbekistan. Of them, 14 species (58,3%) are indigenous forms:

Acipenser nudiventris Bastard Sturgeon
Pseudoscaphirhynchus kaufmanni Big Amu-dar Shovelnose
Carassius auratus Goldfish
Cyprinus carpio Carp
Pelecus cultratus Sabrefish
Abramis. brama orientalis Bream
Chalcalburnus chalcoides aralensis Shemaya
Aspius aspius taeniatus Aral Asp
Rutilus rutilus aralensis Roach
Varicorhinus capoeta heratensis Khramulya
Barbus brachicephalus Aral Barbel
B. capito conocephalus Barbel
Silurus glanis European catfish
Stizostedion lucioperca Sander

Criterion 8:

The lake is closed basin lake and support at least 14 fish species which are totally dependent on this lake for the food, spawning ground and nursery.

13. General location: (include the nearest large town and its administrative region)

Lake Dengizkul is located in south-west periphery of the Bukhara oasis; it is one of the three largest irrigational wastewater lakes in the basin of the Aral Sea. The largest saline wastewater closed waterbody in SW part of the Kyzylkum desert lies in a natural depression 70 km southsouth-west of the city of Bukhara and 35 km south-east of Alat town on the border of Uzbekistan and Turkmenistan, with typical ecological conditions of natural lakes situated in the deserts of Central Asia.

14. Physical features: (e.g., geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; catchment area; downstream area; climate)

In the past, this lake was a terminal reservoir on the River Zaravshan. On a map made in 1914 the area of this lake was 120 km². However, by mid-1950s, the lake had completely dried up and turned into a big solonchak because of the withdrawal of its waters for irrigation.

The construction of the Dengizkul collector and the Amu-Bukhara canal in 1966 resulted in an intensive filling of the lake. In the past 25 years, this lake has turned into the biggest irrigation-wastewater lake out of periodically drying solonchak. Now its area reaches 313 km² and the volume 3,3 km³.

Morphometric characteristics of Lake Dengizkul

Morphometric characteristics	Units of measurement
water level	m 183,1
area	km ² 313,0
volume	mln m ³ 3,347
length	km 43,5
the widest part	km 9
average width	km 7,2
the deepest point	m 23,0
average depth	m 10,69
shoreline length	km 267,8

The lake is 43,5 km long stretching from southeast to northwest. At its widest it is 9 km with an average width of 7,2 km. North-eastern shore in most part is steep, formed of soils with high content of gypsum, sands, marl and gypsum. The southern shore is low, covered with the desert vegetation. The coastline is stable. The depth in the central part is 23 m. North-eastern and south-western reaches of the lake are separated from the central part by underwater elevations which handicap the interwater exchange between the reaches. Above-water vegetation is restricted to northwestern part of the lake consisting mainly of reeds. About 4% of the lake area are overgrown with vegetation.

The soil types are typical for the region. They are as follows: desert sandy soils and sands; greybrown solonchak soils on the eluvium of sandstone with hilly sands; solonchaks on the eluvium of primary rock; marsh-meadow and meadow soils of the arid zone, loamy soils on allusion.

The climate is extremely continental, dry, with high fluctuations in temperatures. An average temperature in January is 0 - 20 C, the absolute minimum - 270 C. An average t0 in July - +27-300 C, but it can be as high as +45+480C.

In cold seasons the wind is of northeastern and northwestern directions, in the warm seasons it is of north and northwestern directions.

Wind-induced lowering and raising of the water level may reach 0,3-0,4 m upon the wind blowing along the main axis of Lake Dengizkul.

Precipitation usually takes place in March-April. Annual precipitation reaches 150-250 mm, in separate years only 100 mm.

An increase in water t0 above 40C usually takes place in the first 10 days of March. The highest water t0 (27-27,50C) is usually in late July and early August. The water t0 is quite homogeneous in the lake aquarium owing to winds. The autumn decrease in water t0 below 40C usually takes place in December.

Depending on synoptic peculiarities in different years, the duration of the freeze-up may range between 0 and 30 days. In cold winters the freeze-up is observed on the whole aquatorium of the lake.

The most intensive growth in the water level reaching 2 m a year took place in 1973 to 1976 during the water escape from Lake Sultandag.

The growth of the water level continued for the whole year slowing down insignificantly in winter months. As the equilibrium of the water balance was maintained and the lake stretched out to the plains north-westwardly, annual water fluctuations of 0,3-0,5 m became characteristic for this lake with peaks in spring.

Lake Dengizkul has no outflow. The main inflow is through the Debgizkul collector. With the growth of irrigation and water withdrawal, the drainage inflow into Lake Dengizkul grows. However, with the increase in the area of Lake Dengizkul, the loss of water due to evaporation also increases.

Water Balance in Lake Dengizkul

Balance components	On average per year
Collector-drainage inflow from Bucharat oasis	0,54
Precipitation	0,05
Lesses as a result of evaporation	0,50

The distribution of mineralization through the lake aquatorium is similar over all seasons. The lowest values are characteristic of the northwestern part of Lake Dengizkul into which flow. The difference in the levels of mineralization between eastern and western reaches 0,3-0,5 g/l. The maximum values are characteristic of shallow northwestern reaches with a slow water exchange with the main part of the lake. An average mineralization value is 13,2 g/l.

The ion content in Lake Dengizkul

Characteristic	Ca	Mg	Na+K	HCO3	SO4	Cl	E
mean value	492	844	2691	179	6338	2614	13208

Transport of bioorganic and organic matter from irrigated fields contributes to a high productivity of the lake despite of increased water mineralization. The formation of collector waters from genetically different waters (ground, filtration and wastewater) cause a higher variability in separate ion concentrations against the water mass of Lake Dengizkul. Sulphate-sodium type of salinization is characteristic of this lake.

The transport of mineralized drainage waters under conditions of high rate of evaporation results in a constant growth in mineralization which reaches 0,3 to 0,4 g/l per year.

15. Hydrological values: (groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.)

The relation of Lake Dengizkul to underground water has not been studied to a sufficient degree. However, in specialists' opinion, the lake is fed by groundwater which, however, does not disturb its water balance.

16. Ecological features: (main habitats and vegetation types)

The relief is a plain with absolute heights of 200-250 m above sea level. The major components of the relief are mound sands and saucer-like hollows of various shapes.

These are largely predetermined by extremely continental dry desert climate, availability of a large salt waterbody and the spread of aquatic habitats into the desert ecosystems. All the habitats can be divided into two large groups.

The first group is directly connected with Lake Dengizkul and located in the aquatorium of this lake. This group includes reeds and cat's-tail growing along the coastline in NW part of Lake Dengizkul.

They grow in a strip a few meters wide and do not cover large areas. This habitat is notable for the richest species diversity of the hydrophilous complex.

Islands and smaller islands are also situated in NW shallow part of Lake Dengizkul not far from the collectors flowing into it. The islands have sloping shores. The smaller islands are located not far from the coastline and are often covered with reeds. Larger islands situated farther have, as a rule, desert bush vegetation, shrubs of karelinia and some other water-loving plants. In these sites cormorants, pelicans and many duck and goose species are concentrated.

Open water space can be in turn divided into shallow bays with submerged aquatic vegetation growing as a rule not far from the shore, and a deep-water area. The former have high biological productivity where many waterfowl and fish species forage.

The second group of habitats is restricted to the coastal part of Lake Dengizkul and is characterized with both various desert plant associations and poorly developed tugai association. The latter is only restricted to the sloping NW part of the shore and borders on the reed vegetation. The major part of the coast is covered by the desert vegetation, the nature of which is predetermined by the relief. The most part of the coastline is steep. As a result, relatively high numbers of Shelducks are characteristic for Lake Dengizkul. Besides, Eagle Owl and Kestrel are common in this area.

The vegetation is differentiated according to the features of the relief, soil type and water conditions (the list of dominating plant species is enclosed). The following plant communities are distinguished.

The formation of hornwort -- *Ceratophylleta* -- is spread and stable. An association of hornwort - ass. *Ceratophyllum demersum* + *aquiherbosum* - with other aquatic plants (*Potamogeton pectinatus*, *P. lucens*, *Miriophyllum spicatum*, *Typha angustifolia*, etc.) is encountered at the depth of 0,7 to 1,5 m in highly silted bed. Submerged weeds are highly dense.

The formation of pondweed — *Potamogeteta* — is the association of *P. pectinatus* and *P. lucens*.

The former occupies more saline plots in SE part of the lake, and the latter more freshwater NW part. The formation of pondweed grows as deep as 2 to 2,5.

The formation of reed - *Phragmiteta* - is dominating among littoral vegetation. The most often encountered are the following:

- pure reed association - ass. *Phragmites communis purum*;
- reeds with heterogeneous grasses ass. *Phragmites com. + mixta herbo*
- reeds with cat's-tail - sum ass. *Phragmites com. + Typha angustifolia*.

The density of reeds alone is high, the height of reeds reaches 3 to 3,5 m. The strip of reeds begins immediately at the water edge and expands until the water depth reaches 1 or 2 m.

The association of reeds with cat's tail are distributed through the lake as strips of various widths growing at the depth as low as 1,5 m. The density of the shrubs is not high, the above water height reaching 1,5 m.

The association of reeds with motley grass grows on the shores is distributed on the shores along the water edge. Besides reeds, the vegetation consists of *Aeluropus littoralis*, sedge, wood reed, karelinia, and other species. Components of tree-bush tugai are also encountered among them. They are papulus, tamarisk and silvery salt tree.

The formation *Tamariceta* comprises two associations: ass. *Tamaricetum pentandra*--mixta, the edificator of which is *Tamarix pentandra*, and ass *Tamaricetum hispedae*, the edification of which is *Tamarix hispida*. The former association is restricted to lowlands and forms dense shrubs. The floristic composition is rather poor: reeds, karelinia, *Suaeda salsa* and camel's thorn.

The association *Tamaricetum hispedae* is spread on saline meadow-takyr or loamy and sandloamy soils showing medium salinity. Ground water is mineralized. The floristic composition mainly includes of halophytes: karelinia, silvery salt tree, sea blithe, barnyard grass, and reeds.

The formation *Salsaleta richteri* is formed of saltwork, *Salsola richteri*. Two associations: ass *Haloxylon persicum* + *Salsoletum richteri* and *S.richteri* are noted. The former grows on hillock sands and is formed of *H.persicum* and *S.richteri*. The cover is of two storeys, 1 or 2 m high in the form of thinned out thicket and single bushes.

Ass. *Salsoletum richteri* is also restricted to hillock sands. Calligonum and bastard acacia can also be observed in this association.

The formation of acacia *Ammodendreta conolyi* is represented by the acacia association (ass.*Ammodendreta conolyi*). This is the most characteristic association for blown sands based on typical psammophytes: *Ammondendron condi*, calligonum, *Calligonum caput-medusae*, *Haloxylon persicum*, *Astragalus*, ephemerals and ephemeroids.

The formation of *Varcalligoneta* is formed of *Calligonum acanthopterum* and *C. caput-medusae*.

It is represented by ass. *Varcalledonetum physxodis* which differs from ass. *Acacia* + *Varcalligoneta* by the availability of *Calligonum acanthopterum*, *Salsoletum richteri* and *Tamarix hispida*.

The vegetation has undergone certain changes connected with either desertification or irrigation.

The general exogenous process has been brought about by man-made impact resulting from the construction of Amu-Bukhara Canal and related processes. The irrigation of this territory has given rise to the emergence of aquatic (submerged), littoral-aquatic and coastal vegetation.

Besides succession of plant communities, also observed is a seasonal succession of plant species, which is typical for the desert zone and in which the aspect of the ephemerals and ephemerids is evident, whose longevity is about 30 or 40 days.

In the floristic composition, there are no strict endemics, but many species (18 out of 47) of this region are endemics to Central Asia. No introduced plant species have been recorded in the area.

Such plants as *Ceratophyllum demersum*, *Salvinia natans*, *Potamogeton lucens* and *P.pectinatus*, *Miriophyllum spicatum*, as well as young shoots of reeds and *Typha angustifolia* are the major source of food for herbivorous fishes. The same plant species are the food for musk-rats. Besides, *Potamogeton lucens* and *P.pectinatus*, *Ceratophyllum demersum* and *Salvinia natans* are the food for both resident and migrating aquatic and waterside species of waterfowl and animals.

In the past 15-20 years, the number of endemic plants has considerable decreased - they have been included with the list of rare and vanishing plant species.

The cause of their vanishing is in their low plasticity and a significant human impact on their habitats.

17. Noteworthy flora: (indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc.)

The List of Dominating Plant Species in the Vicinity of Lake Dengizkul

Salviniaceae

1. *Salvinia natans*

Family *Ceratophyllaceae*

2. *Ceratophyllum demersum*

Family *Halorhagidaceae*

3. *Miriophyllum spicatum*

Family *Lentibulariaceae*

4. *Utricularia vulgaris*

Family *Potamogetonaceae*

5. *Potamogeton lucens*

6. *Potamogeton pectinatus*

Family *Cyperaceae*

24. *C. caput - medusae*

Family *Tamaricaceae*

25. *Tamarix hispida*

26. *T. pentandra*

27. *T. laxa*

Family *Salucaceae*

28. *Salix songarica*

29. *Papulus ariana**

30. *P. proinosa*

Family *Fabaceae*

31. *Alhagi psendalhagi*

7. *Carex physodes*
 8. *Carex riparia*
 9. *Phragmites communis*
 Family Typhaceae
 10. *Typha angustifolia*
 Family Ranunculaceae
 11. *Delphinium bucharicum**
 Family Chenopodiasceae
 12. *Agriophyllum pungens*
 13. *A. Paletzianum**
 14. *Anabasis annua**
 15. *Climacoptera lanata*
 16. *Haloxylon persicum*
 17. *H. aphyllum*
 18. *Suaeda salsa*
 19. *Salsola arbuscula**
 20. *S. Paletziana**
 21. *S. Richteri**
 Family Polygonaceae
 22. *Calligonum acanthopterum*
 23. *C. aphyllum*
 Note: plant species endemic to Central Asian are marked with (*)
32. *Ammondendron argentum**
 33. *A. conoli*
 34. *Astragalus amarus**
 35. *A. lemsonianus**
 36. *Halimodendron halodendron*
 Family Peganiaceae
 37. *Peganum harmala*
 Family Apiaceae
 38. *Ferula caspica**
 Family Convolvonlanceae
 39. *Convolvulus hamadae**
 Family Asteraceae
 40. *Artemisia diffusa**
 41. *A. leucodes**
 42. *A. songarica**
 43. *Karelinia caspica*
 Family Poaceae
 44. *Aeluropus littoralis*
 45. *Calamagrostis dubia**
 46. *Cynodon dactylon*
 47. *Aristida pennata*

Plants included with the Red Data Book of Uzbekistan: *Calligonum paletzianum*, *C. elegans*, *C. matteianum*, *Cousine strobulocephala*, *C. sogdiana*, *Tithymabus scerocyathium*

18. Noteworthy fauna: (indicating, e.g., which species are unique, rare, endangered, abundant or biogeographically important; include count data, etc.)

Fishes

Modern fish fauna of Uzbekistan consists of 19 families, 56 genera comprising 83 species. Of them, 23 species (33,7%) and 43 subspecies are endemic aboriginal forms. Twenty-four fish species have been recorded in Lake Dengizkul, which constitutes 28,9% of the total fish fauna of Uzbekistan. Of them, 14 species (58,3%) are aboriginal forms, 4 spp. are acclimatized (16,7%) and 6 are incidentally introduced (25%). Sixteen species (66,6%) are of commercial and sporting importance. *Acipenser nudiventris* and *P. kaufmanni* are extremely rare and their modern habitation should be attributed to as only probable: both the species have been included with the Red List of IUCN as threatened and with the annex II of CITES. Besides them, *Aspius aspius taeniatus*, which are the objects of captures, are included with the list of those "Data deficient". *Barbus brachicephalus*, which inhabits in Lake Dengizkul in low numbers, was included in the list of rare and vanishing fishes (1997).

The Fish Fauna of Lake Dengizkul.

Taxon	English Name	Origin	Use
Class <i>Osteichthyes</i>			
Order <i>Acipenseriformes</i>			
<i>Acipenseridae</i>			
<i>Acipenser nudiventris</i>	Bastard Sturgeon	R	
<i>Pseudoscaphirhynchus kaufmanni</i>	Large Amu-dar Shovelnose	R	
Order <i>Cyprinodontiformes</i>			
<i>Poeciliidae</i>			
<i>Gambusia affinis</i>	Mosquito Fish	A	
Order <i>Cypriniformes</i>			
<i>Cyprinidae</i>			
<i>Hypophthalmichthys molitrix</i>	Silver carp	A	C
<i>Aristichthys nobilis</i>	Spotted Silver carp	A	C
<i>Carassius auratus</i>	Goldfish	R	CS

Taxon	English name	Origin	Use
<i>Cyprinus carpio</i>	Carp	R	CS
<i>Pelecus cultratus</i>	Sabrefish	R	S
<i>Hemiculter leucisculus</i>	Common Sawbelly	I	
<i>Abramis. brama orientalis</i>	Bream	R	CS
<i>Chalcalburnus chalcoides aralensis</i>	Shemaya	R	CS
<i>Aspius aspius taeniatus</i>	Aral Asp	R	S
<i>Pseudorasbora parva</i>	Stone Morocco	I	
<i>Rutilus rutilus aralensis</i>	Roach	R	CS
<i>Ctenopharingodon idella</i>	Grass Carp	A	C
<i>Pseudogobio rivularis</i>	Amur False Gudgeon	I	
<i>Varicorhinus capoeta heratensis</i>	Khramulya	R	CS
<i>Barbus brachicephalus</i>	Aral barbel	R	
<i>B. capito conocephalus</i>	Barbel	R	S
Order <i>Siluriformes</i>			
<i>Siluridae</i>			
<i>Silurus glanis</i>	European catfish	R	CS
Order <i>Perciformes</i>			
<i>Percidae</i>			
<i>Stizostedion lucioperca</i>	Sander	R	CS
<i>Gobiidae</i>			
<i>Rhinogobius similis</i>	Amur goby	I	
<i>Channidae</i>			
<i>Channa argus warpa-chowskii</i>	Amur Snakehead	E	C

Note: R - aboriginal species C - commercial
A - acclimatized species S - of sporting importance
I - accidentally introduced species

Amphibians and Reptiles

The complex of amphibians and reptiles inhabiting in the vicinity of Lake Dengizkul comprises 2 amphibian species (Marsh Frog, *Rana ridibunda Pall* and Green Toad, *Bufo viridis Laurenti*) and 24 reptile species. Of reptiles, Central Asian tortoise, *Agrionemys horsfieldi Gray* (threatened) and Central Asian desert monitor, *Varanus griseus Daud* are included with the IUCN Red List. Also, the latter species is in the list of Annex 1 of CITES, and Central Asian tortoise and Sand Boa, *Eryx miliaris* are in the Annex II of CITES.

In the national lists of rare and vanishing animals are the Central Asian monitor *Varanus griseus Daud*, Tree snake *Boiga trigonatum Branch* and cobra *Naja oxiana Eich*.

The numbers of Central Asian tortoise *Agrionemys horsfieldi Gray* and *E. miliaris* are relatively high, the others are rare.

The List of Amphibians and Reptiles

Latin name	English name
<i>Amphibia</i>	
<i>Bufo viridis Laurenti.</i>	Green Toad
<i>Rana ridibunda Pall.</i>	Marsh Frog
<i>Reptilia</i>	
* <i>Agrionemys horsfieldi Gray.</i>	Horsfield's tortoise
* <i>Teratoscincus scincus Schl.</i>	Turkestan Plate-tailed Gecko
* <i>Crossobamon ewersmann Wieg.</i>	--
<i>Trapelus sanguinolentis Pall.</i>	Steppe Agama
* <i>Phrynocephalus reticulatus Eich.</i>	Netted Toad Agama
<i>Phrynocephalus interscapularis Licht.</i>	--
* <i>Phrynocephalus mystaceus Pall.</i>	Toad-headed Agama
<i>Varanus griseus Daud.</i>	Desert Monitor

Latin name	English name
* <i>Eremias grammica</i> Licht.	Reticulate Racerunner
* <i>Eremias lineolata</i> Nic.	Striped Racerunner
<i>Eremias scripta</i> Str.	Sand Racerunner
<i>Eremias velox</i> Pall.	Rapid Fringe-toed Lizard
* <i>Eremias intermedia</i> Str.	Medial Racerunner
<i>Eryx miliaris</i> Pall.	Sand Boa
<i>Natrix tessellata</i> Laur.	Diced Snake
<i>Coluber Karelini</i> Bran.	Spotted Desert Racer
<i>Coluber ladacensis</i> Ander.	
<i>Coluber rawergieri</i> Men.	Mountain Racer
<i>Spaleorosophis diadema</i> Schl..	Diadem Snake
<i>Psammophis lineolatum</i> Brand.	Steppe Ribbon Snake
<i>Boiga trigonatum</i> Sch.	Tree Snake
<i>Naja oxiana</i> Eich.	Cobra

Note: endemic animals of Uzbekistan and Central Asia are marked with (*).

Mammals

The mammals inhabiting in the vicinity of Lake Dengizkul comprise 35 species (35,7% of the total species composition in Uzbekistan), all the Felidae species being included with Annex II of CITES.

Geoffroy Bat *Myotis emarginatus*, Goitred Gazella *Gazella subgutturoza* and, Corsak Fox *Vulpes corsak* were included with the IUCN Red List (1996) as endangered, at lower risk and as data deficient, respectively.

Five species of mammals were included with the regional lists of rare and vanishing animals (1996). *Rhinolophus bocharicus* Kast., Long Clawed Ground Squirrel *Spermophilopsis leptodactylus* Lich, and Lichtenstein's Jerboa *Eremodipus lichtensteini* Vinogr. are endemic to the area of Lake Dengizkul.

On the whole, the complex of the mammals inhabiting in the area of Lake Dengizkul is typical of the desert ecosystem.

The List of Mammals

Latin name	English name
<i>Hemiechinus auritus</i> Gm.	Long-eared Hedgehog
<i>Hemiechinus hypomelas</i> Brandt.*	Brandt's Hedgehog
<i>Crocidura suaveolens</i> Pall.	Scilly Shrew
<i>Diplomesodon pulchellum</i> Licht.*	Piebald Shrew
<i>Rhinolophus bocharicus</i> Kast.	--
<i>Myotis blythi</i> Tomes.	Bechstein's Bat
<i>Myotis emarginatus</i> E.G.	Geoffroy's Bat
<i>Myotis mystacinus</i> Kuhl.	Whiskered Bat
<i>Pipistrellus pipistrellus</i> Sch.	Common Bat
<i>Eptesicus bottae</i> Pet.	Botta's Serotine
<i>Canis aureus</i> L.	Jackal
<i>Vulpes corsac</i> L.	Corsac Fox
<i>Vulpes vulpes</i> L.	Fox
<i>Mustela nivalis</i> L.	Weasel
<i>Mustela eversmanni</i> Less.	Russian polecat
<i>Vormela peregusna</i> Guld.*	marbled polecat
<i>Meles meles</i> L.	Eurasian Badger
<i>Felis libyca</i> Fors.	African Wild Cat
<i>Felis chaus</i> Guld.	Jungle Cat
<i>Felis margarita</i> Loche.*	Sand Cat
<i>Gazella subgutturosa</i> Guld.*	Goitred Gazelle
<i>Spermophilopsis leptodactylus</i> Lich.	Long-Clawed Ground Squirrel
<i>Spermophilus fulvus</i> Lich.	Large-Toothed Souslik

Latin name	English name
<i>Allactaga elater</i> Lich.	Little Jerboa
<i>Dipus sagitta</i> Pall.	Hairy-Footed Jerboa
<i>Eremodipus lichtensteini</i> Vinogr.	Lichtenstein's Jerboa
<i>Ondatra zibethicus</i> L.	Muskrat
<i>Ellobius tancrei</i> Blas.	Mole-Vole
<i>Meriones tamariscinus</i> Pall.	Tamarisk Gerbil
<i>Meriones lybicus</i> Lich.	Lybian Jird
<i>Meriones meridianus</i> Pall.	Midday Gerbil
<i>Rhombomys opimus</i> Lich.	Great Gerbil
<i>Mus musculus</i> L.	House Mouse
<i>Nesokia indica</i> Yrayet.	Short-Tailed Bandicoot Rat
<i>Lepus tolai</i> Pall.	Tolai Hare

Note: animal species included with the Red Data Book of the Republic of Uzbekistan are marked with (*)

Birds

The total list of birds inhabiting in the area of Lake Dengizkul comprises 120 species. The seasonal aspect of the avifauna of Lake Dengizkul differs to a considerable degree. Fifty-five bird species, of which six are residents, nest on Lake Dengizkul.

The dominants among the nesting birds are Red-crested Pochard *Netta rufina* Pall. and Coot *Fulica atra* L.; Little Grebe *Podiceps ruficollis* Pall., Cormorant *Phalacrocorax carbo* L., Gray Heron *Ardea cinerea* L., Pochard *Aythya ferina* L., Moorhen *Gallinula chloropus* L., Black-headed Gull *Larus ridibundus* L., Common Tern *Sterna hirundo* L., and Greylag Goose *Anser anser* L. are common; Pygmy Cormorant *Phalacrocorax pigmaeus* Pall., Spoonbill *Platalea leucorodia* L. and Eagle Owl *Bubo bubo* L. are low in number; Marbled Teal *Anas angustirostris* Menetr. is rare. Of special importance Lake Dengizkul is to the species included with the IUCN Red List over their nesting period. In the northwestern part of Lake Dengizkul, which is more shallow and overgrown with reeds, Marbled Teal *Anas angustirostris* Menetr. and Ferruginous Duck *Aythya nyroca* Guld. (both estimated as vulnerable), as well as Pygmy Cormorant *Phalacrocorax pigmaeus* Pall. (at low risk) are encountered. Marbled Teal *Anas angustirostris* Menetr. is rare, but it probably nests there. Pochard *Aythya ferina* L. is a common nesting species inhabiting in the reeds; however, its number is not high. Of the above birds this species is very seldom encountered in the central and southern parts of Lake Dengizkul.

The most common nesting birds in NW part of Lake Dengizkul are Red Crested Pochard *Netta rufina* Pall., Pochard *Aythya ferina* L., Mallard *Anas platyrhynchos* Mae, Coot *Fulica atra* L., Little Grebe *Podiceps ruficollis* Pall., Great Crested Grebe *Podiceps cristatus* L., Moorchen *Gallinula chloropus* L., Grey Heron *Ardea cinerea* L., Greylag Goose *Anser anser* L. and Marsh Harrier *Circus aeruginosus* L.. They are distributed in habitats with above-water vegetation. Cormorant *Phalacrocorax carbo* L. and Coot *Fulica atra* L. inhabit in the open shallow bays of SW part of the lake in summer; the latter are concentrated in numbers of several hundred birds and feed on well-developed submerged vegetation.

The List of Birds on Lake Dengizkul

Species		Rate of Abundance	Nature of stay
<i>Podiceps nigricollis</i>	Black-necked Grebe	m	l
<i>Podiceps ruficollis</i> Pall.	Little Grebe	n	c
<i>Podiceps cristatus</i> L.	Great Crested Grebe	n,w	l
<i>Pelecanus onocrotalus</i> L.	White Pelican	m	r
<i>Pelecanus crispus</i> Bruch.*	Dalmatian Pelican	m,w	r
<i>Phalacrocorax carbo</i> L.	Cormorant	n,w	c
<i>Phalacrocorax pigmaeus</i> Pall.*	Pygmy Cormorant	n,w	r
<i>Botaurus stellaris</i> L.	Bittern	m,w	l
<i>Ixobrychus minutus</i> L.	Little Bittern	n	l
<i>Nycticorax nycticorax</i> L.	Night Heron	m	l
<i>Egretta alba</i> L.	Great Egret	n,w	l

Species			Rate of Abundance	Nature of stay
<i>Podiceps nigricollis</i>	Black-necked Grebe		m	l
<i>Podiceps ruficollis</i> Pall.	Little Grebe		n	c
<i>Egretta garzetta</i> L.	Little Egret		n	l
<i>Ardea cinerea</i> L.	Grey Heron		n,w	c
<i>Ardea purpurea</i> L.	Purple Heron		n	l
<i>Platalea leucorodia</i> L.	Spoonbill		n	r
<i>Cygnus olor</i> Gm.	Mute Swan		v,w	r
<i>Anser anser</i> L.	Greylag Goose		n,w	l
<i>Tadorna tadorna</i> L.	Shelduck		n,w	l
<i>Tadorna ferruginea</i>	Ruddy Shelduck		m,w	l
<i>Anas platyrhynchos</i> L.	Mallard		n,w	c
<i>Anas crecca</i> L.	Teal		m,w	c
<i>Anas querquedula</i>	Garganey		m	c
<i>Anas strepera</i> L.	Gadwall		n,w	l
<i>Anas clypeata</i>	Shoveler		m	c
<i>Anas penelope</i> L.	Wigeon		w	l
<i>Marmaronetta angustirostris</i> Menetr.*	Marbled Teal		n	r
<i>Netta rufina</i> Pall.	Red-crested Pochard		n,w	d
<i>Aythya ferina</i> L.	Pochard		m,w	d
<i>Aythya nyroca</i> Guld.*	Ferruginous Duck		n,w	l
<i>Aythya fuligula</i> L.	Tufted Duck		w	l
<i>Bucephala clangula</i> L.	Goldeneye		w	l
<i>Oxyura leucocephala</i> Scop.*	White-headed Duck	w	l	
<i>Mergus albellus</i> L.	Smew		w	l
<i>Pandion haliaetus</i> L.	Osprey		m	l
<i>Haliaeetus albicilla</i> L.*	White-tailed Eagle		w	r
<i>Circus aeruginosus</i> L.	Marsh Harrier		n	c
<i>Buteo rufinus</i>	Long-legged Buzzard		v	l
<i>Falco tinnunculus</i> L.	Kestrel		n	l
<i>Coturnix coturnix</i> L.	Quail		m	l
<i>Grus grus</i> L.	Common Crane		m	c
<i>Anthropoides virgo</i> L.	Demoiselle Crane		m	c
<i>Rallus aquaticus</i> L.	Water Rail		n	l
<i>Gallinula chloropus</i> L.	Moorhen		n	c
<i>Fulica atra</i> L.	Coot		n,w	d
<i>Chlamydotis undulata</i> Jacg.*	Houbara Bustard		m	l
<i>Pluvialis squatarola</i> L.	Grey Plover		m	c
<i>Pluvialis apricaria</i> L.	Golden Plover		m	l
<i>Arenaria interpres</i> L.	Turnstone		m	c
<i>Burhinus oedicnemus</i> L.	Stone Curlew		n	l
<i>Charadrius dubius</i> Scop.	Little Ringed Plover		n	l
<i>Charadrius alexandrinus</i> L.	Kentish Plover		n	l
<i>Vanelloshettusia leucura</i> Linch.	White-tailed Plover		n	l
<i>Himantopus himantopus</i> L.	Black-winged Stilt		n	l
<i>Tringa totanus</i> L.	Redshank		r	
<i>Actitis hypoleucos</i> L.	Common Sandpiper		m	l
<i>Philomachus pugnax</i> L.	Ruff		m	l
<i>Phalaropus lobatus</i>	Red-necked Phalarope		m	l
<i>Calidris alpina</i> L.	Dunlin	m	c	
<i>Limicola falcinellus</i> Pont.	Broad-billed Sandpiper	m	r	
<i>Larus cachinnans</i>	Yellow-legged Gull		n,w	l
<i>Larus ichthyaetus</i> Pall.	Great Black-headed Gull		w	r
<i>Larus genei</i> L.	Slender-billed Gull		n	l
<i>Larus ridibundus</i> L.	Black-headed Gull		n,w	c
<i>Chlidonias hybrida</i> Pall.	Whiskered Tern		n	l

Species		Rate of Abundance	Nature of stay
<i>Podiceps nigricollis</i>	Black-necked Grebe	m	l
<i>Podiceps ruficollis</i> Pall.	Little Grebe	n	c
<i>Sterna hirundo</i> L.	Common Tern	n	l
<i>Sterna albifrons</i> Pall.	Little Tern	n	c
<i>Hydroprogne caspia</i> Pall.	Caspian Tern	n	l
<i>Columba livia</i> L.	Rock Dove	r	l
<i>Streptopelia turtur</i> L.	Turtle Dove	n	l
<i>Streptopelia senegalensis</i> L.	Palm Dove	r	l
<i>Pterocles orientalis</i> L.	Black-bellied Sandgrouse	v	l
<i>Cuculus canorus</i> L.	Cuckoo	n	l
<i>Bubo bubo</i> L.	Eagle Owl	r	r
<i>Caprimulgus aegyptius</i> L.	Egyptian Nightjar	n	l
<i>Apus apus</i> L.	Swift	m	c
<i>Riparia riparia</i> L.	Sand Martin	m	c
<i>Hirundo rustica</i> L.	Barn Swallow	n	c
<i>Cecropis daurica</i> L.	Red-rumped Swallow	m	l
<i>Motacilla flava</i> L.	Yellow Wagtail	m	c
<i>Motacilla citreola</i> Pall.	Citrine Wagtail	n	l
<i>Motacilla alba</i> L.	White Wagtail	m	l
<i>Motacilla personata</i> Gould		m	l
<i>Anthus spinoletta</i> L.	Water Pipit	m	c
<i>Lanius excubitor</i> L.	Great Grey Shrike	n	l
<i>Luscinia luscinia</i> L.	Thrush Nightingale	m	l
<i>Luscinia megarhynchos</i> Brehm	Nightingale	m	l
<i>Saxicola torquata</i> L.	Stonechat	m	l
<i>Oenanthe isabellina</i> Cretzshm.	Isabelline Wheatear	m	l
<i>Oenanthe oenanthe</i> L.	Wheatear	m	l
<i>Oenanthe deserti</i> Temm.	Desert Wheatear		m l
<i>Acrocephalus agricola</i> Jerd.	Paddy-field Warbler	n	c
<i>Acrocephalus arundinaceus</i> L.	Great Reed Warbler	m	c
<i>Acrocephalus stentoreus</i> H. et E.	Clamorous Reed Warbler	n	c
<i>Hippolais caligata</i> Linch.	Booted Warbler		n c
<i>Sylvia communis</i> L.	Whitethroat	m	l
<i>Sylvia curruca</i> L.	Lesser Whitethroat	m	l
<i>Phylloscopus collybita</i> Vieill.	Chiffchaff	n	c
<i>Scotocerca inquieta</i> Cretzschm	Scrub Warbler	n	l
<i>Cercotrichas galactotes</i> L.	Rufous Bush Robin	n	l
<i>Muscicapa striata</i> Pall.	Spotted flycatcher	m	l
<i>Parus bocharensis</i> Linch.	Turkestan Tit	r	l
<i>Panurus biarmicus</i> L.	Bearded Tit	r	c
<i>Emberiza leucocephala</i> Gm.	Pine Bunting	m	l
<i>Emberiza schoeniclus</i> L.	Reed Bunting	m	c
<i>Passer indicus</i> Jard. Et Selby	Indian Sparrow	n	c
<i>Passer montanus</i> L.	Tree Sparrow	r	l
<i>Corvus cornix</i> L.	Hooded Crow	w	l

Note: there are some abbreviations used in this table

- r - resident r - rare
n - nesting l - lower number
m - migrant c - common
w - wintering d - dominant
v – summer visitor
* - species included in the IUCN Red List

Migrations and winterings are believed to be critical periods in the life history of birds. In this connection, Lake Dengizkul is of crucial importance for waterfowl, for it is situated on the route of bird migrations from Western Siberia and Kazakhstan to Indo-Pakistani wintering areas and is a resting site for many water birds, and it is itself a wintering site for over 27 bird species. Coot *Fulica atra* and Redcrested Pochard *Netta rufina* . dominate in winter, Mallard *Anas platyrhynchos* and Teal *Anas crecca* are common. Of rare birds, Mute Swan *Cygnus olor*, White-headed Duck *Oxyura leucocephala*, Pygmy Cormorant *Phalacrocorax pygmeus*, and White-tailed Eagle *Haliaeetus albicilla* winter there. The latter 3 species were included in the IUCN Red List.

The total number of migrating game waterfowl, as estimated by aerial inventory, ranged from 114.6 thousand to 499.4 thousand; 54.5-92.9% are Coots and about 6.5-42.6% are bay ducks. Among many migrating bird species staying on Dengizkul, the most important are White Pelican *Pelecanus onocrotalus*, Crane *Grus grus* and Demoiselle Crane *Anthropoides virgo*, Dalmatin Pelican *Pelecanus crispus* is rare.

Data on numbers of waterfowl of Dengizkul Lake during the autumn migration (aerial count, departmental materials of Gosbiocontrol)

Birds species	1986 year	1987 year	1988 year
Greylag Goose	220	5	
Bean Goose	6		
Mallard	2.808	1.177	2.901
Teal	23	288	
Gadwall	8	1.182	479
Red Crested Pochard	17.809	86	1.268
Pochard	25.687	32.247	11.105
Ferruginous Duck	5.323	164	976
Tufted Duck	50		
Goldeneye			
Smew	184		
Goosander			
Coot	62.486	464.21	122.558
Total:	114.604	499.359	139.287

Data presented in the above table witness that the numbers of migrating game birds recorded were constantly high on Lake Dengizkul. Coot was dominant (62.500-464.200 birds). Co-dominants were Pochard (11.100 to 32.200 birds) and Mallard (1.200 to 2.900 birds); in separate years up to 17.800 Pochards were recorded.

During the counts game waterfowl, 13 species were recorded. Ferruginous Duck, which was among them, is included with IUCN Red List as an endangered species. This species is constantly encountered on Lake Dengizkul during the autumn migration. There were more hydrophilous birds on Dengizkul Lake during autumn migration really. At the table 2 there are data only for game waterfowl and no data about other hydrophilous birds like grebes, cormorants, herons, waders, galls and terns, which usually present at the lake.

In September 1999 we observed southern and northern parts of lakes bank. There were about 350 feeding waders on the southern shallow bank. Among them were Grey Plover (*Pluvialis squatarola*), Golden Plover (*Pluvialis apricaria*), Turnstone (*Arenaria interpres*), Danlin (*Calidris alpina*), Broadbilled sandpiper (*Limicola falcinellus*), Common Sandpiper (*Actitis hypoleucos*). At some northern bays of lake with reed-bed we found lot of surface-feeding ducks and bay ducks concentrated for feeding and rest. Common number was about 25 thousand. There were Red-crested Pochard, Ferruginous Duck, Tufted Duck, Mallard, Gadwall, Shoveler, Teal. Red-crested Pochard, Gadwal and Shoveler were dominate. Also some Black-necked Greebs, Great Crested Greebs, Gray Herons, Greate Egrets, and Dalmatian pelicans had feeding near by those birds.

Winter aerial counts of the game waterfowl were made in 1987, 1988, 1990 and all hydrophilous birds and waterfowl in 2000. The results of these counts are presented in Table.

Materials on numbers of waterfowl of Dengizkul Lake
during wintering 1987,1988, 1990 and 2000 years
(aerial count, departmental materials of Gosbiocontrol)

Bird Species	Years				
	1987	1988	1990	10.01.2000	3.02.2000
Great Crested Grebe					1
Grebe sp.					8
Pelican sp.				19	
Cormorant				40	40
Pygmy Cormorant				10	
Grey Heron				1	
Mute Swan				17	
Swan sp.				418	96
Greylag Goose	123	10	151		35
Shelduck	253	22	168		5
Mallard	1.23	2.928	555	9.176	4.281
Teal	1.503		1.577	288	56
Gadwall			186		267
Pintail					180
Wigeon		5			
Red-crested Pochard	432	174	270	4.55	3.329
Pochard	14.193	27.929	13.214	29.1	6.909
Ferruginous Duck	35	7.087		245	83
Pochard sp.				28	424
Tufted Duck		770	74		256
Goldeneye	3			1	2
White-headed Duck				1.107	185
Smew	12		70	350	18
Goosander			2		69
Ducks sp.				33.181	4.594
Coot	29.945	95.543	35.477	201.036	91.06
Aggregations (Coots or Pochards)				7	31.3
Steppe Eagle				2	
White-tailed Eagle				19	18
Marsh Harrier					1
Harrier sp.					1
Yellow-legged Gull				15	32
Black-headed Gull				31	106
Gulls sp.					75
Total:	47.729	134.468	51.744	286.634	143.431

The total number of wintering game waterfowl, as estimated by aerial inventory, ranged from 47.7 thousand to 134.5 thousand in 1987, 1988 and 1989. In 2000 there were 286.6 thousand at the beginning of winter and 143,400 when it becomes colder and lake partly was frozen. (Please, look at the above table. Winter climatic conditions in Uzbekistan are not stable. So, in the beginning of January in 2000 the weather became very cold. Temperature in Buchara region near Lake Dengizkul was minus twelve degree and Lake Dengizkul partly was frozen, and other shallow little lakes in this region was frozen too. So, waterfowl were concentrated on the Dengizkul. But two weeks later the weather become warmer and lake was not frozen. In this time some waterfowl redistributed to the other nearest lakes.)

On Lake Dengizkul, of 14 species game birds counted in winter 1987, 1988 and 1990 most numerous were Pochards, the numbers of which reached 29,7%; 20,8%; 25,5%, and Coots (62,7%; 71%; 68,6%). Among rare species Ferruginous Duck does not wintering on Lake Dengizkul on a regular basis. In separate years its numbers can be significant. So, 7.087 ducks were recorded in 1988, only 35 in 1987, and none of them in 1990.

In 2000 26 species of hydrophilous birds were recorded there. The total numbers of birds reached 286,600 and 143,300 birds in January and February, respectively. In these months, the same species prevailed. The dominant was Coot, which constituted 70.1% in January and 63.5% in February.

On Lake Dengizkul, the highest numbers were also recorded for Pochard, Mallard, Red-crested Pochard and White-headed Duck. We, for the first time for Uzbekistan, recorded the wintering of White-headed Duck. At the beginning of wintering period we recorded 1107 White-headed Ducks, and 185 birds in February. The numbers of this bird may have decreased due to the cold spell and their movement to the other water bodies. Similar changes in numbers were recorded for Ferruginous Duck. In January and February, we recorded 245 and 83 Ferruginous Ducks, respectively. Of threatened birds included in the IUCN Red List we recorded Dalmatian Pelican, Pygmy Cormorant, Ferruginous Duck, White-headed Duck and White-tailed Eagle; of those having national importance we recorded Mute Swan and Steppe Eagle.

The availability of sufficient fish stock enables fish-eating birds to inhabit in the lake area. Cormorant *Phalacrocorax carbo* dominates in this group, and can be observed over all seasons of the year. Literary data (Shernazatov, Nazarov, 1991) witness wintering of such birds as grebes, pelicans, herons and swans, but without indicating specific species. Using simple mathematical calculation, we can state that during the autumn migration pelicans, cormorants, herons, swans and gulls constituted 1,26% of the total number of the birds recorded, and in winter 1987-88 — 1,45%. Really in winter 2000 number of hydrophilous birds were lower.

Of species belonging to the unique avian fauna on Lake Dengizkul, Dalmatian Pelican, White Pelican, Mute Swan, Marbled Teal, Ferruginous Duck and White-headed Duck, White-tailed Eagle, Pallas' Sea Eagle and Imperial Eagle are noted. The results of the counts show that Lake Dengizkul as a site of concentration of migrating and wintering waterfowl and hydrophilous birds is of international importance in connection with its high number, also as a site which supports some species of international importance and more than 1% of the world population of White-headed Duck.

19. Social and cultural values: (e.g., fisheries production, forestry, religious importance, archaeological site, etc.)

The social value of the lake consists in that it provides the part of the population with jobs such as fishery, and enriches the food of the population from nearby villages and even towns. For the needs of the local population insignificant stocks of reeds are withdrawn as construction material. The commercial mining of gas in the vicinity of and on Lake Dengizkul enabled the provision of the population with fuel and thus preserved trees and shrubs, which are important components of the desert ecosystem. Amateur fisheries are conducted by representatives of the local population, people working in mining industry, and residents of the towns Mubarek, Karakul and Gazli. The availability of a recreational zone enables the workers of mining industry to have good recreation, and the availability of the ornithological reservation on Lake Dengizkul is of educational importance for both the social groups, and through them.

20. Land tenure/ownership of: (a) site (b) surrounding area

According to the Law of the Republic of Uzbekistan on land ("Land Codex"), all lands are ownership of the state.

The territory around Lake Dengizkul and the lake proper belong to the state and are used by the Ministry of Agriculture and Water Management of the Republic of Uzbekistan. Khokimiyat of the Alat district, as State bodies, manage them on site. There are two collective agriculture enterprises ("shirchat") "Alat" and "Gulistan".

21. Current land use: (a) site (b) surroundings/catchment

Lake Dengizkul, being an object of the Ramsar Convention, is a site where commercial fish captures, which reach considerable amounts, take place. According to G.K Kamilov et al. (1994), fish captures on Lake Dengizkul reached 172 tonnes in 1992.

Lands adjoining this lake are not used for agriculture. They are used as desert pastures for livestock raising, mainly Astrakhan sheep.

The following types of pastures are distinguished:

- a) pastures with *Salsola arbuscula* and *Salsola palezkiana* are used all the year round, providing 2 metric centners of dry forage per ha, in NE part of the area adjoining the lake;
- b) calligonum pastures used all the year round (2,7 metric centners per ha) in the northern part;
- c) shrubby pastures providing low crops (1,3 metric centners/ha) in the southern part.

The total estimate of the forage from the range, hilly, fixed and mobile sands ranges between 1,3 and 2,7 metric centners of dry forage per ha. The stock of Astrakhan sheep is assessed at 20,000, which is less than 25 sheep and goats per 100 ha.

There are some enterprises of the mining industry - gas collecting points Urtabulak and Tungyzhovuzak are situated in the area adjoining the lake. There are 9 wells and derricks in the northern part of Lake Dengizkul and in the southern part, there are three. Ten km to the east of Lake Dengizkul is an oil collecting point Urtabulak. An asphalt motor-way passes along the northern shore, as well as gas pipes and power transmission line.

There are deposits of mineral water that hold promise in future use.

22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects: (a) at the site (b) around the site

Excessive inflow of water from the collector-drainage network, which has taken place in separate years, significantly influenced the water level in Lake Dengizkul - floods caused the death of the waterside vegetation and islands were submerged, which resulted in the destruction of some habitats.

Further intensive development of the mining industry accompanied with the construction of a large number of new wells and gas-collecting points promotes the appearing of a landscape with remnants of industrial activity of man and the development of communicational network, and will give rise to the reduction of natural habitats of the desert ecosystem.

23. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

Currently, there are package of Laws on use regulation, conservation and reproduction in Uzbekistan. Uzbekistan also signed the International Convention on Biodiversity Conservation (CBD), Conventional on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on the Conservation of Migratory Species of Wild Animals (CMS). Uzbekistan also signed the agreements on Slender-billed Curlew and Siberian Crain in the framework of CMS.

The National Strategy and Action Plan on Conservation of Biodiversity has been developed which was endorsed by the Government of Uzbekistan. One of the most important points in it is protection of wetlands and expansion of the network of specially protected natural areas.

All these documents are directly related to Lake Dengizkul. All activities relating to nature use are under control of the State Committee for Nature Protection. On Lake Dengizkul there is a specially protected natural area which has the status of state nature reserve and belongs to the 4th category of IUCN. This protected area is called "Ornithological Nature Reserve Dengizkul". It was set up in 1992 and occupies an area of 8,600 ha. This reserve is supervised by State Committee for Nature Protection. Hunting waterfowl and waterside birds is prohibited there.

24. Conservation measures proposed but not yet implemented: (e.g., management plan in preparation; officially proposed as a protected area, etc.)

No such proposals have been made.

25. Current scientific research and facilities: (e.g., details of current projects; existence of field station, etc.)

Bukhara University has been conducting long-term studies on the fish fauna in Lake Dengizkul. The results of these studies have been summarized in a book “Commercial Fishes in Waterbodies Situated in Lower Reaches of the River Zarafshan” (1989) and in separate articles. Tashkent State University (Kamilov et al., 1994) determined its importance in terms of fishery.

No special fundamental studies on the avifauna of Lake Dengizkul have been conducted, as yet. However, in 1987 to 1989, an aerial inventory was performed which provided some idea on the species composition and members of migrating and wintering game waterfowl. The data obtained as a result of the inventory were summarized in the report “Studies on the Numbers, Levels of Reproduction and Management of Commercial Species of Animals and Birds in Uzbek SSR” (1989) made at the Biology Faculty of Tashkent State University and published as the information report “Current State of Numbers and the Distribution of Water-Swamp Birds Inhabiting in the Basin of the River Zarafshan and Mid- Stream of the River Amu Darya (Shernazarov, Nazarov, 1991).

In June 1997, the ornithologists of the Institute of Zoology of Uzbek Academy of Sciences conducted a short-term survey of Lake Dengizkul with the aim of identifying the species composition and numbers of nesting birds (Lanovenko, 2001).

In January and February 2000 State Inspection of Flora and Fauna together with Institute of Zoology of Uzbek Academy of Sciences and National University conducted aerial censuses of waterfowl at Dengizkul Lake. The above list of birds on Lake Dengizkul is based on these surveys and the sources mentioned above.

26. Current conservation education: (e.g., visitors centre, hides, info booklet, facilities for school visits, etc.)

This proposal on the inclusion of Lake Dengizkul in the Ramsar list is the first ever made. No other conservation or educational programs on wetlands have ever been proposed or carried out. However, the State Inspection of the Protection of Fauna < Flora and Nature Reserves, and Regional Society of Hunters and Fishermen conduct education work with the local population.

27. Current recreation and tourism: (state if wetland is used for recreation/tourism; indicate type and frequency/intensity)

No active tourist or recreational activities have been carried out on Lake Dengizkul. However, there is one recreational zone for the workers of oil and gas extracting industry where they practice sport fishing. Less than 300 men attend this zone a year.

28. Jurisdiction: (territorial, e.g. state/region, and functional, e.g. Dept of Agriculture/Dept. of Environment, etc.)

Lake Dengizkul is under jurisdiction of the local authorities of the Bukhara regional and Alat district Khokimiyats (in case of industrial and agricultural activities). State Committee for Nature Conservation realizes state control for use of natural resources of Lake Dengizkul.

29. Management authority: (name and address of local body directly responsible for managing the wetland)

The responsibility for the protection of Lake Dengizkul and surrounding territory are conferred on State Inspection for the Protection of Fauna, Flora under State Committee for Nature Protection (Gosbiocontrol)

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30. Bibliographical references: (scientific/technical only)

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Annex K: Uzbekistan Society for the Protection of Birds (IBA) Data Sheet

UZ021 Dengizkul Lake

Location Uzbekistan, Bukhoro
 Central coordinates 64° 6.68' East 39° 7.52' North
 IBA criteria A1, A3, A4i, A4iii
 Area 49,658 ha
 Altitude 183 - 267m
 Year of IBA assessment 2006

Uzbekistan Society for the Protection of Birds



Ornithological information The list of birds of Dengizkul Lake was compiled from personal records and the literature and includes 133 species. 53 species breed, 9 are resident, 14 wintering and 57 migrants (Lanovenko, 2001). In August 2001 a brief survey of the coastal northern and northeastern part of the lake was carried out (Lanovenko, 2001) and this provided the information on the biome-restricted species used for this account. Winter counts in 2000 and 2003-2005 recorded 44 species, with the number of wintering birds ranging from 19,277 to 286,634 birds. The dominant species also changed between counts. These figures are comparable to those of winter aerial counts 1987, 1986 and 1990-91 when numbers ranged from 21,297 to 504,000 birds (Shernazarov, Nazarov, 1991; Asian Waterfowl Census 1990, Asian Waterfowl Census 1991). Nevertheless the total number of birds always exceeded 20,000. Important wintering species are *Pelecanus crispus*, *Marmaronetta angustirostris*, *Aythya nyroca* and *Oxyura leucocephala*.



Site description Dengizkul lake is situated 75 km south-south west from Buhara town near the border with Turkmenistan. It is surrounded by mainly sandy desert with large sand dunes and bushes of saxaul and acacia – the northern part of the Sundukli sands. Hilly sands are most typical for the boundary region with Turkmenistan. The lake is situated in a natural low-lying landscape. The water is strongly salty and supplied by a collector-drainage channel. In former times it was the final reservoir of the Zarafshan river. The IBA consists of the open water area and coastal strip 500 metres wide.

Populations of IBA trigger species

Species	Season	Period	Population estimate	Quality of estimate	IBA Criteria	IUCN Category
Mallard <i>Anas platyrhynchos</i>	winter	2000-2005	187-10,670 adults only	good	A4i	Least Concern
Marbled Teal <i>Marmaronetta angustirostris</i>	winter	2000-2005	4-120 adults only	medium	A1, A4i	Vulnerable
Red-crested Pochard <i>Netta rufina</i>	winter	2000-2005	18-4,550 adults only	good	A4i	Least Concern
Common Pochard <i>Aythya ferina</i>	winter	2000-2005	250-29,100 adults only	good	A4i	Least Concern

Ferruginous Duck <i>Aythya nyroca</i>	winter	2000-2005	8-245 adults only	medium	A1	Near Threatened
Smew <i>Mergellus albellus</i>	winter	2000-2005	18-350 adults only	good	A4i	Least Concern
White-headed Duck <i>Oxyura leucocephala</i>	winter	2000-2005	185-5,135 adults only	good	A1, A4i	Endangered
Dalmatian Pelican <i>Pelecanus crispus</i>	winter	2000-2005	1-35 adults only	good	A1	Vulnerable
Common Coot <i>Fulica atra</i>	winter	2000-2005	1,820-208,036 adults only	good	A4i	Least Concern
Egyptian Nightjar <i>Caprimulgus aegyptius</i>	breeding	2001	2 adults only	medium	A3	Least Concern
Brown-necked Raven <i>Corvus ruficollis</i>	resident	2001	1 adults only	medium	A3	Least Concern
Great Tit <i>Parus major</i>	resident	2001	6 adults only	medium	A3	Least Concern
Streaked Scrub-warbler <i>Scotocerca inquieta</i>	breeding	2001	1 adults only	medium	A3	Least Concern
Sykes's Warbler <i>Hippolais rama</i>	breeding	1997-1998	5 adults only	medium	A3	Least Concern
Desert Warbler <i>Sylvia nana</i>	breeding	2001	1 adults only	medium	A3	Least Concern
A4iii <i>Species group - waterbirds</i>	winter	2000-2005	19,277-286,634 individuals	medium	A4iii	

Protected areas

Protected area	Designation	Area (ha)	Relationship with IBA	Overlap with IBA (ha)	
Dengizkulskiy	Wildlife Refuge	8,600	protected area contained by site	8,600	
Lake Dengizkul	Wetlands of International Importance (Ramsar)	31,300	protected area contained by site	31,300	

Habitats

IUCN habitat	Habitat detail Extent (% of site)
Shrubland	6%
Desert	9%
Wetlands (inland)	77%
Artificial landscapes (terrestrial)	8%

Land use

Land-use	Extent (% of site)
agriculture	15%
military	70%
nature conservation and research	100%
other	15%

Khauzak-Shady Biodiversity Action Plan

Other biodiversity Mammals include badger and jackal and there are colonies of gerbils and jerboas. Reptiles include *Teratoscincus scincus*, *Varanus griseus* (IUCN Red List species) and *Phrynocephalus interscapularis*. Amphibians include *Bufo viridis*. There are many different spiders here including karakurt and phalanx. Fish include *Stizostedion lucioperca* and *Cyprinus carpio*. There are numerous small sandhoppers which provide plentiful food for fish and birds. Vegetative associations consist of coastal thickets of reed and reed mace. On the shore there are several associations of desert vegetation and a poorly developed tugai association.

Management considerations The Lukoil company is carrying out an increasing amount of gas extraction. Construction of new wells and laying of a gas pipeline on the bottom of lake are planned. These works also will demand construction of a new communications networks and could lead to a partial loss of coastal habitats and increased problems for birds. Because of the proximity of the State border on the southwest coast, the construction of special buildings and new roads resulted in significant destruction of coastal habitats. For example - partial loss of habitats (about 15% of coastal sandy desert with good bushes of saxaul and no grazing) and a reduction in the number of biome's CA04b species.

Protection status Dengizkul Ornithological Reserve was created by a Decision of the Council of Ministers of the USSR №530 in 1973. Validity of this was prolonged by a decision of the Buhara Regional Executive Committee №157/11 from 26.06.90. In October 2001 Dengizkul lake was included in the list of wetlands of international importance (Ramsar site No.1108).

Conservation response Short-term summer research was carried out in 1998 as part of a NABU project on IBAs. In January and February 2000 two winter aircraft counts were carried out as part of the "Protection of Uzbekistan's Wetlands and their Waterfowl" project". In 2001-2003, with support of the Ministry of Agriculture, Nature Management and Fishery of the Kingdom of the Netherlands through its embassy in Moscow, expeditions searching for wintering areas of *Anser erythropus* were carried out. In 2003-2004 within the framework of the WWF-Russia and Wetlands International "Development of strategy for protection of waterfowl and wetlands on the Central - Asian flyway" project international winter counts of waterfowl were made.

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Contribute Please click [here](#) to help BirdLife conserve the world's birds - your data for this IBA and others are vital for helping protect the environment.

Recommended citation BirdLife International (2012) Important Bird Areas factsheet: Dengizkul Lake. Downloaded from <http://www.birdlife.org> on 26/01/2012

To provide new information to update this factsheet or to correct any errors, please email [BirdLife](#)

Annex L: Documents on the 182.2 m Maximum Level of Dengizkul Lake

(translation from Russian)
Emblem of the Republic of Uzbekistan
State Committee for Nature Protection of the Republic of Uzbekistan
100159, 5, Mustakillik Sq., Tashkent
Tel.: +998(71) 239-43-42, 239-11-71, Fax:239-14-94
<http://www.uznature.uz> e-mail: info@uznature.uz

March 29, 2010 No 02-621

Attention: Mr. Chiloyants E.A.
Director General
“LUKOIL Uzbekistan Operating Company” LLC
To No 1612
Dated 09.03.2010

Having reviewed your request regarding level of Dengizkul Lake in connection with operation and design of gas production facilities at the sections of Dengizkul field in Alat district of Bukhara province, State Committee for Nature Protection of the Republic of Uzbekistan would like to inform you as follows.

Inundation of oil and gas facilities that may be caused by increase of Dengizkul lake water level above 182.2m will cause contamination of surface-water and groundwater with oil products and phenols, and correspondingly death of individual species of plants, which are food supply for animals and fish.

In this connection in order to prevent possible ecological risks, related to fluctuation of water level in Dengizkul Lake, it is considered reasonable to approve lake water level at watermark of 182.2 m.

In our turn we would like to notice that at present in the Republic there are conducted works for meliorative improvement of soil, in particular according to the Minutes of the Meeting of “Meliorative Fund for Improvement of Irrigated Lands at the Ministry of Finance of the Republic of Uzbekistan” No 03 -11 – 3 dated 10.02.2010, approved by the Prime Minister of the Republic of Uzbekistan, for 2010 it is planned to construct 9.2 km long manifold from Kumsulton lower reach to Dengizkul Discharge manifold and renovate 0.7 km long Dengizkul Discharge main collector. Implementation of these measures may cause increased discharge of field wastewater to Dengizkul Lake. In this connection it is considered reasonable to agree projects of oil and gas production facilities at the sections of Dengizkul field in Alat district of Bukhara province with corresponding departments of the Ministry of Agriculture and Water Resources of the Republic of Uzbekistan.

Chairman *signature* N. Umarov

On the letterhead of UZGIP
Emblem of the Republic of Uzbekistan
Republic of Uzbekistan
Ministry of Agriculture and Water Resources
Company with limited liability
Uzbek Scientific Investigation and Design Survey Institute

44, Navoiy str., 100021, Toshkent, o/a 202100000500471479001 in Joint stock Commercial Bank TURON
MFO 00446 TIN 200898483 OKONH 66000
Tel: (3712)2 42-27-76, Fax: (3712) 144-47-00, 243-29-85

28.10.2010 No 027-213

Attention: Mr. E.A. Chiloyants
Director General
“LUKOIL Uzbekistan
Operating Company” LLC
Copy: Mr. V.A. Atalyants
Chief Engineer
OJSC “UzLITneftegaz”

Having reviewed “Dengizkul Field Shady Section Field Facilities Construction” working project documentation, developed by OJSC “UzLITneftegaz”, UZGIP design institute approves the working project documentation on condition that there will be implemented actions for protection of Khauzak and Shady sections of Dengizkul field from underflooding with water of Dengizkul lake, the actions will be specified in scientific technical report, developed by UZGIP LLC under concluded with “LUKOIL Uzbekistan Operating Company” LLC contract No 441 for “Research and Feasibility Study of Alternative Measures for Protection of Khauzak and Shady Sections of Dengizkul Field from Underflooding with Water of Dengizkul Lake”, dated 15.10.2010.

Institute Director

Signature

U.V. Abdullayev

Annex M: Lukoil Health, Safety, and Environment Policy

HEALTH, SAFETY AND ENVIRONMENT POLICY IMPLEMENTED BY THE OPEN JOINT STOCK COMPANY "OIL COMPANY LUKOIL" IN THE TWENTY-FIRST CENTURY

http://www.lukoil.com/static_6_5id_267_.html#

The LUKOIL Group strategic objective is to ensure dynamic sustainable development corresponding to that of global oil majors in terms of their efficiency and competitiveness.

LUKOIL Group social responsibilities consist in an adequate working environment and appropriate remuneration, environmental safety and preservation of the cultural heritage.

Being aware of its social responsibilities related to environmental protection and efficient use of natural resources, the Company hopes the public will understand the complexity and the scale of the tasks it is facing.

OAO LUKOIL top priority objectives include creation of a safe working environment for its employees, health protection of LUKOIL Group personnel and local communities in the areas of LUKOIL Group operations, and environmental protection.

To ensure accomplishment of the aforementioned tasks, the Company has developed and is successfully running its Health, Safety and Environment Management System which includes compliance with fire safety and emergency response requirements. It is in line with the applicable Russian law, is based on the best Russian and global practices and has been certified to comply with ISO 14001 and OHSAS 18001 standards.

The objectives of the Health, Safety and Environment Policy implemented by the Open Joint Stock Company "Oil Company LUKOIL" in the twenty-first century (hereinafter referred to as the Policy) are to:

- increase petroleum gas utilization rate through expansion of gas-processing and power-producing capacities;
- apply the zero-discharge principle while developing offshore fields;
- increase the output of environmentally friendly fuels compliant with the European standards;
- comply with greenhouse gas reduction provisions of the Kyoto Protocol;
- by introducing power efficient techniques and using alternative energy sources ensure efficient management of natural resources in the areas of LUKOIL Group operations and of those used for production;
- by introducing new cutting-edge techniques, equipment and materials and increased process control automation bring under control and gradually reduce both the amount and toxicity of emissions, discharges of pollutants and waste;
- ensure continuous improvement of HSE performance, including without limitation, through increased reliability of process equipment, its safe and accident free operation, introduction of new technologies and automated emergency systems;
- ensure that the management, personnel, rescue services and units of LUKOIL Group organizations are prepared to take accident elimination, fire fighting and emergency response measures, as well as enhance preparedness and provide more advanced equipment to fire-fighting and rescue units;
- ensure more efficient development and implementation of OAO LUKOIL programs aimed at identifying and achieving the most critical health, safety and environment, occupational safety and emergency response objectives;
- reduce anthropogenic environmental load resulting from operation of newly commissioned facilities by ensuring better quality of front end and design documents;
- exercise more efficient production control, corporate supervision and internal auditing to ensure compliance with the Health, Safety and Environment regulations at LUKOIL Group sites based on cutting-edge information technologies, technical diagnostics and remote monitoring techniques in line with ISO 14001, ISO 17020 and OHSAS 18001 international standards.

To achieve the above-specified goals, OAO LUKOIL commits to the following:

- implement the entire range of injury and accident prevention and mitigation measures that are practicable and available to it;

- ensure that scheduled and implemented steps and measures related to prevention of impact upon personnel, population and environment are viewed as those of higher priority than emergency response measures targeting such impact;
- ensure that there is continuous and consistent improvement in terms of how and to what extent the personnel, residents and environment are impacted by the Company's operations, products and services, as well as consumption of natural resources in line with the current level of scientific, technological and social development;
- continuously implement task-specific measures aimed at reducing oil and gas losses, as well as oil and gas processing losses, and preventing them from entering the environment;
- introduce up-to-date scientific developments and technologies to gradually reduce specific consumption of natural resources, materials and energy and yet maintain the maximum possible production levels;
- ensure compliance with the applicable Russian law, international treaties, industry-specific and corporate regulations, as well as national laws of the countries of LUKOIL Group operations governing health, fire and environmental safety and emergency response preparedness;
- assess the impact that the scheduled business activities, products and services may have on the health of the personnel, population and environment;
- assess production, occupational, and fire-safety risks, develop and implement measures to mitigate and offset such unforeseen losses;
- make and implement any managerial and production-related decisions that necessarily take account of substantial environmental issues, as well as production and occupational risks;
- request that all personnel employed by LUKOIL Group perform their work in compliance with the applicable industrial, fire and environmental safety, health and emergency response rules and regulations; introduce respective incentives, provide training and advanced training to the Company's personnel and LUKOIL Group employees;
- make best efforts to improve environmental quality in the areas of LUKOIL Group operations;
- request that corporate entities contracted by LUKOIL Group comply with the industrial, fire and environmental safety, health and emergency response regulations adopted by LUKOIL Group organizations;
- publicly report to the Company's shareholders and personnel on industrial, fire and environmental safety, health and emergency response issues;
- inform on a regular basis all parties concerned (public at large, executive and legislative bodies, etc.) of LUKOIL Group operations in the field of industrial, fire and environmental safety, health and emergency response;
- continuously improve the Health, Safety and Environment Management System in compliance with ISO 14001 and OHSAS 18001 standards;
- exercise control over compliance with the obligations assumed by the Company as part of the Policy.

These Policies shall apply to OAO LUKOIL and LUKOIL Group organizations.

Approved by the Resolution of OAO LUKOIL Management Committee (Minutes No. 7 of 12 March, 2009)

Annex N: EBMP Outline

EBMP ANNOTATED OUTLINE BASED ON:

**GUIDANCE DOCUMENT
FOR THE CREATION OF AN
ENHANCED MONITORING PLAN FOR THE BIODIVERSITY
ACTION PLAN FOR THE PROPOSED KHAUZAK–SHADY
NATURAL GAS DEVELOPMENT AT LAKE DENGIZKUL,
UZBEKISTAN**

Prepared for

Multilateral Investment Guarantee Agency
World Bank Group
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Prepared by

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December 19, 2011

GUIDANCE DOCUMENT FOR THE CREATION OF AN ENHANCED BIODIVERSITY MONITORING PLAN FOR THE BIODIVERSITY ACTION PLAN FOR THE PROPOSED KHAUZAK–SHADY NATURAL GAS DEVELOPMENT AT LAKE DENGIZKUL, UZBEKISTAN

1. Purpose of Enhanced Biodiversity Monitoring Program (*½ page*)

This document is intended to provide guidance for the creation of an enhanced biodiversity monitoring plan (EBMP) for wildlife impacts potentially resulting from the Khauzak–Shady natural gas development around Lake Dengizkul, Uzbekistan, proposed by Lukoil. The EBMP comprises an essential component of the Biodiversity Action Plan (BAP), prepared by the project proponent (Lukoil). LUKOIL Uzbekistan Operating Company LLC (LUOC) has committed to the development and implementation of a BAP covering its activities in the vicinity of Lake Dengizkul, which is a protected area, and to ensure compliance of the proposed development with Performance Standard 6 of the International Finance Corporation (IFC)/ Multilateral Investment Guarantee Agency.

2. IFC Performance Standard 6 (*½ page*)

(Define and explain performance standard, describe how EBMP will ensure compliance with it)

3. Scope of Enhanced Biodiversity Monitoring Program (*1 to 2 pages not including tables and figures*)

- **Impacts**—EBMP will cover all wildlife biology impacts that have been determined as potentially resulting from the project. Pollution, disease, soil, and other impacts are treated separately in the BAP in an indicator section. Wildlife biology impacts covered in this EBMP include direct mortality from collision or electrocution with structures, habitat loss, fragmentation, behavioral disturbance, impacts to breeding success, habitat utilization; Significant impacts will be identified
- **Mitigation of Significant or Important Impacts**—EBMP will cover all proposed mitigation measures being implemented to avoid, minimize or compensate for the significant impacts listed in the BAP and discussed above
- **Taxa**—Discuss prioritization, i.e., how consideration of three criteria for all taxa occurring in region resulted in a prioritization of taxa for the EBMP on the basis of the global and regional significance of the predicted impacts on wildlife from the proposed project
- **Content**—Discuss how this EBMP will provide specifics on what, when, where for each specific monitoring protocol to be employed as a component of the EBMP, based on the “why” derived from the prioritization

4. Baseline Monitoring Biodiversity Program (*3 to 4 pages not including tables and figures*)

Provide a detailed review of the existing monitoring efforts applied at the site to date, including at a minimum the following:

- Text descriptions of all monitoring protocols applied
- Maps of where each protocol was conducted
- Table illustrating when all monitoring was conducted

- Table showing compiled data from the baseline monitoring
- Text discussion of remaining gaps in monitoring effort, based on wildlife impact priorities identified in the BAP

5. Enhanced Monitoring Biodiversity Program (*½ to 1 page*)

Purpose and Need—include priority list from the BAP, refer to discussion of gaps in baseline monitoring above, and describe intent of EBMP—to provide the data needed to assess the extent of project-generated impacts to wildlife, focused on the project-related priorities, but encompassing all possibly affected wildlife species.

6. Ecological Procedures of Prioritized Potential Wildlife Impacts (*4 to 5 pages not including tables and figures*)

Include and elaborate on information from the BAP, mapping out specifically where and when in and around the lake that the prioritized impacts may occur, and warrant monitoring. This section should include not only the calendar information from the BAP (which needs to be revised once species prioritization is revised), but also spatial information that will be used to target monitoring efforts, such as potential breeding areas of all high priority species and location of lines (marked and unmarked sections indicated).

7. Biodiversity Monitoring Procedures (*4 to 5 pages not including tables and figures*)

Present the range of monitoring techniques to be employed, as they address the priorities and current gaps. Include a table that includes priority list from the BAP, gaps in baseline monitoring from earlier, and columns to indicate which new techniques will be employed in the EBMP to fill in the gaps, as determined by the priorities.

Following this table and introductory text, include a separate subsection for each specific monitoring protocol to be implemented. Each of these subsections should include the following:

- What priority taxa/phenomena will the technique cover?
- When will it be conducted? (include a complete calendar with specific sampling frequency, timing in tabular form)
- How long will it be conducted? (minimum of five years of post-construction monitoring is recommended given the variability of migratory birds using the lake)
- Where will it be conducted? (include map)
- By whom will it be conducted? (demonstrate sufficient training, expertise)
- Full textual description of monitoring protocol. (For carcass surveys, include bias correction experiments and calculations [e.g., correcting for searcher efficiency and carcass removal by scavengers], also include procedure for wildlife mortality reporting, and specimen handling, collecting, and curating.
- Description of how monitoring techniques will be used to evaluate the effectiveness of proposed mitigation
- Will need two sections one on general monitoring procedures and one on mitigation monitoring procedures listed in the BAP.

8. Data Processing and Evaluation (2 pages)

Present a specific plan for data entry, quality control and assurance (review), storage, analysis, and interpretation. Include discussion of personnel and management structure to assure quality, including independent review. Include timetable for periodic data reporting and evaluation procedure.

9. Adaptive Management Plan for Assuring Protection of Biodiversity (3 to 4 pages not including tables and figures)

Present the overall rationale and strategy for adaptive management in this situation. Include a plan for adaptive decision-making responses in the event that unforeseen or extreme adverse wildlife impacts should be detected.

In particular, this section should refer to all mitigation steps that are included in the BAP, and describe specifically how the effectiveness of these mitigation steps will be evaluated through the monitoring efforts. Specific benchmarks and decision triggers should be listed and fully described as adaptive management responses when additional mitigation steps are determined necessary, e.g., existing mitigation is not working or unexpected impacts are found to occur.

10. Enhanced Biodiversity Monitoring Reporting (1 to 2 pages)

Provide a plan or procedures and schedule for reporting the results of the Enhanced Biodiversity Monitoring including interim and annual monitoring reports. Indicate the reviewers of the monitoring report including MIGA, state organizations, and other stakeholders.

Annex O: Proposed 2012 Monitoring Plan

To provide a basic level of detail related to habitat mapping, and to frequency and methods of surveys, the 2012 monitoring program will adhere to the following five points (with the understanding that the table in this annex will be modified by LUOC as it continues to develop its 2012 field program):

1. **Habitat mapping:** Habitat mapping will consist of a one-time survey of potentially affected lakeshore habitat (approximately 500 m width) and of where project activities will occur. Mapping will follow a scientifically valid mapping protocol and will be carried out by a qualified expert. The shoreline identified within Lukoil's concession (as indicated in Figure 2 Location of Proposed Shady Project Activities) is the area to be mapped.
2. **Frequency of general avifaunistic surveys:** Sampling frequency and duration will be robust enough to capture the seasonal patterns of occurrence (phenology). The frequency of surveys should be more concentrated during migration periods (and for 2012 field program, a minimum of 4 weeks in Spring and 4 weeks in Fall (coinciding with high migration), with quarterly monitoring during the rest of this year). Based on the 2012 field work experience, LUOC will reconsider the frequency and duration of future monitoring surveys to properly address the issues when it develops the Enhanced Biodiversity Monitoring Plan.
3. **Methods of general avifaunistic surveys:** Sufficient point count locations will be illustrated on a map, with a focus on the shoreline and in areas where project activities are taking place. Point counts will be carried out for 10 minute durations with unlimited radius. Observer will be qualified to identify all the birds potentially present in the region, based on sight or sound.
4. **Frequency and methods for breeding bird surveys:** The survey frequency will be scientifically sufficient to accurately document all breeding activity of priority marsh nesting birds during the breeding season, with surveys focusing in the marshy areas where priority species will likely be breeding, shoreline habitats, and in areas where project activities are taking place. The purpose of these surveys is to observe all signs of breeding activity (territorial behaviors, courtship, nest building, confirmed nesting, feeding/tending young, confirmed fledglings) utilizing established ornithological techniques for bird breeding activities and to map where these activities are taking place, following known ornithological techniques. Observations will be land-based and/or by boat, and will be carried out by a qualified specialist.
5. **Frequency and methods for power line surveys:** Observe flying birds (including flight heights) present near the power lines. Timing and frequency of surveys will be focused when migratory waterfowl, cranes, and pelicans are in highest abundance (late fall through early spring).

Item	Description of Activity	Purpose and need for activity	Expected results	Schedule (beginning and end of activity)
1	Primary winter survey of Shady site and along the entire lakescape, including north-west bay – monitoring of bird wintering.	Primary ornithological survey. Survey of transects along the entire lake and will be used method of point count with 10 minute interval in the open areas with good field of vision, also transect survey including location of communication corridor (power distribution line and water crossing) about 25 km long. Transect width is 50 m. Survey method is walk along a route taking stock with help of optical devices (field glass, telescope, photographic equipment, GPS). Definition of species composition, number, places of bird concentration (rest, feeding). It will be registered how often birds cross the road and power distribution line, how high and in what direction they fly, in what regime they use power poles as perches.	Obtaining baseline information for further monitoring. Compilation of spatial distribution diagram for the birds, wintering at the lake based on “Google” pictures and mapping data. Analysis of obtained data and ranging of species by priority levels during wintering. Preliminary definition of potential bird nesting areas. If required – there will be developed recommendations regarding mitigation of project impact on the birds, wintering at the lake.	29 March 2012 to 10 April 2012
2	Spring survey of Shady site and along the entire lakescape, including north-west bay – monitoring of spring migration and beginning of breeding season of nesting birds.	Ornithological survey in period of spring migration of late migration species and beginning of bird breeding season. Survey of transects along the entire lake, in particular in north part of the lake, north-west bay and along communication corridor (including power distribution line and water crossing) about 25 km long. Transect width is 50 m. Survey method is – walk along a route taking stock, will be used method of point count with 10 minute interval in the open areas with good field of vision and travel in a row boat with use of optical devices (field glass, telescope, photographic equipment, GPS). Definition of species composition, number, places of bird concentration (rest, feeding). It will be registered how often birds cross the road and power distribution line, how high and in what direction they fly, in what regime they use power poles as perches. Spotting of bird breeding areas. Observation of bird behavior, registration of nesting signs (mating behavior, protection of nesting areas, construction of nests, brooding, feeding).	Obtaining baseline information for further monitoring. Compilation of spatial distribution diagram for migrating birds. Compilation of spatial distribution diagram for nesting birds based on “Google” pictures and mapping data (places where couples, nesting areas were spotted). Analysis of obtained data and ranging of species by priority levels during spring migration and beginning of nesting period. If required – there will be developed recommendations regarding mitigation of project impact on nesting birds.	2 May 2012 to 12 May 2012
3	Summer survey of Shady site and lakescape, including north-west bay – monitoring of nesting bird breeding period ending.	Ornithological survey in period of bird breeding ending, appearing of broods. Survey of all nesting places, included places spotted during beginning of nesting. Survey method is – walk along a route taking stock, will be used method of point count with 10 minute interval in the open areas with good field of vision and travel in a row boat with use of optical devices (field glass, telescope, photographic equipment, GPS). Comparison of nesting bird species composition, definition of brood number. Observation	Obtaining baseline information for further monitoring. Elaboration of spatial distribution diagram for nesting birds based on “Google” pictures and mapping data (places where young broods, nesting areas were spotted). Analysis of obtained data and ranging of species by priority levels after nesting period. If required – there will be developed	21 June 2012 to 7 July 2012

Item	Description of Activity	Purpose and need for activity	Expected results	Schedule (beginning and end of activity)
5	Autumn survey of Shady site and along the entire lakescape, including north-west bay – monitoring of autumn bird migration.	<p>behavior of young birds and chicks. It will be registered how often birds and brood cross the road and power distribution line, how high and in what direction they fly, in what regime they use power poles as perches.</p> <p>Ornithological survey in period, when main bird migration takes place. Survey of transects along the entire lake, including communication corridor (constructed power transmission line and water crossing) about 25 km long. Transect width is 50 m. Survey method is walk along a route, will be used method of point count with 10 minute interval in the open areas with good field of vision, taking stock with help of optical devices (field glass, telescope, photographic equipment, GPS). Definition of species composition, number, places of bird concentration (rest, feeding). Comparison of bird quantitative composition after breeding period. Clarification of concentration points in comparison with spring migration period. It will be registered how often birds cross the road and power line, how high and in what direction they fly, in what regime they use power poles as perches.</p>	<p>recommendations regarding mitigation of project impact on nesting process and chicks.</p> <p>Obtaining baseline information for further monitoring and development of the draft Enhanced Biodiversity Monitoring Plan (EBMP). Compilation of spatial distribution diagram for migrating birds at the lake based on “Google” pictures and mapping data. Analysis of obtained data and ranging of species by priority levels during autumn migration. If required – there will be developed recommendations regarding mitigation of project impact on migrating birds.</p>	15 October 2012 to 22 October 2012
6	Preparation of final report based on the results of primary ornithological monitoring in 2012.	Office processing and analysis of obtained data, development of ornithological monitoring program for 2013 taking into account obtained data, clarification of bird monitoring priority for every specific period of activity at the lake. Definition of specific methods of bird stock taking, development of recommendations for optimization of monitoring schedule taking into account defined priorities.	<p>Development of comprehensive and detailed program of ornithological monitoring for 2013 taking into account obtained results.</p> <p>Development of final recommendations for mitigation of project impact on top priority bird species. This information will be used for finalizing the EBMP.</p>	1 November 2012 to 30 December 2012

Annex P: Baseline Bird Monitoring Studies

Compiled by Dr. E. Lanovenko

In order to define approaches to monitoring of project impact on avifauna of Dengizkul lake as base there were used data from scientific literature, proprietary materials of Zoology Institute of the Academy of Sciences of the Republic of Uzbekistan (scientific reports), collection materials of the Institute and Tashkent State University, results of surveys, conducted as part of international projects and personal observations of Dr. E.N.Lanovenko during the period of 1988-2009. More detailed information about baseline materials is given below.

To the present day there have not been conducted any basic researches of avifauna at the Lake. At the end of 20th – beginning of 21st century, scarce information from scientific literature was summarized in 1-3 volumes of multi-author book “Birds of Uzbekistan” (1987, 1990, 1995).

In 1986-90, the state hunting recording group of Tashkent State University conducted an inventory at water bodies of south Uzbekistan from an airplane that provided information about species composition and abundance of migrating and wintering birds of the region, including Dengizkul Lake. Results of the inventory-taking are published in the form of information bulletin "Current Status of Abundance and Distribution of Water and Wading Birds of the Basin of the Zaravshan River and Middle Course of the Amu Darya River" (Shernazarov, Nazarov, 1991) and other publications (Nazarov, 1988, Shernazarov, 1987; Shernazarov, Nazarov, 1991 ; Asian Waterfowl Census, 1990, 1991; Cadastre Reference Book, 1992) and summarized in the report on the second phase of project “Protection of Uzbekistan’s wetlands and their waterfowl” (July, 1999) (Atadjanov et al, 1999). As part of the work in 1986, 1987 and 1988 there was conducted an autumn inventory from an airplane at Dengizkul Lake. According to the results of the inventory, the abundance of migrating birds varied from 114,000 in 1986 to 499,000 in 1987; winter inventory-taking was conducted in 1987, 1988 and 1990, and the abundance of wintering birds ranged from 47,700 in 1987 to 134,000 in 1988.

In May, 1997 and June, 1998 E.N.Lanovenko conducted survey of the water body in order to study species composition and abundance of nesting birds (Lanovenko, 2001). The survey covered mostly the north-west and east parts of the Lake. Analysis results showed that of 120 bird species observed at the water body at the time, 63 species were nesting ones. In July 1999 independently and in August 2000 together with John Howes – expert from Asian Wetland Bureau, she surveyed the main water area of Dengizkul Lake and the bay in the north-west part of the lake. This allowed a supplement to the list of bird species inhabiting the Lake, mostly sandpipers.

In winter 2000 as part of the third phase of above mentioned project “Protection of Uzbekistan’s wetlands and their waterfowl” there was conducted an airplane survey of Dengizkul and Djidekul lakes (on January 10 and February 3). Based on its results there were recorded 286,000 and 143,000 birds and 31 species (Atadjanov et al, 2000). For the first time in Uzbekistan there was found wintering area of white-headed ducks (1107 birds). Later only land winter surveys were conducted along the perimeter of Dengizkul Lake main water area, except for the territory along the west bank from Samantepa hill to the north canal. As part of achieving goals of AEWA, the Moscow office of Wetlands International in 2003-2005 organized an International Waterbird Census in Central Asia and the Caucasus. In the framework of this project three censuses of waterfowl were made at Dengizkul Lake. All data were included in the Wetlands International Data Base and in the Data Base of Institute of Zoology of the Republic of Uzbekistan. During mentioned counts there was

registered from 18,500 to 39,300 birds of 30 species. Results were published by Wetlands International (Solokha, 2006) and in some other publications.

In January 2006 E. Lanovenko and colleagues made ornithological observation along south and east banks of the lake. They observed 40,800 birds of 29 species. During the extremely cold winter in 2008 during similar survey on February 26, there were recorded 1,006 birds of 8 species. Results of the survey are also included into the data base of Zoology Institute of the Academy of Sciences of the Republic of Uzbekistan.

As part of project, BirdLife International in 2008 published the book "Important Bird Areas in Uzbekistan. Priority Sites for Conservatuion" in which E.Lanovenko and M. Turaev had authored an article about birds of Dengizkul (Lanovenko, Turaev, 2008).

Analysis of all available sources allowed us to make a list of birds of Dengizkul Lake for the present document, which includes 170 species. The earlier completed surveys also allowed the authors to compile conceptual maps of nesting areas and concentration of migrating and wintering birds, which will be updated in the process of field work in 2012.

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