MOTT MACDONALD

# MTO Gas Chemical Complex in the Bukhara Region, Uzbekistan

Environmental and Social Impact Assessment,
Volume I: Non-Technical Summary

October 2022

Mott MacDonald
246, Traian Street
District 2
3rd floor
Bucharest 024046
Romania

T +4 031 620 8471
mottmac.com

# MTO Gas Chemical Complex in the Bukhara Region, Uzbekistan

## Environmental and Social Impact Assessment, Volume I: Non-Technical Summary

October 2022

SC Mott MacDonald Romania SRL.
Registration no: J40/9360/1998. Vat no:
RO11071473

# Issue and revision Record

| Revision | Date | Originator | Checker | Approver | Description |
|---|---|---|---|---|---|
| A | 25.08.2022 | S. Goncharov<br>E. Mokrinskaya | A. Strokina | M. Melinte | Draft Non-Technical Summary. |
| B | 31.08.2022 | S. Goncharov<br>E. Mokrinskaya | A. Strokina | M. Melinte | Draft Non-Technical Summary. rev 2 |
| C | 24.10.2022 | S. Goncharov<br>E. Mokrinskaya | A. Strokina | M. Melinte | Vol I Non-Technical Summary – Final Revision |
| | | | | | |

**Document reference:** 100100912 | Vol I NTS | C

**Information class: Standard**

# Acronyms and Abbreviations

| Abbreviation/Acronym | Definition |
|---|---|
| ABMC | Amu-Bukhara Machine Canal |
| ACs | Affected communities |
| AoI | Area of influence |
| CLO | Community Liaison Officer |
| Company | GAS CHEMICAL COMPLEX MTO CENTRAL ASIA, Limited Liability Company |
| E&S | Environmental and social |
| EBRD | European Bank for Reconstruction and Development |
| EHS | Environmental, health and safety |
| EIA | Environmental Impact Assessment |
| EPC | Engineering, procurement and construction |
| ESIA | Environmental and Social Impact Assessment |
| ESMMP | Environmental and Social Management and Monitoring Plan |
| ESMS | Environmental and Social Management System |
| EVA | Ethylene vinyl acetate |
| FEZ | Free Economic Zone |
| GCC | Gas Chemical Complex |
| GPP | Gas processing plant |
| IFC | International Finance Corporation |
| LDPE | Low density polyethylene |
| LLC | Limited Liability Company |
| LRP | Livelihood Restoration Plan |
| MIGA | Multilateral Investment Guarantee Agency |
| NTS | Non-Technical Summary |
| OHS | Occupational Health and Safety |
| PET | Polyethylene terephthalate |
| PP | Polypropylene |
| PPE | Personal protective equipment |
| PSs | IFC Performance Standards |
| SPZ | Sanitary protection zone |
| TMP | Traffic Management Plan |
| TPA | Terephthalic acid |
| WWTP | Wastewater treatment plant |

# Contents

Acronyms and Abbreviations 2

1 Introduction 1
1.1 Overview 1
1.2 ESIA process and applicable requirements 1
1.3 Where can I find more information about the Project? 2

2 Gas Chemical Complex 3
2.1 Why is the Project needed? 3
2.2 What is the Project? 3
2.2.1 Project location 3
2.2.2 Project components and processes 4
2.2.3 GCC production process 5

3 Environmental and Social Impacts 7
3.1 How was the Project assessed and what were the findings? 7
3.2 What are the Project activities that could affect environment and people? 7
3.3 What are the results of the assessment? 7
3.3.1 Social impacts and risks 8
3.3.2 Air quality 11
3.3.3 Ground conditions 11
3.3.4 Water resources and water quality 12
3.3.5 Ecology and biodiversity 12
3.3.6 Materials and waste management 13
3.3.7 Traffic and transport 13
3.3.8 Noise and vibration 13
3.3.9 Greenhouse gas assessment 14
3.3.10 Cultural heritage 14
3.4 Managing the environmental and social impacts 15

# 1 Introduction

## 1.1 Overview

The purpose of this non-technical summary (NTS) document is to present in clear, simple and concise manner the main findings of the environmental and social impact assessment (ESIA) undertaken for the planned development of a new gas chemical complex (GCC) in the Republic of Uzbekistan (the Project).

The GCC will operate on the technology for producing methanol from natural gas and the further production of olefins from methanol with further polymerization of olefins to the following products:

- Low density polyethylene (LDPE) – 80,000 tons per year
- Ethylene vinyl acetate (EVA) – 100,000 tons per year
- Polyethylene terephthalate (PET) – 300,000 tons per year
- Polypropylene (PP) – 252,000 tons per year
- Terephthalic acid (TPA) – 256,000 tonnes per year (feed stock for PET production).

The approximate volume of natural gas processing will be ~ 1.3 billion $m^3$ per year.

The GCC site is located in the south-west of the Republic of Uzbekistan, in the Karakul district of Bukhara region, relatively close to the border with the Republic of Turkmenistan.

The GCC site will accommodate an operational process area, in addition to administrative and utilities management areas. Natural gas for the Project will be supplied to the Project from a new gas processing plant (GPP) via a new 134km gas pipeline connecting to the Arniez natural gas distribution station. It is also projected that another 117km gas pipeline may be constructed and will connect the GPP to the natural gas distribution station in Gazli.t Ancillary components will include power supply, water supply and wastewater treatment infrastructure.

The programme of construction works for the Project is currently proposed to take a period of three years (30 months). The current schedule assumes construction commencement in 2022.

The planned commissioning date for the Project is the end of 2025. The estimated lifecycle of the complex is 25 years.

## 1.2 ESIA process and applicable requirements

GAS CHEMICAL COMPLEX MTO CENTRAL ASIA, LLC (the Company) will seek financing for the Project from international lenders. International lenders for the Project have not been confirmed, however the current understanding is that lenders will be signatories to the Equator Principles or those committed to the Performance Standards on Environmental and Social Sustainability of the International Financial Corporation (IFC) and Multilateral Investment Guarantee Agency (MIGA) environmental and social standards and requirements.

Therefore, to address the potential environmental and social (E&S) requirements of a range of potential banks, the ESIA has been undertaken in line with the following international requirements (hereafter referred to as the “applicable international requirements”):

- EBRD Environmental and Social Policy (ESP) and Performance Requirements (2019)
- MIGA Performance Standards for Environmental and Social Sustainability (2013)
- PEquator Principles (IV) (2020)
- IFC Performance Standards on Environmental and Social Sustainability (2012)
- IFC Environmental, Health, and Safety (EHS) Guidelines: General Guidelines (2007)

- IFC General EHS Guidelines: Construction and Decommissioning (2007)

## 1.3 Where can I find more information about the Project?

Information on the Project is available on the GCC website: http://uzmto.com

The following Draft ESIA documents have been disclosed and published on the GCC website:

- ESIA Scoping Report
- Human Rights Impact Assessment
- Stakeholder Engagement Plan
- Draft ESIA Report prepared in line with applicable international requirements:
  - Volume I: Non-Technical Summary (this document)
  - Volume II: Impact Assessment (to be disclosed)
  - Volume III: Technical Appendices (to be disclosed)
  - Volume IV: Environmental and Social Management and Monitoring Plan (to be disclosed).
  - .

The Project Stakeholder Engagement Plan acts as a strategic document for planning a comprehensive approach to consultation with local communities, interested government authorities and other key stakeholders, and for information disclosure for the lifecycle of the Project (during design phase, construction, operation and decommissioning).

The key channels identified for communicating information to interested parties are as follows:

- Disclosure of the full Draft ESIA Report via GCC's website and within the local communities to allow people to get information on the ESIA findings and potential impacts of the Project
- Disclosure of the full Draft ESIA Report to key Project stakeholders (local governments, government authorities, regulators, etc.)
- Ongoing media communications
- Ongoing stakeholder meetings during construction phase operation and demolishing
- Dedicated Project Community Liaison Officer (CLO)
- Monitoring and reporting
- Annual reports.

Any questions, comments and queries regarding the Project can be addressed to GCC via the contact details presented below.

**Table 1.1: Contact Details of GCC CLO**

| Contacts | Project CLO |
|---|---|
| Name: | Yuldasheva Nazira Irrakhim kizi |
| Name: | 40 Shkhrisabz Str, Tashkent 100081, Republic of Uzbekistan |
| Tel.: | +998 (71) 120-32-87 ext. 13118 |
| Email: | Nazira.yuldasheva@uzmto.uz |
| Language of communication: | Russian, English, Uzbek |

# 2 Gas Chemical Complex

## 2.1 Why is the Project needed?

The Project has been developed under the Government's programme for further development of the petrochemical industry in the Republic of Uzbekistan and the 2030 National Development Concept for Oil and Gas Industry[1]. The construction of the GCC is the second largest gas processing plant in Uzbekistan.

The Project will convert approximately 1.3 billion tonnes per annum of natural gas into LDPE, EVA, PET and PP. These products are used in a wide variety of applications, including packaging, textiles, stationery, plastic parts, bottles, sports and laboratory equipment, automotive components and insulating material and therefore are higher-value products. The processing of natural gas to a saleable product with added value will have a positive effect on the economy of Uzbekistan and will satisfy growing demand for these products in the country and overseas.

The Project will also create a number of permanent jobs within the Bukhara region. Employment opportunities will be created in both the construction and operational phases with the peak construction workforce expected to be over 9,000. During operation the Project will directly employ approximately 1,560 people, although it is estimated that with the associated jobs from the Project supply chain and other associated manufacturing industries, permanent employment during operations will be higher.

The Project will diversify the economy of the region and be a driver for economic development of the region and Uzbekistan, enabling growth of textile, chemical para-pharmaceutical industries as well as car manufacturing and building sectors.

## 2.2 What is the Project?

### 2.2.1 Project location

The GCC site is located in the south-west of the Republic of Uzbekistan, in the Karakul district of Bukhara region, approximately 33 km south-west of the border with the Republic of Turkmenistan. The distance from the district's administrative centre, Karakul town, to the city of Bukhara is about 60 km.

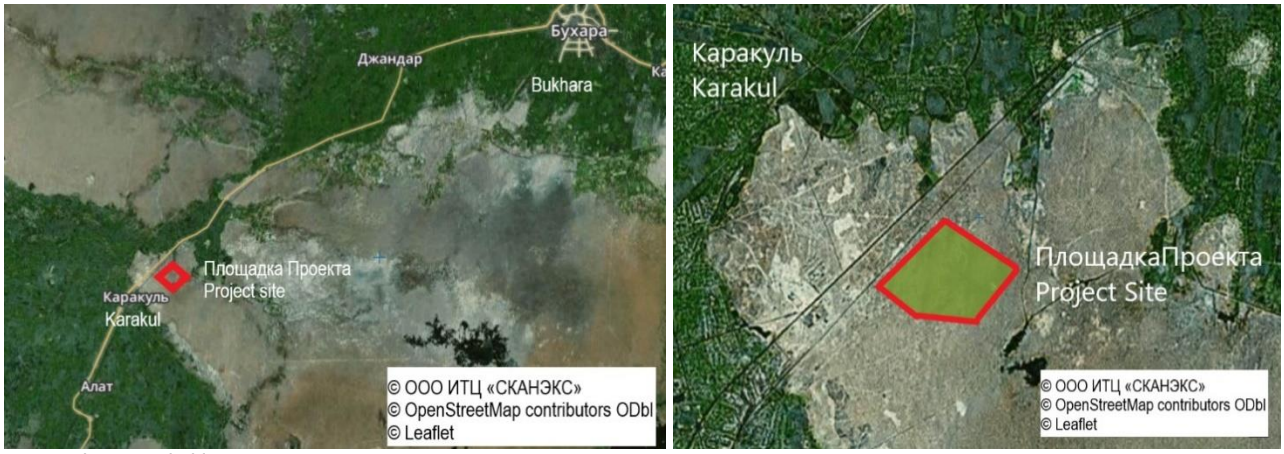
The GCC site is an area of desert land with sparse herb and shrub vegetation disturbed by regular grazing. The land shows signs of historical pollution by household waste carried by wind from a waste landfill located 2km to the south-west.

The main drivers of the site selection are the vicinity of water sources, access to power supply, the proximity to the interregional motorway and railway, and the availability of workforce required for the operational phase of the Project. The proximity to key markets in Europe and Asia also provides benefits for exporting end products.

The nearest protected areas are the National Reserve "Dengizkul Lake" located 35 km to the south-west of the GCC site, National Reserve "Qumsulton" located approximately 20 km to the south-east from the natural gas pipeline route, and the cultural heritage object "Paykent" located 500 m from the natural gas pipeline route.

[1] Presidential Decree No.PP-4388 of 09.07.2019 "On Measures to Secure Energy Resources Supplies to the Economy and Population, Financial Recovery and Improvements in Managing the Oil and Gas Industry".

**Figure 2.1: Site location plan**

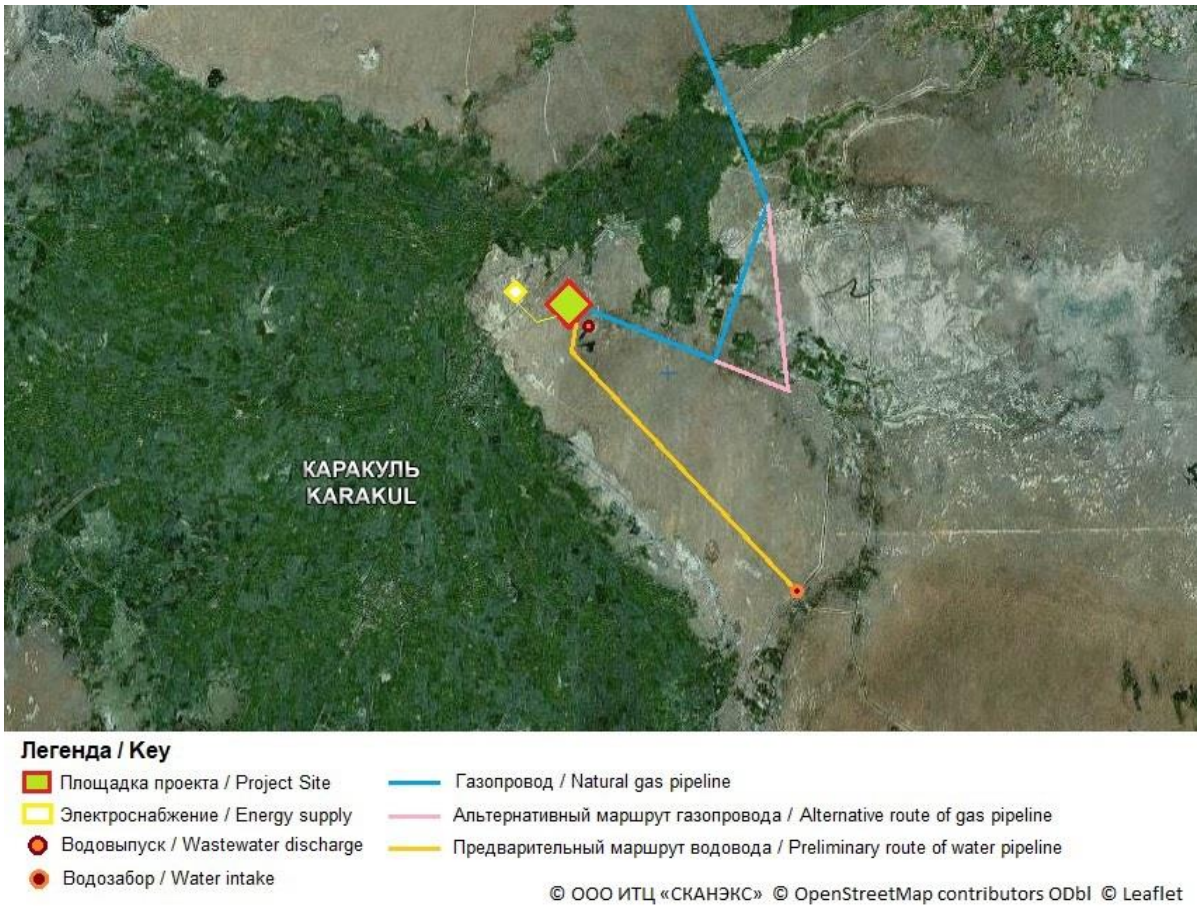



Source: kosmosnimki.ru, 2021

### 2.2.2 Project components and processes

Natural gas is the main feedstock for the GCC. It is intended that natural gas will be supplied from a new gas processing plant connected to the Arniez natural gas distribution station by a new 134km dedicated branch pipeline. Another 117km natural gas feedstock pipeline will connect the GPP to the existing natural gas distribution station in Gazli. It is anticipated that 65 km of this pipeline will be constructed within the corridor of the existing Trans-Asian gas pipeline.

**Figure 2.2: Proposed Project facilities**




Source: "Sanoat Energetika Guruhi" LLC, kosmosnimki.ru, 2020

The electric energy demand of the Project is 155MW per year. Power supply for the GCC will be provided via two overhead power lines from an existing substation "Karakul" located 2.5km north-west of the Project site, one 55km overhead power line connected to the Bukhara Combined Heat and Power Plant, and from the photo power station which will be constructed in the vicinity of the Project site.

Process water in volume of 1,360t/h will be supplied to the GCC from the Amu-Bukhara Machine Canal which is fed by the waters of the Amu-Darya River. A water intake facility will be located 28 km south-east of the Project site and a new water pipeline will transport water from the water intake to the GCC.

It is currently proposed that treated wastewater from the GCC with a flow of 825.5t/h will be returned to the production processes (water recycling). Excessive treated wastewater with the flow of 73.7$m^3$/h will be discharged into a new evaporation pond located 13-14km to the north-east of the Project site. .

The preliminary location of the proposed location of the Project facilities are shown in Figure 2.2 above.

### 2.2.3 GCC production process

The GCC production plant will occupy the southern part of the Project site, with administrative and utility buildings and facilities to be located in the northern portion.

The GCC will annually receive 1.3 billion $m^3$ of treated and dehydrated natural gas through the new GPP which will be constructed next to the Project site and supplied with the natural gas from the designated pipeline branches. The GCC will include several process stages for sequential production of syngas, methanol, light olefins.

The olefin production process will consist of a sequence of operations:

- Commercial gas is fed to the syngas block of the methanol unit (hereinafter referred to as MeOH), where synthetic gas is generated in the presence of hydrogen, carbon monoxide and carbon dioxide
- Syngas then enters the methanol block, where it is converted into methanol to produce MTO-grade olefins
- Light olefins (ethylene and propylene) are produced from the MTO unit and are subsequently polymerized into LDPE, PET and PP.
- PET is produced by interacting ethane with TPA and monoethylene glycol.

Products from the GCC process will be transported from the complex via motorway for the local market and via railway abroad.

# 3 Environmental and Social Impacts

## 3.1 How was the Project assessed and what were the findings?

An assessment has been undertaken for potential impacts arising from the Project development within an Environmental Impact Assessment and a Social Impact Assessment (collectively presented as an ESIA). The ESIA includes:

- Establishment of the baseline to understand current conditions at and around the proposed Project site
- Prediction of impacts and identifying the most important (significant) impacts
- Identification of mitigation measures to be included in the design, procedures, development and management of the Project.

The significance of an impact is described based on the sensitivity of the receptor (Project affected persons, their community or environmental aspect) and magnitude of the impacts of the Project on that receptor. Where possible, impact magnitude and sensitivity are described with reference to legal requirements, accepted scientific standards or accepted impact assessment practice and / or social acceptability.

Where the ESIA found that the Project could cause moderate to major adverse impacts then actions or procedures (referred to as mitigation measures) have been developed to avoid, reduce or otherwise mitigate the effects and reduce their significance to an acceptable level. A great number of potential impacts can either be avoided or reduced through mitigation; however, some residual environmental impacts may be unavoidable. Each chapter of the ESIA has assessed whether residual impacts, either beneficial or adverse, remain after mitigation. A summary of the key findings is provided below.

## 3.2 What are the Project activities that could affect environment and people?

It is recognised that a project of this scale and duration has the potential to impact the environment and local communities in both positive and negative ways. The social aspects that could experience moderate effects during the Project development include:

- Employment generation (beneficial impact)
- Localised economic development (beneficial impact)
- Influx of workers and population change (adverse impact)
- Economic displacement of the farms (adverse impact)
- Disturbance impact (adverse impact).

Additionally, potential health, safety, security, wellbeing and human rights risks that could affect construction workers, GCC's employees and local communities during the construction, operation and decommissioning phases of the Project have been identified.

Identified adverse environmental impacts (such as air and water quality, ground / soil, ecology and biodiversity, noise and vibration impacts, etc.), including cumulative impacts, are assessed to be negligible or minor in significance. Their prevention or further mitigation is possible through compliance with national and applicable international requirements, and implementation of additional measures specified in reference documents on best available techniques and mitigation recommended in the ESIA.

## 3.3 What are the results of the assessment?

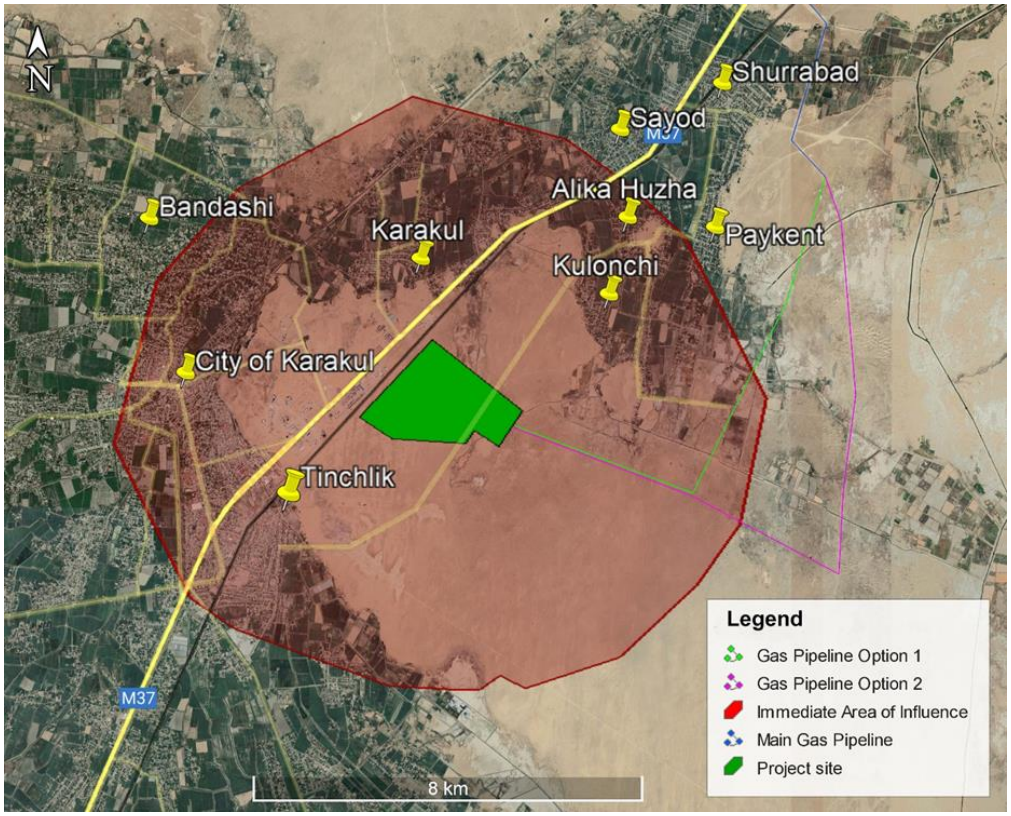
The results of the ESIA are summarised below.

### 3.3.1 Social impacts and risks

**Employment generation**

Employment generation is one of the key beneficial effects for the affected communities adjoining the GCC site in the Karakul, Alat and Zhondor districts of the Bukhara region (Figure 3.1) during the construction, operation and decommissioning phases of the Project.

**Figure 3.1: Immediate Area of Influence (AoI), 5km radius**




Source: Mott MacDonald desktop study, December 2021

The construction phase of the Project is expected to last approximately 30 months including installation works. At the peak construction periods, anticipated between 2022 and 2023, the Project is likely to generate employment for approximately 9,000 workers.

The Company will appoint an engineering, procurement and construction contractor (EPC Contractor) who will attract subcontractors from the nearest and other districts of the Bukhara region or elsewhere in Uzbekistan or from abroad, depending on the specialisation and construction needs. The EPC Contractor will control all sub-contractors involved in the construction. Approximately 7,000 jobs will be made available for skilled workers and 2,000 jobs for unskilled workers during construction.

Temporary employment generation in the construction phase of the Project has the potential to stimulate the local economy through the provision of income to workers, and the potential to support vulnerable groups (such as women, young adults, the unemployed or low-income residents) especially if vulnerable local people are employed. The Project will also provide opportunities for local people to increase their income in particular women engaged in seasonal works in the fields, young adults with no or limited experience and the unemployed. Given the high level of unemployment in the Project area (up to 11%) and the large number of residents employed in seasonal work, and therefore without permanent income (about 4,000 people in the three neighbouring districts), the benefits of temporary construction jobs to local

communities will be significant. To enhance benefits to local communities a Project Recruitment Policy will be developed, and notifications will be made to the local employment centres and heads of the local communities of the available jobs. The Project will also prioritise recruitment for local people.

Once operational, it is expected that approximately 1,560 workers will be employed for the Project. The jobs will generally be for workers of a medium to high skill level. If necessary, training will be provided at the GCC Training Centre. The remainder of the required staff will be sourced as graduates from the local sector-focused vocational education institutions. Since the GCC will operate in the free economic zone (FEZ) "Karakul", new jobs will also be created in related industries. These new jobs will contribute to the development of special skills and the accumulation of experience among the local population as well as improving the local communities' wellbeing. The operational jobs will be long-term, but far fewer people will be affected compared to the construction phase. The Project will advertise new jobs opportunities via adverts specifying the required skill levels, indicative timeframes for the recruitment process and likely duration of contracts. Local employment centres will be notified of the available new jobs to provide an opportunity for the skilled unemployed workforce to benefit from the Project.

**Influx of construction workforce**

Since it is not known at this time where most of the construction labour force will originate from, the Project intends to provide accommodation for workers who will come from other regions of Uzbekistan, as well as foreign specialists and the Company's personnel involved in construction, will be accommodated in two camps. One of the camps will be constructed within FEZ "Karakul" where the GCC will be built. This camp will be designed for 2,000 people with the capacity to accommodate 80-100 people in each building simultaneously.

The second construction camp for maximum 7,800 people will consist of eleven seven-storey buildings, which will be built about 1km northwards of the GCC site. The construction camps will be designed and equipped to conform with international standards and recommendations of the International Finance Corporation and the European Bank for Reconstruction and Development[2]. These recommendations are recognised as the best international practice for managing workers accommodation. For each construction camp first aid stations and medical staff with the necessary qualifications will be provided. An ambulance will also be provided. Agreements will be signed with the hospitals in the city of Karakul and in the city of Bukhara for the provision of medical care. The workers will commute by buses from the construction camps to the construction site and back.

The Project and the influx of construction workers is not expected to drain the capacity of schools and nurseries, since construction workers will not arrive with their families. However, the capacity of hospitals in the city of Karakul and in the city of Bukhara may be affected. The local communities are considered to be of high sensitivity to influx of construction workers bearing in mind the rural areas surrounding the Project and limited capacities of the available social infrastructure in the rural ACs. In order to mitigate potential adverse impacts of construction workers influx into the local area a Workers' Code of Conduct will be developed by the EPC Contractor to govern worker behaviour in neighbour communities. Cultural awareness training shall be provided to foreign workforce and HIV/AIDs awareness training and voluntary medical checks will also be provided to the construction workers. These measures in combination with monitoring and supervision efforts by the Company will mitigate this adverse impact to being minor.

**Localised economic development**

During the construction and operation phases the Project will need to purchase materials, equipment and services, thereby creating business opportunities for local suppliers, including for workers' transportation, catering, security services providers, or suppliers of construction materials, plant and equipment. Overall, the procurement of goods, equipment and services by the Project will be a beneficial impact and this will be strengthened through provision of the right to the EPC Contractor to prioritise recruitment of local sub-contractors and suppliers and the publication of procurement adverts on the Company and EPC

[2] Guidance Note by IFC and the EBRD. Workers' Accommodation: Processes and Standards. August 2009.

Contractor's websites (including sub-contractors) well in advance to promote opportunities for local suppliers. Procurement training for local sub-contractors and suppliers may also be provided.

**Land use changes and economic displacement**

In 2021, the Government of the Republic of Uzbekistan allocated 250 hectares of land for the purposes of the Project. This land has been originally pastureland and forestry land of the Karakul State Forestry Administration and was planned for planting saxaul to prevent soil erosion. Additional land for the GCC site is needed and will be acquired by the Project in 2022-2023 as soon as the land area is confirmed in the design process.

Two options are currently being considered for the gas pipeline route (Figure 3.1.). For both options economic displacement is predicted for the farmers who use the irrigated land along the future pipeline route. The land acquisition process will be carried out in accordance with applicable international requirements. The Company will develop a Resettlement Policy Framework to define the basic principles for managing the land acquisition process. All affected farms will be identified upon confirmation of the gas pipeline route and the Company will complete their socio-economic census. Based on the collected data and the Resettlement Policy Framework, the Company will develop a Livelihood Restoration Plan (LRP) to manage economic displacement impacts associated with the gas pipeline project. The LRP will include eligibility criteria, an entitlement matrix, livelihood restoration options and a displacement-oriented grievance mechanism. The Company will undertake consultations with the affected farmers to agree the livelihood restoration measures. The Company will regularly report to the lenders on the LRP progress. All these measures will mitigate the adverse impact on farmers to being minor.

**Disturbance**

Temporary noise and vibration impact on local communities during the construction phase will be mitigated through implementation of the best practice measures, including undertaking all noisy works during daytime, avoiding unnecessary movement of vehicles, etc. Impacts on M37 motor road users resulted from increased road traffic during the construction phase will be mitigated through implementation of a Construction Traffic Management Plan to be developed by the Project. The proposed mitigation will reduce the disturbance impact to minor or negligible.

**Revenues and taxes**

When operational, the Project will also generate economic benefits through tax (income tax, environmental charges, land ownership tax, property tax, profit tax, value added tax) allocations and payments to the national and local budgets, including social insurance payments charged on salaries (to the pension fund, compulsory medical insurance fund). The future tax payments are estimated at about USD 120 million, of which about USD 80 million will be allocated to the national budget and about USD 40 million will be paid to the local budget. The funds allocated to the local budget may be investment in social infrastructure and payments of social allowances for vulnerable groups in the ACs. Thus, a positive impact is expected from the development of the local economy.

**Retrenchment**

Decommissioning works will require a temporary workforce to be employed by the Project on the one hand, and retrenchment of the staff employed during the operational phase, on the other hand. Retrenchment could cause income insecurity for those members of staff affected. The effects of any required retrenchment will be mitigated through retrenchment planning (e.g., a Retrenchment Plan) prior to anticipated collective redundancies.

**Social risks**

In addition to social impacts of the GCC, social risks have been identified that (if not managed properly) could potentially result in adverse impacts on health, safety, security, wellbeing and human rights of construction workers, GCC's employees and local communities. Such risks may be imposed by the production processes, hazardous materials handling and transportation and emergency situations during

the construction phase and operation of the GCC. Such risks can be mitigated through implementation of standard health and safety management measures and appropriate planning.

The Company will use management procedures and mechanisms to protect health and ensure safety and security of its own personnel, contractor organisations involved in the Project, and the local communities. Primarily mitigation will be achieved via occupational health and safety (OHS) compliance by workers, appropriate preparedness to emergency situations, emergency response planning, monitoring of contractors' OHS compliance as well as security arrangements at the construction site and when the Project is operational.

Training programmes in OHS training for all construction (including sub-contractors) and operational workers will be provided and appropriate use of personal protective equipment (PPE) and job specific risk assessment will be arranged by the Project. Various monitoring and management measures to mitigate these social risks have been developed and recommended specifically for the construction and operation phases of the Project. These measures are included in the Project Environmental and Social Management and Monitoring Plan (ESMMP). The ESMMP also includes key performance indicators and implementation route for each mitigation activity recommended for the Project.

### 3.3.2 Air quality

Emissions to air during the construction, operation and decommissioning phases of the Project have the potential to affect nearby receptors.

To avoid impacts from dust emissions during the construction and decommissioning phases, mitigation measures will be implemented in line with the construction good practice.

Air emissions during the operational phase will be mitigated through measures embedded in the Project design by the choice of the modern technologies being used. All combustion sources will be designed in line with good industry practice to minimise the emission of pollutants. In addition, the Project design provides for modern process equipment and measures to control and minimise fugitive emissions. Pipes, valves, seals and tanks will be regularly monitored to check for any fugitive emission releases.

Baseline air quality data indicates that existing concentrations of the pollutants are below the sanitary standards. Modelling of operational emission dispersion from the Project sources indicates that they would have a negligible effect on pollutant concentrations at locations outside the sanitary protection zone (SPZ).

The impact of air emissions from evaporation ponds on the local communities will be assessed after selection of their technical specifications.

After Project commissioning, workplace conditions will be assessed to determine any occupational air quality hazards and measures to mitigate or compensate impacts of these hazards.

Taking into account the proposed design and operational mitigations, residual impacts are assessed as negligible to minor significance for the construction / decommissioning phase and negligible for the operation phase of the Project.

### 3.3.3 Ground conditions

The potential risk of soil contamination to occur during the construction phase and subsequent operation is considered to be negligible. The key potential impacts during the construction phase may relate to improper handling and storage of construction materials, fuels, chemicals, oils and lubricants, as well as poor handling and storage of construction wastes.

A range of potentially contaminated wastewaters will be generated during construction activities including surface runoff, and the sanitary wastewater. This uncontrolled and untreated wastewater could impact surrounding soils quality.

Additionally, whilst the soil and groundwater quality is understood to be poor, there is potential for contamination from the construction activities to affect groundwater quality in the shallow aquifer, particularly in the case of a larger scale contamination event such as a tanker or reservoir spill.

All the above identified risks can be managed to reduce the likelihood and severity by means of good practice environmental management. Management of these risks during the construction and operation phases of the Project will be provided through compliance with legislative requirements, design solutions, waste handling requirements, oil spill response plans, and additional measures proposed in the ESMMP. Risks at all phases of the Project life cycle will be managed within the framework of the Company's environmental management system).

### 3.3.4 Water resources and water quality

During the construction phase, impacts on water resources associated with the earthworks, surface runoff and vehicle and machinery movements is assessed to be of negligible significance provided the construction follows local construction norms and rules, and good environmental practice and pollution prevention measures.

The main risks for water resources and water quality are associated with the Project's operational phase and relate to water abstraction, discharge of wastewater and floods.

Amu-Bukhara Machine Canal (ABMC) supplies approximately 2 billion $m^3$ of water for irrigation annually. The Project water consumption of 12 million $m^3$ of water from the ABMC for production needs will be small (0.5%) and within the design capacity of ABMC.

The Project will construct and operate a new local industrial wastewater treatment plant (WWTP) during the operational phase. The Project WWTP will receive and treat all contaminated surface and process wastewater generated by the Project. The treated effluent in the volume of 825.5$m^3$ per hour will be reused in the Project production process (water recycling system) providing added benefits of minimising water abstraction requirements for the Project. Excessive treated wastewater with the flow of 73.7$m^3$/h will be discharged into the new evaporation pond located 13-14km north-eastward of the GCC site.

The capacity of the drainage system for the Project site is designed to receive storm and melt water based on maximum recorded daily rainfall. All surface runoff will be diverted to the storm sewer and transported to the WWTP. Consequently, the risk of flooding in respect to the Project is assessed as being negligible.

### 3.3.5 Ecology and biodiversity

There is potential for the Project to impact on protected species of animals and habitats hosting these species during the construction, operation and decommissioning phases. The nearest protected area to the Project site is the Kumsulton State Reserve, located over 20km and no impacts to this area from the Project development are predicted et the moment.

During the construction of the Project, environmental receptors may be exposed to the following types of impacts:

- Death of animals with limited mobility and vegetation at construction sites (direct impact)
- Degradation of habitats near the construction site as a result of dust, littering, oil pollution and polluted runoff from the site
- Exposure to noise and light will be a concern for animals living near the construction site.

During operation, adverse impacts on biodiversity may be caused by accidental releases of pollutants (eg. leaks and spills from product pipelines and during transportation) and disturbance to migratory birds due to gas flaring.

The ESIA proposes various mitigations for these potential adverse impacts including minimisation of vegetation and animal loss. Pollution prevention and emergency response measures will also be

implemented to prevent or address spills resulting from vehicles, equipment and pipeline operation and during loading / unloading operations.

Monitoring of ecological mitigation will be conducted for the duration of the construction phase. These requirements, along with associated responsibilities and reporting requirements are detailed in the ESMMP.

After the successful implementation of mitigation, residual adverse effects on biodiversity and ecosystem services are assessed as negligible.

### 3.3.6 Materials and waste management

The Project will generate a number of waste streams during both construction and operation which will be classed as hazardous, non-hazardous and inert. Adverse impacts can occur during construction due to improper handling of hazardous materials and waste and these will be managed through Project specific waste management plans to store and handle hazardous materials and waste in line with best practice.

Appropriate safety standards, sanitary and OHS requirements on hazardous waste handling will be implemented. Waste will only be transported via licensed external waste contractors. All operational waste will be stored in separate containers located in specific storage areas within the industrial area. Where possible the Company shall identify other end users to either reuse or recycle the operational waste generated by the Project in order to minimise the amount of waste sent to landfill. These requirements and best practice recommendations are detailed in the ESMMP.

The production process will use and generate hazardous materials, including raw materials, waste and equipment maintenance and cleaning materials. During operation, all the hazardous materials and substances will be collected and stored in accordance with best practice, in appropriate containers and at designated areas. At all storage sites, measures will be taken to protect the environment, such as bunding of sites against contamination of soils and surface water in case of possible leaks or spills. Licensed contractors will be engaged to transport hazardous materials and waste from the Project site. Also, as part of the production management, employees will be trained in the rules for handling hazardous materials and waste.

Following the implementation of the identified mitigation measures and best practice waste management procedures as detailed in the ESIA and ESMMP, the significance of impacts from waste and materials handling is considered to be negligible.

### 3.3.7 Traffic and transport

The main potential impacts of the Project on traffic and transport are associated with increased traffic on the roads, road deterioration, disturbance from abnormal load movements and increased risk of accidents. Unmitigated impacts during construction and operation phases of the Project may potentially be significant.

A detailed Traffic Management Plan (TMP) will be developed to identify key issues and appropriate solutions. The TMP will include mitigation measures to provide efficient transportation of materials and equipment to and from site and minimise traffic congestion and disturbance to local communities and other road users.

The implementation of good practice measures and recommended measures of the TMP will mitigate potential traffic and transport impacts to be negligible.

### 3.3.8 Noise and vibration

Temporary noise and vibration impacts during the construction of the Project are expected to arise due to site clearance and ground works, movement of materials to and from the site and the construction and installation of Project infrastructure. During the operational phase, the key sources of noise will be from the operation of the process equipment and the transportation of materials and products to and from the site.

An assessment of the potential noise impact of such activities on nearest settlements and receptors to the Project site has been conducted as part of the ESIA. Based on background noise measurement data for each of the sensitive receptors and the construction and operational noise levels predicted for the Project, it has been assessed that the noise and vibration impact to the identified receptors during all phases of the Project life cycle will be negligible. Best practice noise control measures will be implemented during the construction and operational phases as set out in the ESMMP.

### 3.3.9 Greenhouse gas assessment

The Project design incorporates measures to minimise greenhouse gas (GHG) emissions through selection of the best available techniques, highly efficient equipment and respective operational management controls.

Total emissions of GHGs associated with the operation of the Project are expected to be ~1.6MtCO2/year per year (~1MtCO2e/year from the production process). This level of GHG emissions is approximately ~0.9% of total GHG emissions in the Republic of Uzbekistan.

### 3.3.10 Cultural heritage

There are five of historical or cultural importance places within the proposed Project site area, however four of them are located at a sufficient distance from the Project site and infrastructure, and therefore, the risk of impact on them is assessed as insignificant. At the same time, at a distance of about 500 m from the projected gas pipeline (associated project) there is a site of cultural importance "Paykent" and therefore, for the entire duration of the construction of the gas pipeline, the Company will ensure the safety of this cultural heritage site.

Taking into account the proximity of the site "Paykent" to the gas pipeline route, as well as the potential for finding sites of historical or cultural importance during the earthworks, the Company has developed a ‘Chance Find Procedure’, which is mandatory for all contractors and subcontractors, including associated projects. This will be available on the Company's website.

Cumulative impacts relate to the potential total impacts of past, present or future actions of existing or planned activities in the Project's area of influence. Although an individual project’s operations may not result in a significant impact, when combined with other effects that exist in the same geographical area at the same time, it may result in a cumulative impact being significant.

When assessing the activities that may impact the environment and communities the Project ESIA assessment included consideration of the potential impacts and activities of the associated projects.

The main cumulative social impact identified in the ESIA is the future development of the FEZ "Karakul" and related industries in the Karakul and Alat districts of the Bukhara region. This cluster will specialise in the gas chemical produce. Additional job opportunities will be offered for the ACs at related industries both during construction and operation. The development of the FEZ "Karakul" will also stimulate the economic growth in the Karakul district.

On the other hand, cumulative impacts are predicted in respect of the gas chemical cluster which will be associated with the disturbance and inconvenience for the ACs during construction and operation of related industries. The implementation of the recommended measures to manage adverse disturbance impacts will ensure their control, mitigation or prevention.

Air dispersion modelling conducted for the Project takes into account the other emissions sources located near the GCC and indicates that the Project will not affect the air quality beyond the overall SPZ boundaries.

## 3.4 Managing the environmental and social impacts

A Project ESMMP has been prepared that further develops the management and mitigation measures which have been defined within the ESIA. The primary objective of the ESMMP is to safeguard the environment, site staff and the local communities from any Project activity that may cause harm or nuisance or affect human rights. Requirements of monitoring are also set out in the ESMMP. It is the responsibility of the Company, the EPC Contractor and all sub-contractors to implement the measures set out in the ESMMP, and to monitor its implementation during construction and operation phases of the Project. The lenders may also monitor ESMMP implementation.

The ESMMP is presented in Volume IV of the ESIA Report.

mottmac.com