ACG Phase 3 Project
Environmental & Socio-Economic Impact Assessment

Executive Summary

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ES1 Introduction

This Environmental and Social Statement (ES) has been prepared following a detailed Environmental and Socio-economic Impact Assessment (ESIA) of the proposed ACG Phase 3 project. The ES has been prepared for submission to the Azerbaijan Ministry of Ecology and Natural Resources (MENR) to gain approval for the project and as such, has been conducted in accordance with the legal requirements and policies of Azerbaijan and in line with International Finance Institutions (IFIs) requirements established during ACG Phase 1 and 2. The ESIA process has also been undertaken in the context of BP’s Health, Safety and Environment (HSE) Policy and the HSE policies of the AIOC partners.

ES2 ACG Project Background

The Azerbaijan International Operating Company (AIOC), operated by BP is planning to begin development of Phase 3 of the Azeri Chirag and Deep Water Gunashli (ACG) Full Field Development (FFD) Project. The ACG Contract Area has estimated oil reserves of 5.2 billion barrels of oil representing roughly half of the proven oil reserves in Azerbaijan’s offshore fields. It lies in the Azerbaijan sector of the Caspian Sea approximately 120 km south east of Baku (Figure ES.1).

Figure ES.1 ACG Contract Area Location and Phased Field Development

Overall, FFD is expected to cost $10 billion over the phased life of the project representing about 10% of the investment required to extract the Caspian region’s anticipated reserves. The primary objective of the ACG FFD Phase 3 project is to produce the recoverable reserves in the deep water Gunashli part of the field (DWG). Peak Phase 3 design production is anticipated to be 316 Mbd of oil and 350 MMscfd of gas. The predicted oil production profile for Phase 3 is presented in context with each of the preceding phases of ACG FFD development in Figure ES.2.
ES2.1 Benefits of ACG FFD

The ACG Phase 3 project is part of the ACG FFD development and will deliver major economic benefits to Azerbaijan. The project, together with the linked investments including the Early Oil Project (EOP), Phases 1 and 2 of the ACG FFD, and the BTC project are collectively by far the largest investments ever committed in Azerbaijan. They will have a major positive effect on the national economy of Azerbaijan.

With prudent revenue management, the projects can lead to positive social and environmental change within Azerbaijan. The economic assessment for the three proposed phases of ACG FFD development so far indicates that revenues from oil and gas production and transit would be very significant especially within the term of the Production Sharing Agreement (PSA) to 2024. Over the peak period between 2007 and 2017 these revenues are predicted to exceed all other sources of public revenue.

With respect to ACG Phase 3 specifically, the project has the potential to either result in, or create the climate for, the following positive impacts:

- A yield of revenues can be used for investment in the non-oil sector;
- Contribution to poverty alleviation, sustainable development and increased standards of living via the revenues generated;
- Creation of both direct and indirect employment opportunities;
- Continuing development of a national resource and income generation to Azerbaijan.

ES2.2 ACG Phase 3 Project Overview

The ACG Phase 3 Project presently represents the last phase of development of the ACG FFD Project and will target the Deep Water Gunashli (DWG) part of the Contract Area. Estimated recoverable oil-in-place in the DWG field range between 1,000 and 1,200 MMstb. Oil and gas export from the Phase 3 offshore platforms to the onshore Sangachal Terminal will be via tie-in lines to the existing Azeri Project (ACG Phase 1 and Phase 2) pipeline infrastructure (Figure ES3). The project will require offshore drilling and production facilities, a means of transferring the produced hydrocarbons to the ACG Phases 1 and 2 hydrocarbon export pipelines and a hydrocarbon reception and processing facility onshore for storage and
onward delivery of the export product. In addition, as the DWG field reservoir is pressure depleted, then the project requires subsea water injection facilities that will provide immediate water injection support to the field. These subsea facilities will be tied back to the main offshore production platforms.

**Figure ES.3** Location of ACG Phase 3 Offshore Facilities and Flowlines in Relation to all Developments in the ACG Contract Area

### ES3 Policy, Legal and Administrative Framework

#### ES3.1 Production Sharing Agreement (PSA)

The ACG PSA is the legally binding agreement for the joint development and production sharing of the Azeri and Chirag fields and the deep water portion of the Gunashli Field. This agreement, between the State Oil Company of Azerbaijan Republic (SOCAR) and AIOC shareholder parties (Contractor Parties) was made on the 20th September 1994 and was enacted into Azerbaijan law on 2nd December 1994. Under the terms of the PSA, AIOC, acting on behalf of Contractor Parties, has the right, until 2024, to develop and produce hydrocarbons from the ACG offshore fields. The PSA states that the conduct of operations should be undertaken with respect to the general environment, other natural resources and property, with the order of priority being the protection of life, environment and property.

According to Article 26.3 of the PSA, AIOC shall comply with the present and future Azerbaijani laws or regulations of general applicability with respect to public health, safety and protection and restoration of the environment to the extent that such laws and regulations are no more stringent than current international petroleum standards and practices at the execution date of the PSA.

Beyond the framework of the PSA, the project will also be undertaken with due regard to AIOC HSE design standards, Corporate Policy, international conventions as ratified by the Azerbaijan government and national legislation (Figure ES.4). Applicable national and international guidelines and standards, including the requirements of the International Finance
Institutions (IFIs), have also been reviewed as part of this ESIA in order to ensure that the development is undertaken in a manner that is compliant with these guidelines and standards.

Figure ES.4 Legislative framework of ACG Phase 3 project

ES3.2 BP HSE Policy and ACG Phase 3 Health, Safety & Environment (HSE) Design Standards

ES3.2.1 BP HSE Policy

BP as operator of AIOC is committed to ensuring that the principles and expectations contained within the BP document “What We Stand For” are applied to all aspects and phases of all business operations. The principles focus on five key areas:

- Ethical conduct;
- Employees;
- Relationships;
- HSE performance; and
- Control and finance.

These principles seek to encourage safer and more secure employment, increase efficiency, improve job satisfaction and provide a better-trained workforce within all business operations. The HSE principle reflects BP’s commitment to health, safety and environmental performance “no accidents, no harm to people and no damage to the environment” as endorsed by the Chief Executive Officer.

HSE expectations to be adopted by all BP managers and the boundaries within which all BP managers must operate are further described in the document “Getting HSE Right”, which provides a broad-based set of expectations collated into a series of thirteen elements of
accountability, and which forms the central part of the BP HSE Management System Framework.

The HSE Management System Framework links into BP's commitment to HSE whilst at the same time driving the processes, procedures and management systems implemented by individual Business Units. Auditing and monitoring programmes are used to confirm that systems and processes are in place and working effectively.

**ES3.2.2 ACG Phase 3 HSE Design Standards**

In 2003, the AIOC partners’ Contracts Management Committee (CMC) approved a set of HSE standards for the design of the ACG FFD Phase 3 Project. These standards built upon the standards set out in the PSA, Phase 1 & 2 HSE design standards, and took into consideration international standards and local environmental conditions. The Phase 3 HSE Design Standards serve as the standards that AIOC has self-imposed for Phase 3 engineering design. Therefore, while the PSA forms the legal basis for conducting operations, these standards seek to supplement, enhance and further define the standards set forth in the PSA.

**ES3.3 International Finance Institutions Guidelines and Standards**

The Phase 3 Project shall be undertaken in accordance with applicable IFI environmental and social policies and guidelines, including:

- World Bank Operational Policy Note 11.03 "Management of Cultural Property" (September 1986);
- World Bank Operational Directive 4.30 "Involuntary Resettlement" (June 1990);
- World Bank Group Guidelines for Oil and Gas Development (Onshore) (July 1998);
- World Bank Guidelines: Thermal Power (July 1998);
- World Bank General Environmental Guidelines (July 1998);
- International Finance Corporation (IFC) Guidelines for Oil and Gas Development (Offshore) (December 2000);
- IFC Operational Policy 4.04 "Natural Habitats " (November 1998) ("IFC OP 4.04");
- IFC Policy Statement on Forced Labour and Harmful Child Labour (March 1998);
- IFC Hazardous Materials Management Guidelines (December 2001);
- IFC General Health and Safety Guidelines (July 1998); and

Phase 3 will integrate into the Azeri project Environmental and Social Action Plan (ESAP). This illustrates AIOC’s adherence to the requirements of these IFC environmental and social policies and guidelines. The ESAP considers all stages of the development including construction, commissioning, operation, and decommissioning.

**ES3.4 Ratified International Conventions**

The Azerbaijan Republic has entered into and ratified a number of international conventions, many within the last year. AIOC will endeavour to provide information necessary to allow the government to meet their obligations with respect to these conventions.
ES3.5 National ESIA Legislation and Regulatory Bodies

In Azerbaijan, major private and public developments require the preparation of an ESIA. The objective of the ESIA process is to provide a means whereby adverse impacts can be identified and either avoided or minimised to acceptable levels.

The fundamental principle of the ESIA is applied by the Azerbaijan Ministry of Ecology and Natural Resources (MENR), the main environmental regulatory body, using the Law of the Azerbaijan Republic on Environmental Protection, August 1999 and the Handbook for the Environmental Impact Assessment Process published in 1996, with the assistance of the United Nations Development Programme (UNDP). The handbook includes requirements for scientific expertise and public consultation. Following its submission to the Ministry, the document is reviewed for up to three months by an expert panel.

The main environmental regulatory body is the Ministry of Ecology and Natural Resources (MENR). This body is responsible for the following:

- Development of draft environmental legislation for submission to the Parliament (Milli Mejlis);
- Implementation of environmental policy;
- Enforcement of standards and requirements for environmental protection;
- Suspension or termination of activities not meeting set standards;
- Advising on environmental issues; and
- Expert review and approval of environmental documentation including ESIAs.

In addition, the MENR has responsibility for the implementation of the requirements set out in international environmental conventions ratified by the Azerbaijan Republic.

ES4 Environmental and Socio-Economic Impact Assessment

The ESIA process incorporates a number of steps. A key element is the interaction with the engineering design team with the objective of removing, or at a minimum reducing, as many of the potentially significant impacts as practicable, while enhancing positive benefits of the project wherever possible. This has been achieved as follows:

- Assessing a wide range of design options against numerous criteria including environmental and social impact, safety, technical feasibility, cost, ability to meet project needs, and stakeholder concerns.
- Environmental and Socio-economic Issues Identification (ENVIID) workshops held between the Phase 3 project team and the ESIA Consultants to identify the project environmental and socio-economic aspects associated with all proposed activities from construction through installation and operation, including planned routine activities (activities occurring during normal operating conditions), planned but non-routine activities (activities that are planned to occur outwith desired normal operations but within operational design parameters) and unplanned (accidental) events. Proposed project activities and potential events were considered in terms of their potential to:
  - Interact with the natural environment including its physical and biological elements;
  - Breach the Production Sharing Agreement, relevant international, national, industry and operator and partner standards and operator/partner policy; and
  - Interact with the existing socio-economic environment.
Mitigation workshops that were held in London and Baku with the relevant project design teams following the impact assessment of the proposed Phase 3 project. These workshops were designed to:

- Confirm the level and accuracy of project design defined in the Project Description and used for impact assessment;
- Discuss and confirm mitigation measures incorporated into the project to ensure that the impact assessment was informed and accurate;
- Communicate the results of the impact assessment and identify any areas where additional mitigation may be required; and
- Facilitate the development of mitigation and monitoring to be committed to in the ESIA, in order to reduce significant or residual impacts.

A critical element of the ESIA process has been the public consultation and disclosure programme. The objectives of this process were to inform stakeholders about the project, allow stakeholders to raise key issues and concerns associated with the project, source accurate information, identify potential impacts and offer the opportunity for alternatives or objections to be raised by the potentially affected parties, non-governmental organisations, members of the public and other stakeholders.

The concluding step of the ESIA process is the public disclosure of a draft ES for which comment is sought from the public and regulatory authorities. After the disclosure period of 60 days, the draft ES is revised and a final ES is submitted to the MENR, approval typically forthcoming 30 days after submission.

ES5 Options

ES5.1 Introduction

A number of alternative engineering design options were considered for the development including the “no development option” (Section ES5.2). As the Phase 3 project follows previous phases of ACG development there is existing infrastructure, such as the marine pipelines and the terminal facilities at Sangachal, therefore no option selection process for these parts of the development was undertaken. The option selection process therefore centred on the offshore facilities to develop DWG, with further consideration of reserves that Chirag is unable to recover and secondary reserves. As part of this, locating facilities in West Chirag (between Chirag and DWG) as well as DWG were considered. Project design options for the offshore facilities were identified and evaluated using a number of screening criteria. Non-viable options were rejected at an early stage in the process and potentially viable options were taken forward for further consideration. The screening criteria used during the option evaluation process are as follows:

- Safety;
- Technical feasibility;
- Logistical feasibility;
- Environmental and socio-economic implications;
- Capital expenditure (CAPEX);
- Schedule and ability to execute the project;
- Operating expenditure (OPEX);
- Availability;
- Operability;
- Partner and government agreement; and
- Reputation.
BP’s Capital Value Process (CVP) was used to check key project development decisions and provide assurance that the project definition is sound. The CVP is synergistic with standard engineering design phases and consists of a number of stages (Figure ES.5) with ‘gates’ between stages that all project development decisions must pass through.

Project concept design options are considered in terms of their feasibility during the Appraise Stage. Recommended design options are then passed into the Select Stage during which the preferred option for development is selected. At the time of the ESIA, the Phase 3 project was in the Define stage of the CVP.

Figure ES.5 BP Capital Value Process

ES5.2 No Development Option

In addition to the possible design alternatives for the development, a decision not to proceed with Phase 3 of ACG FFD was also recognised as an option. This was not considered viable following sanction of the Phase 1 and Phase 2 developments, as the programme of ACG FFD has been designed to achieve sufficient recovery of reserves that will make the investment in the region economically attractive. Without Phase 3 this would be difficult to achieve.

The “no development” option would mean that the potentially significant benefits described in Section ES-2.1 (Benefits of ACG FFD) would not be realised as there would be a significant reduction in revenues to the Azerbaijan government from oil export earnings that would in turn reduce the broader benefits to the Azerbaijan economy that such revenues can deliver. The Phase 3 project will also provide additional benefits including a continued source of employment for national citizens and continued use of in-country facilities and infrastructure as well as local suppliers.

ES5.3 Selection of Offshore Facilities

A number of concepts for offshore facilities were considered from the appraise stage through to define as follows;

- A DWG standalone concept that is analogous to the Phase 1 offshore platform facilities, with additional subsea water injection wells tied back to the offshore platforms;
- Two variants to the DWG standalone – 1. a Phase 1 analogue with twin drilling facilities and 2. a single combined platform, the latter with subsea water injection wells; and
- Two options for extending the development to the West Chirag area – 1.a single platform on both DWG and West Chirag and 2. a Phase 1 analogue at DWG with a subsea production development at Chirag. Both these options included the requirement for additional subsea water injection wells.

Within these concepts, a number of variations for the selection of offshore facilities and technology were considered based on the screening criteria in Section ES.5.1. The result of the assessment recommended that Phase 3 proceed into the Define Stage with the DWG standalone concept, as listed first above which is analogous to the Phase 1 offshore development. The commonality of design was considered valuable in terms of using the lessons learned from construction of the Phase 1 facilities as well as the potential ability to use available and previously upgraded fabrication yards and infrastructure and the trained in-country workforce. This would reduce costs and schedule risks and presents a high degree
of confidence in project deliverability. This concept is also inherently safe and allows the HSE strategies developed for Phase 1 and Phase 2 to be transferred to the Phase 3 design, construction and operational programme.

The chosen concept does not however allow access to the secondary reservoirs in West Chirag or provide opportunities to support production from the existing Chirag field. Pre-investment requirements for a potential future development in West Chirag are being included in the design of the offshore facilities. This mainly consists of definition of space and jacket riser location requirements.

ES6  ACG Phase 3 Project Description

ES6.1  Phase 3 Facilities and Programme Design

The Phase 3 Project will include the construction, installation, commissioning and operations of two bridge-linked offshore platform facilities (a Drilling, Utilities and Quarters (DUQ) platform, bridge-linked to a Production, Compression, Water Injection and Utilities (PCWU) platform), three inter-field pipelines (two oil and one gas) that will tie-in to the existing Azeri Project export pipelines, two subsea water injection developments tied back to the offshore platforms, and expansion of the existing onshore terminal facilities at Sangachal.

Many of the offshore facilities will be constructed within Azerbaijan, with the remaining facilities assembled in-country from specialised components transported from the international market. Once assembled/constructed these facilities will be transported and installed at the offshore development location. The schematic layout of the ACG Phase 3 facilities and the proposed schedule for project activities are provided in Figure ES.6 and ES.7 respectively.

Figure ES.6  Schematic of the Phase 3 Project
The Phase 3 project drilling activities will include a 10 well pre-drilling programme to be conducted at the DWG site from the semi submersible Mobile Offshore Drilling Unit (MODU), nominally the “Dada Gorgud” prior to installation of the DUQ platform. Subsequently a 38 well platform-drilling programme will be completed from the DUQ platform. The MODU will also drill six to eight water injection wells at the two subsea sites and these will be tied-back to the PCWU platform, with their subsea controls tied back to the DUQ platform.

As discussed in Section ES5.3, the Phase 3 offshore platform facilities, less the subsea developments, is effectively a clone of the Phase 1 offshore facilities and therefore, has benefited during the design stage from much of the development work performed for Phase 1. Similarly, lessons learnt from Phase 2 have been exploited. The design precedence from Phase 1 / Phase 2 for FFD operability in part restricted some opportunities for incremental improvements; for instance, use of waste heat recovery and flare gas recovery offshore. Nevertheless, the Project design represents a state of the art development and considerable effort has been expended to ensure that potential environmental and socio-economic impacts are mitigated through appropriate design measures.
ES6.1.1 ACG Phase 3 Fabrication and Construction

Phase 3 offshore facilities will be provided by a combination of in-country and out-of-country fabrication and construction. Where in-country fabrication and construction is required, it is predicted that local yards developed as part of ACG Phases 1 and 2 will be used. The principal in-country yards under consideration are the Shelfprojectsroi (SPS) yard and the Amec-Tekfen-Azfen (ATA) yard located to the south of Baku. At the time of writing, fabrication/construction contracts had not been awarded and therefore a final selection of yard or yards has not been made. Where possible, selected materials and components required for construction will also be sourced within Azerbaijan, where the specification and quality of materials can be assured from a local supplier.

Phase 3 components and modules fabricated outside of Azerbaijan will be imported into Azerbaijan by road, rail and sea using the transportation routes established for the previous Azeri Project construction programmes. The main proven routes are the Russian Federation canal system and road and rail networks through Turkey/Georgia and Iran depending on the point of origin of each component.

In summary, the fabrication and construction of Phase 3 facilities and components will be as follows;

- In Azerbaijan: DUQ and PCWU Jackets, drilling template, steel deck frames required for the DUQ and PCWU topsides, bridge-link between the PDQ and PCWU and flare boom;
- Out of Azerbaijan: PDQ and PCWU utility, drilling module and process equipment, the majority of subsea components (including subsea manifolds and distribution units, trees and control and hydraulic system components) and flowline pipe sections.

All facilities will be assembled at the onshore fabrication yards and subject to a process of pre-commissioning and testing prior to load out and installation offshore.

ES6.1.2 Offshore Installation, Hook-Up and Commissioning

Once constructed, the following offshore facilities will be installed at the Phase 3 offshore locations:

- 12 slot drilling template;
- DUQ and PCWU jackets;
- DUQ and PCWU topsides;
- The platforms bridge-link; and
- Two subsea manifolds and associated facilities.

The installation of each offshore facility will be carried out separately as shown in the Phase 3 development schedule (Figure ES.7). Transportation of the facilities from the construction yard to the offshore location will be conducted using the Derrick Barge Azerbaijan (DBA) for transportation of the drilling template, and the STB-1 barge for the jacket structures and topsides. Support vessels will be located on site to aid the installation and hook-up and commissioning (HUC) activities. Further vessels will supply equipment and materials, travelling between the shore and the offshore location.

ES6.1.3 Drilling Programme

Phase 3 development will require the drilling of the following wells:

- 33 platform producer wells;
- 13 platform water injection wells;
• 2 platform cuttings re-injection (CRI) wells; and
• 6 to 8 subsea water injector wells.

Additional reservoir penetrations will be achieved in the future by sidetracking the 54 primary wells described above. The delivery of the projected production profile for Phase 3 (shown in Figure ES.2) requires drilling operations to be carried out in three key stages as follows:

• Template drilling or "pre-drilling":
  A number of wells will be pre-drilled at the offshore platform site from a Mobile Offshore Drilling Unit (MODU), prior to the installation of the DUQ and PCWU platforms. This will enable rapid completion and tie back of these wells and thus early production from these wells once the platforms are in place. A 12-slot drilling template will be installed at the DUQ offshore location to enable this.

• Subsea water injection wells:
  A number of water injection wells will be drilled using the MODU prior to the installation of the offshore platform facilities. These wells will be drilled in two locations to the north-west and south-west of the central platform location in readiness to be completed as subsea tie-backs to the platform facilities.

• Platform Drilling:
  Once the offshore platforms are installed at the DUQ location, subsequent wells will be drilled from the DUQ platform to utilise the 48 available well-slots.

During the drilling programme, surface and top-hole section drill cuttings will be drilled with Water Based Mud (WBM) and the cuttings will be discharged either directly at the seabed (MODU surface-hole section), or via a cuttings caisson (MODU and platform top-hole sections). The platform surface-hole section will be driven with a closed-end casing so no cuttings will be generated. Discharged WBM cuttings will form cuttings piles on the seabed and drill cuttings dispersion modelling has been conducted to predict the maximum deposition depth and area of seabed coverage from the discharged cuttings.

All lower-hole sections will be drilled with Non Water Based Mud (NWBM). The NWBM cuttings generated from wells drilled on the platform will be re-injected in dedicated Cuttings Re-Injection wells (CRI). If the re-injection facility is unavailable (e.g. due to equipment trips or failures), then the NWBM cuttings will be containerised and shipped-to-shore for treatment and disposal in accordance with the Azerbaijan Business Unit (AzBU) Waste Management Plan. All NWBM cuttings generated during MODU drilling programme will be containerised and shipped-to-shore for treatment and disposal.

ES6.1.4 Subsea Development

To provide water injection for reservoir re-pressurisation and pressure maintenance, the Phase 3 Project will include the installation and operation of two subsea water injection developments, as introduced in Section ES1.2.1.1. Following the pre-drilling of the water injection wells, the subsea facilities will be fixed on the seabed approximately 4 km to the northwest and 5 km southwest of the DUQ and PCWU platforms. The facilities will be operated and controlled remotely from the DUQ platform, and the supply of water for injection will be from the PCWU platform. The facilities to the northwest will be installed in approximately 175 m of water and those to the southwest will be in approximately 275 m of water. Each subsea development will consist of the following:

• A subsea manifold with distribution unit;
• Cables and piping between the manifolds and 3 well trees
• Control/command cables (umbilicals) between the DUQ and manifolds; and
• A 12” water injection flowline or 10” flexible flowline tied-back to the PCWU platform.
The generic layout of a Phase 3 subsea development is illustrated in Figure ES.8 below.

**Figure ES.8 Phase 3 Subsea Development Layout**

The subsea equipment will be designed to allow remote operation and maintenance by Remotely Operated Vehicles (ROVs). They will also be designed for ease of retrieval to minimise and simplify well intervention procedures without affecting non-associated equipment and systems.

**ES6.1.5 Offshore Hydrocarbon Production and Export**

The ACG Phase 3 project plans to produce hydrocarbons from the DWG field by 2008. Offshore production consists of a number of operations that allow the safe and efficient production of hydrocarbons from the flowing wells. Flowed hydrocarbons from DWG will be partially separated and stabilised on the DUQ platform. Oil will then be transferred to the inter-field pipelines that feed into the Phase 1 and Phase 2 export pipelines.

Unlike the Azeri project, associated gas from Phase 3 will not be re-injected into the reservoir for disposal or pressure support purposes. A portion of treated gas will be used as fuel gas on the platforms and for gas lift in producing wells, with the remaining gas sent for export. During Phase 3 production, this gas will be cleaned, dried and compressed on the PCWU platform and then transferred to inter-field gas pipeline for onwards export to the onshore terminal with the Azeri Project gas.

As the DWG oil field is depleted water injection for pressure maintenance will be required from the start of production. Seawater will be lifted to meet the water injection demand. Produced water and cooling water (lifted seawater) will also be re-injected thus negating the need to routinely discharge these wastewater streams to sea.

A range of chemicals will be required to aid the production process, inhibit corrosion of equipment, prevent the build up of scale, and to assist hydrocarbon export. AIOC has a policy to limit chemical use and where use is essential, only selected chemicals of known low toxicity (i.e. OCNS Category E or D or those approved under the Project’s HSE Design Standards) will, as far as practicable, be used. No production chemicals used will be discharged from the platforms to the marine environment under normal operating conditions.
Any water-soluble chemicals used in the produced water system will normally be re-injected into the reservoir with the produced water. If all water injection lines become unavailable simultaneously (a very low probability event) then produced water will be discharged to sea.

Hydrocarbon export from the Phase 3 offshore facilities will be via the existing Azeri Project marine export pipeline infrastructure running to the onshore terminal at Sangachal. The existing pipeline infrastructure established for the Azeri Project includes:

- A 30” diameter oil pipeline running from the Central Azeri field to shore installed as part of the Phase 1 project;
- A 28” diameter gas pipeline running from the Central Azeri field to shore installed as part of the Phase 1 project; and
- A 30” diameter oil pipeline running from the Central Azeri field to shore to be installed as part of the Phase 2 project.

There is also an existing 24” oil line from the EOP Chirag-1 platform to shore but this facility will not be used as part of the Phase 3 development.

- Three (3) infiel d export pipelines will be installed between the Phase 3 PCWU platform and the above Azeri Project pipelines. These pipelines will be connected to the existing pipelines at connections (wye pieces) pre-installed on the Azeri Project pipelines.

The Phase 3 export pipeline materials and design will be consistent with that used for the Azeri Project including all design features to ensure integrity and corrosion prevention. The pipelines will be constructed of carbon steel and will be designed to ensure that they are suitable for the environmental conditions in the development area including seawater properties and geo-hazards. All the pipelines will be fitted with non-return “check valves” near base of the PCWU platform.

The pipelines shall also have external corrosion protection that will consist of a three-layer polypropylene/polyethylene coating. Additional external corrosion protection will be provided through cathodic protection by means of conventional aluminium-zinc-indium sacrificial anodes attached to the pipelines at regular intervals. The pipelines will also be externally coated with concrete or steel to provide the weight required to ensure stability on the seabed as well as mechanical protection against impact.

Installation of the Phase 3 connecting pipelines will be from the pipe-lay barge Israfil Guseinov, with support from 2-3 anchor handling vessels and 2-3 pipe-haul barges and tugs. The pipe-laying operation is continuous with the barge moving progressively forward as sections of the pipe are welded, inspected, coated on board, and then deployed to the seabed. Once in place, the line will be flooded with inhibited seawater in preparation for commissioning and then tied-in to the wyes and spools at the platform.

**ES6.1.6 Onshore Terminal Expansion**

Expansion of the onshore terminal at Sangachal to accommodate the increased production from Phase 3 will include the installation of two additional hydrocarbon process trains with a nominal capacity of 175 bpd per train for crude oil separation and stabilisation. The construction activities required for the Phase 3 terminal expansion are minor in comparison to those required for Phase 1 and 2, but will involve a number of common activities. The majority of the Phase 3 steel, process vessels, pipework and equipment will be manufactured outside of Azerbaijan and will be imported by rail or via rivership through the Russian canal system. Construction materials will be sourced from local Azerbaijani suppliers wherever possible.

The construction programme will involve the establishment of underground services such as drains and the firewater systems; earthworks to establish foundations, plus surface pipework, tank and facility construction and tie-in. Construction methods will be based on those already established for previous phases. It may be necessary to carry out ‘hot work’ at times adjacent
to producing plant as the terminal will be in operational mode during the Phase 3 construction phase.

Production operations for Phase 3 terminal facilities will be consistent with and will operate in parallel with those for all Phases of the ACG development and essentially consist of oil reception, separation and stabilisation. Together these facilities will supply stabilised oil to three available 800 Mbbbl storage tanks prior to metering and export. The third crude oil storage tank is required to meet the storage requirement of the Phase 3 project and is currently being installed as part of the Phase 1 scope to ensure availability and flexibility at the start-up of the Phase 1 project and the Baku-Tbilisi-Ceyhan (BTC) project. Gas processing will be minimal and will consist of reception and gas dewpointing.

The treated oil will be exported via the BTC pipeline and the gas (less a portion used for fuel gas at the terminal) will be exported to SOCAR for distribution in the Azerbaijan national grid. Produced water will be treated and disposed of with the produced water from Phases 1 and 2. The final disposal solution for produced water when determined will be considered in a dedicated and separate ESIA.

**ES7 Existing Natural Environment**

**ES7.1 Overview**

The ACG Phase 3 project will take place in the Caspian Sea, an enclosed body of water occupying 386,400 km² and with a shoreline of 5,360 km. The Caspian is approximately 1,200 km long and averages 310 km in width. Caspian sea levels have fluctuated significantly over time and it is currently 27 to 28 m below the world ocean level. The sea level dropped by 2.9 m in the period between 1929 and 1977 and rose by 2.4 m between 1977 and 1997. The recent sea level rises have resulted in the flooding of coastal land and damage to settlements, industrial enterprises and irrigated land.

The Caspian exhibits a multitude of environmental stresses. Most are the result of the many years of pollution from a vast array of land-based sources that reach the Caspian via the 130 rivers that drain its watershed. The largest of these is the Volga. This river receives domestic waste from over half the population of Russia, along with a significant percentage of the country’s heavy industry. It is estimated that the Volga contributes 80% of the pollution load entering the Caspian. The combined effect of these and other factors is illustrated by the current poor state of the Caspian fishing industry. The effects have been particularly noticeable for the sturgeon fishery, where the Azerbaijan quota has been reduced in recent years.

**ES7.2 Offshore Environment**

The ACG Contract Area is approximately 40km in length, 11.5 km wide, and lies in the Middle Caspian. The area is characterised by an uneven topography, natural gas seeps, gas charged sediments, and subsea mudflows. The Contract Area contains large mud volcanoes.

The climatic conditions in the project area are mild (above sea air temperatures up 0 – 25°C) with most of the rainfall occurring in the Spring and Autumn months. The wind regime is very variable and unpredictable with the strongest winds from a northerly direction.

The Phase 3 project will be located in an area of water depth between 170m and 200m. The sea temperature in the contract area varies between a winter mean of 5 °C and summer mean of 25 °C. Currents in the area are weak, but storm surges, caused by episodes of very strong winds, occur frequently, with waves over 2m occurring most often during the July/August/September period. The Caspian has lower salinity than the world’s oceans, and uniquely, seasonal and spatial variations in salinity. The water is oceanic in origin but has been diluted by the inflowing rivers, which have also increased the concentration of certain minerals. During the winter months the upper layers of water become highly oxygenated and
in summer the water column becomes stratified. Hydrocarbons have been detected in the seawater in the contract area, some of which is thought to originate from the natural venting of hydrocarbons from mud volcanoes.

The sediments in the Contract Area are mostly medium to coarse sand with considerable spatial variation in the most abundant particle size. The sediments contain hydrocarbons but it is not possible to determine whether they are of natural or anthropogenic origin. Heavy metal content and radioactivity levels have been measured at typical background levels.

The benthic communities in the Contract Area are of high importance to Caspian Sea fish stocks, with crustacean-dominated communities in the northwest of the Area and annelid-dominated communities in the southeast. The Caspian sea contains a unique assemblage of fauna. About 75% of the species of the Caspian are endemic, 6% are from the Mediterranean and 3% are from the Arctic. The remaining 16% are freshwater immigrants that have adapted themselves to the salinity of the Caspian. Because of the special nature of the Caspian ecology the species introduction is a significant concern in the region and already several species of introduced zooplankton and fish have become established.

**ES7.3 Onshore Environment**

The onshore environment for the Phase 3 project is that surrounding the Sangachal Terminal. In addition, the ATA and SPS yards are being considered for use in onshore construction and fabrication of offshore facilities. No additional land take will be required for Phase 3, as all project activities will be contained within the boundaries of existing facilities.

The Sangachal terminal is located in a semi-desert area, in a low-lying basin on the margin of the Caspian Sea, approximately 10 to 12 m above the local sea level. The ATA Yard is located on the shores of the Caspian around 8km to the south of Baku on a sited bounded by the Caspian on the east and to the west by undeveloped land with a residential development 1km beyond. The Bibiheybat Oil Field is located to the north. The SPS Yard is located approximately 20km southwest of Baku, also on the Caspian coastline, in an area of shallow lagoons and small undulations of up to 2m. All three sites have a warm semi-arid steppe climate giving a mean temperature in summer of 26°C and 0°C in winter and a little rainfall occurring between October and March. A locally thermally driven wind system is based on onshore/offshore pressure differences and can result in very strong winds occurring with little forewarning.

Soils at the Sangachal Terminal have a low humus content, short soil profile and low agricultural productivity. The ATA Yard comprises made ground, and the SPS Yard has been used as an industrial facility for some years.

No aquifers supplying potable water are found in the vicinity of the Sangachal, ATA or SPS facilities. No significant ground water has been identified at Sangachal. At ATA ground water occurs at shallow depths and hydrocarbons are present: it is thought as a result of nearby historical oil field activities. A similar situation is thought to be present at the SPS Yard.

Air quality around the Sangachal and ATA facilities have been found to be within World Bank Environmental Guidelines with the exception of particulate measurements.

**ES7.3.1 Flora and Fauna**

The potential for the project to interact with onshore flora and fauna receptors is restricted given that all activities, except for transportation, will take place within the boundaries of existing sites. The ATA and SPS Yard in particular are industrial sites and virtually devoid of flora and fauna. However the Sangachal terminal has several items of ecological interest and environmental sensitivity in the vicinity of the site, and SPS is located next to a proposed Ramsar site. These items are briefly described below.

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1 A Ramsar site takes its name from Ramsar in Iran where the Ramsar Convention (Convention of Wetlands of International Importance Especially as Waterfowl Habitat) was drawn up in 1971. Azerbaijan is party to the Ramsar Convention.
Seeds of Sharp-edged Darling Iris (Iris acutiloba) listed in the 1989 Red Book of Azerbaijan and in the 1997 International Union for the Conservation of Nature (IUCN) Red List of Threatened Plants were found close to the terminal.

The Spur-thighed tortoise (Testudo graeca iberia) a species listed in the 1989 Red Data Book of the Azerbaijan Republic and in 1994 IUCN Red List of Threatened Animals as “vulnerable”, has been previously observed throughout the terminal area and it was encountered during surveys carried out in May/June 2001 in the coastal area close to the interface with the inland areas.

The Sangachal Terminal is situated on a bird migratory route between the breeding grounds as far north as the Arctic and wintering areas in South Asia and Africa. The wetlands close to the terminal in particular host an abundance of migrating wildfowl and passerines. The following Red Data species have been recorded near the terminal:

- Black-bellied Sandgrouse (Pterocles orientalis): ARB and 2000 IUCN Red List
- Dalmatian pelican (Pelecanus crispus): ARB and 2000 IUCN Red List
- Lesser kestrel (Falco naumanni): 2000 IUCN Red List and proposed for inclusion in ARB list
- Long-legged buzzard (Buteo rufinus): Proposed for inclusion in ARB.

The SPS Yard is located close to a pair of shallow lagoons known as the Shelf Factory Lagoons, separated from the Caspian by shingle banks and reeds. These are proposed as a Ramsar site due to the abundance of overwintering wildfowl and the presence of three ARB listed species and the IUCN Red Listed Pygmy cormorant (Phalacrocorax pygmeus).

Although the terminal has a limited potential to impact on local flora and fauna, the impacts of an accidental event in the offshore location, such as an oil spill, could have a much wider impact. Therefore the flora and fauna in the wider coastal region of the Caspian has been considered. The coastal zone of the Caspian, from Azerbaijan to Iran, is one of international ornithological importance. It supports both nationally and internationally significant numbers of migrating and overwintering birds, including species protected in Azerbaijan and Europe. Surveys at sensitive coastal sites have recorded four national Red Data species:

- Mute Swan (Cygnus olor);
- Greater Flamingo (Phoenicopterus rubber);
- White Tailed Eagle (Haliaeetus albicilla); and
- Dalmation Pelican (Pelecanus crispus).

To qualify as a Ramsar site, a wetland must support:- a) 20,000 or more waterfowl, OR b). substantial numbers of individuals from particular groups of waterfowl, indicative of wetland values, productivity or diversity OR c). 1% or more of the individuals in a population of one species or subspecies of waterfowl.

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ES8 Existing Socio-Economic Environment

A considerable amount of socio-economic information for the national and local baseline relevant to the ACG Phase 3 project area has been compiled through the ACG Phase 1 and Phase 2 ESIAs. In terms of the data relevant to ACG Phase 3, regional and local baselines were revisited to gain the most recent data, where possible and to reflect any changes in socio-economic baseline as a result of these previous project phases.

ES8.1 Regional Baseline

ES8.1.1 Population

The terminal site at Sangachal is located in the Garadag District as part of the Baku Administrative Region extending from just south of Baku to Gobustan. The latest population figures indicate that approximately 98,555 people are resident in the District. In addition to the key settlements of the district, namely Lokbatan, Sahil (previously Primorsk), Gobustan, Elet, Gizildash, Mushfigabad, Sangachal, Buta, Cheyildag (previously Umbaki), Korgoz and Shangar, there are three small villages Umid, Shikhlar, and Kotel. The majority of this population is Muslim with only a small minority, (approximately 7.4%) being Christian.

ES8.1.2 Employment and Income

Employment in Garadag District is dominated by its proximity to the industrial and economic activities in Baku and Sahil. The oil and gas industries support large numbers of workers while activities in the agricultural sector are generally largely confined to grazing during the winter season. Fishing is limited and is concentrated around Elet, Sangachal and Lokbatan and appears to be undertaken for recreational and subsistence purposes.

The average monthly income in Garadag District for 2002 is estimated to be $100. For the first six months of 2001, the oil sector and its associated industries contributed approximately 50% of total GDP in Garadag District with the construction industry accounting for approximately 30%.

ES8.1.3 Infrastructure

The Baku-Alyaty highway routed along the Sangachal Bay coastline passes to the south of the terminal location. This section of road is a main highway in Azerbaijan being part of the main transportation route north from Baku to Boyuk and to Kesik at the Georgian border and south from Baku to Astara to the Iranian border. In addition, the Baku-Alyaty railway runs parallel to the highway through the Garadag District and is part of the main transportation route for Azerbaijan in terms of its capacity. A number of utility lines and pipelines are also routed along the coast parallel to the highway and railway line. These utility lines provide electricity, communications, oil, gas and water.

Health services in the area are provided through medical ambulance stations in the main settlements and also two hospitals. Health issues that have arisen include a typhus epidemic in 1989 and respiratory problems.

There are 24 secondary schools and 4 colleges in the Garadag District with a capacity for approximately 13,700 students at any one time. In total however, between 25,000 and 27,000 children are studying in these schools. These figures indicate problems of overcrowding. Although no figures are available on the percentage of graduates from the total school population, a rough estimate is that 6% of school age children graduate from secondary school. Of these, 37% are continuing their education in colleges and other higher schools.

The internally displaced persons (IDP) and refugees in Garadag District are primarily located in Lokbatan, Sahil, Gizildash and Sangachal settlements. Just over 20% of IDPs in the
District are from Armenia while the remaining 80% are IDP from occupied territories of Fizuli, Agdam, Zengilan, Gubadli, Kelbejer, Jebrayil, Lachin districts and Shusa, Khojavend, Khojali city and villages of the Nagarno Karabakh region.

ES8.2 Local Socio-Economic Receptor Profile

The socio-economic receptors\(^2\) identified within the local area\(^3\) around the proposed ACG Phase 3 Project developments included Sangachal town, some herding settlements, Umid IDP/cement workers camp, Sahil town and Bibiheybat oil field.

ES8.2.1 Sangachal Settlement

ES8.2.1.1 Population

There were approximately 3,595 residents in Sangachal Town in 2003. This figure includes more than 500 IDPs from the 10 different districts within Azerbaijan that are currently occupied by Armenia. Approximately 62.5% of the population is male and 37.5% female (AHFS, 2001). The majority of residents are within the 31-50 year age category. Some 97% of the residents are Muslim with the remaining 3% Christian and included 95.2% Azeri Turks, 2.9% Russian and 2.9% Slav.

Almost 13% (i.e. approximately 520) of Sangachal residents are classified as IDPs. Most IDPs arrived in Sangachal in 1992, although people continued to arrive throughout 1993 and 1994. IDPs within Sangachal do not live in permanent accommodation. They are housed in public buildings, abandoned homes or railway cars.

Based on discussions with the Garadag Executive Power, it appears that there are no major health problems in Sangachal town. However, health was discussed as part of the AHFS survey undertaken in Sangachal and in 2001 over 50% of the population assessed their health as poor, however no official figures were available to support this assertion. A public immunisation campaign has been undertaken within the town, and was administered by doctors from the United Hospital in Sahil (Garadag Executive Power; 22/10/03).

The distribution of diseases between Sangachal, Sahil and Umid follow similar patterns for Garadag District as a whole. However, there are differences in the total incidence of disease between the settlements. According to Garadag Executive Power (22/10/03) the most common health problems for adult males in Sangachal are respiratory or cardiology in nature while adult females have more ailments of an oncological nature. There is also no form of maternity welfare support in the settlement and most women give birth at home.

ES8.2.1.2 Employment and Income

According to the Garadag Executive Power’s representative for Sangachal the quality of life of residents in this settlement has risen since increased employment opportunities have become available for local residents. The main economic activities in Sangachal revolve around industry, oil and gas and trade sectors. The expansion of Sangachal Terminal and activities at ATA and SPS as part of ACG Phase 1 and 2 are viewed as key drivers of the economic development occurring in the area since 2001. The main increases in employment have been within the oil and gas industry, other industrial fields, and transport. For example, at the time of writing approximately 280 people from Sangachal are employed at Sangachal Terminal by one of the main contractors\(^4\) (it should be noted these employment levels fluctuate depending on project requirements). According to the Garadag Executive Power, most IDPs living in Sangachal are employed, specifically providing labour to the oil and gas sector.

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\(^2\) A socio-economic receptor is defined as something that could be impacted upon by the proposed development that would affect the economic or social profile of the area.

\(^3\) Local is classed as 2-5km around the various facilities, whilst regional is taken as the wider surrounding area and in this instance, the Garadag District.

\(^4\) AIOC-BP-Tekfen Azfen, Azeri Project, Recruitment and Training Follow-Up Report, 14/3/04
ES8.2.1.3 Infrastructure

There are very few roads in and around Sangachal and most of these are gravelled. According to the Garadag Executive Power the quality of the road network has improved since 2001 and this has been linked to the construction works at the Sangachal terminal. There is no hospital or pharmacy within Sangachal. There is however, an ambulance station that provides basic first aid. From discussions with Garadag Executive Power it was ascertained that the station and ambulance are not in a good condition. Although Sahil United Hospital is not far away in terms of distance (about 15 minutes by bus), with few cars in Sangachal, and unreliable public transport, the United Hospital is not ideally positioned to serve the Sangachal community.

Although schools are present in Sangachal, several children travel to the school in Sahil in order to participate in extra curricular activities (e.g. sports and music) and attend the vocational training school. Such activities are not available in Sangachal (Garadag Executive Power; 5/7/01). Most of the children between the ages of 6 and 17 attend school although some do not due to financial difficulties. The number of students going on to tertiary education is slowly increasing but the numbers who go on to higher education varies from year to year (Garadag Executive Power; 5/7/01) and has attendant difficulties. Some universities charge attendance fees and as public transport to Baku is not reliable (i.e. the service is irregular and seats can be limited), regular attendance at university can be difficult.

ES8.2.2 Herding Settlements – Central North and West Hills

The area surrounding the existing Sangachal Terminal has been used by an extended family of pastoralists as winter grazing pasture since 1961. The land acquisition prevented them from using some of the area for grazing and subsequently they requested to be moved. AIOC are currently (February 2004) in discussion with the various parties concerned on the exact nature of the re-location. The herders will be moved once agreement has been reached between all parties concerned. Full details of the process are contained within the ACG Phase 1 and Shah Deniz Stage 1 Resettlement Action Plan and the herders will not be affected as a result of the ACG Phase 3 development.

ES8.2.3 Umid Camp

Umid Camp is essentially two camps within one settlement; one camp houses IDPs and another camp is for workers from the Garadag Cement Plant at Sahil. The camp has been given permanent status and is now recognised as a formal settlement.

ES8.2.3.1 Population

In total there are 1,200 people currently living in Umid Camp, compared to 1,300 people in 2001, a 8% decrease between 2001 and 2003. Of the present 1,200 people, 67% are IDPs and the remaining 33% local residents. The major ethnic groups include Azeri, Tallish and Lezghin and the majority of residents are Muslim. It is estimated that 48.3% of the population is male and 51.7% female.

ES8.2.3.2 Employment and Income

Since the construction works undertaken at the terminal as part of ACG Phase 1 and Phase 2, the overall conditions for the inhabitants are considered to have improved, largely due to the increased employment. According to the Garadag Executive Power, unemployment within Umid settlement decreased from 78% in 2001, to 8% in 2003. It is believed that a significant proportion of those now employed are involved in construction activities at Sangachal Terminal and the ATA and SPS fabrication yards. At the time of writing, approximately 80 personnel were currently employed at Sangachal Terminal by one of the project’s main contractors.5

5 AIOC-BP-Tekfen Azfen, Azeri Project, Recruitment and Training Follow-Up Report, 14/3/04
Despite the increased employment opportunities for local residents and resultant spending, no private businesses or small enterprises have developed. A few residents are involved in fishing and this is for subsistence purposes to supplement their diet. Such fishing is by rod from the shores nearest to the camp, including from the jetty built for the Early Oil Project (EOP).

Many of the IDP families have been affected by the war, influencing employment opportunities where injuries were sustained. Information given indicates that 10 households within the IDP population of the camp have war veterans as a member of the household and a further 14 households have officially injured war veterans as members of the household. The key concerns of war veterans in Umid Camp are the perceived lack of government support and the small amount of pension received (Head of Garadag Executive Power Representation, Umid Settlement; 05/07/01).

All of the children from the IDP Umid Camp are immunised by doctors from Sahil hospital. Whilst the medical facilities are free, there is a limited supply of medicine. There is however, a general belief held by Garadag Executive Power that the health services are getting better. Assistance from international organisations is on an infrequent and ad hoc basis and so does not form a reliable alternative to the public system (Head of Garadag Executive Power Representation, Umid Settlement; 05/07/01).

ES8.2.3.3 Infrastructure

There is a school, medical office, bakery and post office within Umid Camp. There is a rudimentary sewage system, however plans exist to upgrade this in the near future through the ACG Community Investment Program. There are telephones in every house in the IDP camp and all households have regular access to electricity and gas within their homes. Wood is not used for heating nor cooking purposes. Sufficient quantities of water are piped to households from the Kura River and the supply is regular. The water supply is cold water only, which is normal for the area.

Medical services within the camp are limited and the existing medical facility is a basic first aid post capable of providing only limited services. Most women give birth at a maternity home and for more serious health problems, residents must use the hospitals at either Sahil or Baku.

One school in the Camp provides secondary level education. At the time of writing, approximately 200 pupils attended the school, in comparison to 120 pupils in 2001 (Head of Garadag Executive Power Representation, Umid Settlement; 22/10/2003). There are only seven classrooms and overcrowding is a problem. As a result, a shift system has been applied whereby pupils attend either the morning or the afternoon sessions. Even though the technical and material basis of the school is not sufficient, the teaching is said to be of a good quality. Very few male students continue with higher education because of limited finances and compulsory military service. A limited number of female students continue with tertiary education.

ES8.2.4 Sahil

ES8.2.4.1 Population

Figures for 2003 indicate that there are approximately 20,900 people living within the Sahil boundaries. This is compared to 21,000 residents in 2001, illustrating a 0.5% population decrease between 2001 and 2003. The gender split of the current population is 48.8% male and 51.2% female, which is similar to Umid but different from Sangachal with 62.5% males. The major ethnic groups in the settlement are Azeri (93%), Russian (4.3%), Caucasian nations (1.8%) and other (0.6%) with Muslim and Christian being the most widely supported religions.
There are approximately 7,175 IDPs living in Sahil. The majority of IDPs in Sahil arrived in 1992, although people continued to arrive throughout 1993 and 1994. IDPs within Sahil are housed in public buildings or dormitories, private houses, or rented accommodation.

**ES8.2.4.2 Employment and Income**

The key areas of employment for Sahil residents during 2003 were the oil and gas sector, other industries, and public utilities. Employment within oil and gas and other industrial fields has increased significantly since 2001, with employment in public utilities, education and culture, domestic services, catering and trade increasing only slightly. Increases are primarily related to ACG project activities at the Sangachal Terminal Expansion Programme (STEP) and the SPS and ATA fabrication yards, however levels will fluctuate depending on project requirements.

According to the AHFS survey that was conducted in 2001 the unemployment rate was 63.2% in Sahil. Data received from Garadag Executive Power indicates that this figure has decreased to 52.3% in 2002 and 29.3% in 2003.

The AHFS survey gathered a range of data on Sahil residents’ perception of family welfare and income levels in 2001. This showed that 52.3% of informants claim to be poor or very poor. However, according to Garadag Executive Power (20/10/2003) the indications are that the general quality of life for the residents in Sahil has increased since 2001. This has largely been due to increased employment opportunities for both males and females of the settlement. In addition the funding of various development projects has benefited children in the area e.g. a new computer centre, day care centre for handicapped children and entertainment centre has likely added to the quality of life for children in the settlement.

**ES8.2.4.3 Infrastructure**

There are approximately 282 houses and 2,089 apartments in Sahil. According to official sources all residences in the town have electricity and gas, and supplies are regular, reliable and sufficient. Wood is generally not used for heating or cooking.

All of the apartments are privately owned, however the majority of the houses (90%) are owned by the government. During 2003 site visits, the survey team noted a lot of construction activities underway in the settlement and this may be aimed at solving any existing shortage of housing.

The majority of the houses within Sahil have telephones. According to the Garadag Executive Power the majority of people have access to televisions although exact figures are unavailable and it is unclear whether “access” means a television in the home or within a communal area. Sahil community receives most of its information from the television and the main newspapers and radio channels are readily accessible.

The roads in and around Sahil are mostly covered in asphalt and are viewed as satisfactory, despite the poor condition of the surfacing and lighting. According to the representatives of Garadag Executive Power based in Sahil, the quality of the road network has not changed in the past three years.

A cold water supply is piped into the town from the Baku-Kura pipeline and is believed to occasionally be insufficient for the purposes of the settlement. There is no certified hot water supply to Sahil, although this is typical for the area. Bottled water is not used for drinking, washing or cooking (Garadag Executive Power; 20/10/03). The settlement also has both centralised sewage and garbage disposal systems in place. However, according to the Garadag Executive Power the sewage system needs to be repaired.

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According to Garadag Executive Power (20/10/03) the health of the residents of Sahil is good. However this does not correspond with the feedback from the Sahil population in 2001. Sahil Central Hospital #23 serves approximately 25,000 people. Although 65 beds are available, sheets, blankets and food are not provided. There are 47 doctors, 7 midwives, 120 nurses and a further 46 assistants working at the hospital. The hospital is open 7 days a week, 24 hours a day, and provides the following services: immunisations, URI in children, treatment of diarrhoea in children, child growth monitoring, anti-natal care, delivery services, patronage, family planning services, laboratory analysis, health education, basic emergency care and treatment of minor injuries.

The local population believe the level of medical care received is satisfactory, and medical fees are levied. The facility is also conveniently located (i.e 1-3km from the town). Those interviewed in the AHFS survey estimated that they spent between 80,000 and 100,000 manat in 2000 on medical care.

There are 5 schools in Sahil including 3 secondary, 1 boarding school and one lyceum. Children from Sahil, Umid and Sangachal attend the schools in Sahil. A number of pupils from Sahil also attend specialised schools in Baku. The ACG Community Investment Programme has assisted in the rehabilitation of the refugee school in Sahil, which was in a very poor condition.

To overcome overcrowding, schools operate on a shift system with up to three shifts daily. At the Kasabasi school, the Human Development Forum is providing computer courses for 341 children.

**ES8.2.5 SPS Yard**

SPS is a potential location for fabrication/construction of ACG Phase 3 activities. There are a range of domestic and commercial buildings and associated activities within the vicinity of the SPS Yard. The socio-economic survey identified 3 groups of residential buildings, a range of commercial activities (e.g vehicle renting company, AzGas Plant, shop), signs of agricultural activities and a number of buildings at which the exact nature of the activities being undertaken was not confirmed. It appeared that some of the buildings exist due to the presence of the SPS Yard facility. While unconfirmed, it is considered that some of the residents may be employed at the facility or at least work in small commercial enterprises that support the Yard’s operations.

**ES8.2.6 Bibiheybat Oil Field**

Bibiheybat Oil field surrounds the ATA yard. Fabrication activities may occur at the yard as part of the Phase 3 construction programme. At the time of writing, 122 people live within 1.5km of the ATA Yard. Some 16% of the population is aged six or below, 24% is between the ages of seven and 16, 56% between 17 and 59 years of age and the remaining 4% being 60 years old or over. All of those households surveyed were Muslim. There are a number of companies and households situated within the oil field. The majority of the households in the area have been occupied since 1993 - 1997.

There are nine companies employing 2,945 people within 1.5 km of the ATA yard. The majority of companies are well established with some being based at their present site since the 1920s and 1930s. Most employees arrive at work by public service bus, primarily from Bayil district. Specific buses are provided for employees working at the ATA Yard.

All surveyed companies and households have access to electricity. Only 50% of businesses and 43% of households have access to gas. Only six households (i.e. 21% of the total) use wood for cooking and heating in the home.

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7 All of the information contained on the Bibiheybat Oil Field is sourced from ATA Yard : Socio-Economic Baseline Survey, Final Report, URS, November 2003.
All businesses obtain water from the main Baku supply and the supply was reported as being regular, although one business reported shortages during the summer months. Residents of surveyed households indicated that they either obtain water from the main Baku supply or from the shipyard's water pipeline.

Only one business and three households have a centralised sewage system. All businesses stated they have a centralised garbage collection and disposal system but only eight households (i.e. 29% of the total) have access to such a service.

The main sources of income for households in the survey area are industry, the service sector and government/humanitarian support. For the majority of households surveyed, these income sources have remained the same in recent years.

Nine of the surveyed households (i.e. 32% of the total) own livestock (mainly poultry). In all cases the livestock are kept for their eggs and meat and live in the area surrounding the house. Only one household (i.e. 4% of total) is involved in fishing.

Almost 65% of household residents surveyed stated that they had health problems. A broad range of health problems were cited, but the main health issues identified were liver and heart conditions, glandular fever and child birth trauma. Residents in the survey area indicated that they access a variety of different hospitals located in Baku, Bibiheybat, Bail and Shigor settlements.

Seven schools were identified as being accessed by residents in the survey area. There are 2 schools in Bibiheybat, 4 in 20th settlement and 1 in Bailov. Of these seven schools, 3 are IDP schools. Almost 25% of residents in the area are currently pupils or students and almost 16% have achieved either secondary technical or university level education.

Access roads to households in the survey area are primarily earth or gravel, although some are asphalt. Almost 90% of surveyed residents indicated that they consider the roads to be of poor quality.

**ES9 Environmental Impact Assessment**

**ES9.1 Introduction**

The impact assessment was performed considering the project as occurring in a number of distinct stages:

- Offshore facilities – onshore construction and pre-commissioning;
- Offshore facilities – offshore installation, hook-up and commissioning;
- Mobile offshore drilling unit (MODU) drilling (template and subsea water injection sites);
- Offshore facilities – platform drilling, production and operations;
- Offshore interfield pipelines – installation and operations;
- Onshore facilities – construction and commissioning; and
- Onshore facilities – operations.

The following steps were undertaken in the assessment for each of the above stages:

- Routine and planned non-routine activities within each project phase were identified and the potential environmental and socio-economic aspects associated with these activities

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8 Schools in Baku are often numbered rather than named.
9 Environmental aspect defined as “An element of an organisation’s activities, products or services that can interact with the environment”, Environmental Management Standard ISO 14001.
For each aspect, potential impacts\textsuperscript{10} were considered and the effect of mitigation measures established through the design process/mitigation workshops were then taken into account. These measures comprise either specific design components or operational management procedures intended to eliminate or reduce the potential for impacts from the identified activities. In particular, lessons learned from the offshore facility and terminal expansion programmes for Phase 1 and Phase 2 of ACG FFD were taken into consideration, particularly the environmental and social management procedures that have been put in place. An assessment was made of their success in mitigating impacts related to Phase 1.

Where issues remained and the potential for residual impacts was identified, these issues were assessed and their significance ranked using the methodology, probability of occurrence (likelihood) and consequence criteria. Where the residual impact was found to be of low significance, no further mitigation measures are considered necessary. Where potentially significant residual impacts were identified, these will require additional mitigation measures above and beyond those already in place for the project.

Phase 3 is the final phase of FFD, and the development has many activities in common with Phases 1 and 2. As a result many of the potential impacts are similar, and can be mitigated by a common set of measures. The ESIA for Phase 3, took into consideration the considerable amount of work carried out in developing mitigation and management measures for Phases 1 and 2. As part of the ESIA process advantage was taken of the fact that Phases 1 and 2 are under construction, and the effectiveness of some of those mitigation measures could be assessed. This ESIA found that the majority of impacts were of low residual significance due to the mitigation and management measures already in place.

### ES9.2 Summary of the Impact Assessment Results

When considered in isolation, the majority of proposed Phase 3 activities have been predicted to result in an insignificant impact, either due to the small scale of the activity, the distance of the activity from receptors, or through the effective mitigation of impacts through careful design and procedural controls. Phase 3 will follow the EOP, Phase 1 and Phase 2 developments and as such needs to be considered within the context of FFD. The assessment of potential cumulative impacts considers those impacts that may result from the combined or incremental effects of past, present or future activities on environmental or socio-economic receptors. Phase 3 activities will contribute to an accumulation of activities, issues and impacts associated with FFD, such as noise, air emissions (including greenhouse gas emissions) and socio-economic issues.

The potential for accidental events to occur during the different stages of the Phase 3 project has also been assessed in terms of probability of occurrence and the resulting consequence of these accidents. In addition, Phase 3 activities may contribute to the challenge of meeting wider operational issues relating to FFD or other BP AzBU activities in the region.

The results of this assessment show that no impacts were identified with a high residual significance. Over the project, six impacts were identified as having a medium residual significance. 2 impacts are directly related to the ACG Phase 3 development as a single project (i.e. the project occurs on its own with no consideration of other projects in the region). The remainder arise as a result of either the project in a cumulative context with other AzBU activities such as ACG Phases 1 and 2 and Shah Deniz, or relate to wider issues associated with FFD or other AzBU activities in the region. As such, these require further mitigation and monitoring and are discussed in the following subsections.

\textsuperscript{10} Environmental impact defined as “Any change to the biophysical environment, positive or negative, that wholly or partially results from a project activity or associated process”, Environmental Management Standard ISO 14001.
ES9.2.1 Residual Impacts from the ACG Phase 3 Project in Isolation

ES9.2.1.1 Discharge of WBM drill cuttings from surface hole sections

The length of time over which the drilling programme will run (10 years) and the total volume of water based mud cuttings that will be discharged to sea (14,706 m$^3$ from the MODU and 10,526 m$^3$ from platform drilling) will result in a physical impact to the seabed at and near to the drilling locations. Importantly, there will be no opportunity for the marine organisms to recolonise the impacted area until the drilling stops. It should also be noted that concerns over discharge of drill cuttings and the resultant disturbance of the benthic habitat was raised during consultation.

A BPEO study into drill cuttings management was performed for the Phase 1 ESIA. Several issues were highlighted with containing and shipping cuttings to shore:

- Containerising the volume of cuttings that would be generated during drilling of the surface and top-hole sections would be technically difficult as storing large volumes of cuttings on the topsides has inherent safety risks.
- The cuttings would be generated at a high rate thereby necessitating frequent vessel operations and quick off-loading of the cuttings from the topsides.
- Shipping to shore results in atmospheric emissions from vessel operations.

The study concluded that while not desirable, release of WBM drill cuttings to the seabed is, on balance, the best environmental option.

Deposition of the WBM cuttings may extend for up to 1.4 km from the platform and lead to a predicted biomass loss of 3,300kg.

The impact of the release of WBM drill cuttings will be mitigated via a number of measures:

- Selection of low toxicity WBM;
- Sampling and analysis of the cuttings to ensure chloride levels are kept within operating standards;
- Discharge from the platform will be from a caisson at −138m, well below the productive zone.

ES9.2.1.2 Oil Spills

The accidental events of greatest environmental significance are a well blow out or pipeline rupture, both of which would result in a large-scale oil spill. Both scenarios are extremely unlikely due to the incorporation of a variety of protective measures during project design, which include:

- Prior to production, drilling geophysical surveys will be conducted and shallow gas pilot holes drilled to enable potentially dangerous gas pockets to be avoided.
- Blow Out Preventors (BOP). BOPs will be utilised in all wells drilled and can be rapidly closed following an influx of formation fluids into the well bore. In an emergency situation, gas will be vented at the surface and any oil will be contained in the drilling rig’s mud system.
- Mud logging to assess the characteristics of the formation being drilled and assist in identifying dangerous conditions potentially leading to a blow out.
• External protection of pipelines with concrete to provide the weight required to ensure stability on the seabed and mechanical protection against impact (mitigated as part of the ACG Phase 1 and Phase 2 projects).
• Pipeline route selection also minimises possible interference from anchoring boats and the risk of damage due to dropped objects. In the nearshore zone where the pipeline is potentially vulnerable to passing ships it will be buried under the seabed (mitigated as part of the ACG Phase 1 and Phase 2 projects).
• Regular pipeline inspection - side scan sonar and visual inspection surveys by ROV with onboard camera, internal intelligent pig surveys, and flow rate monitoring
• Pipeline corrosion protection measures (sacrificial anodes and protective coating) and corrosion monitoring

The environmental impacts of spilled oil are dependent upon the potential for oil to contact sensitive resources. Under a no-response modelled scenario, the potential distribution of a worst-case oil spill (a large-scale blow-out) could extend throughout the middle and south Caspian, with oil reaching the shorelines of Azerbaijan, Turkmenistan and Iran. In practice, AiOC has developed an ACG specific Oil Spill Contingency Plan (OSCP) and Phase 3 will integrate into this plan. The Caspian littoral states are also developing National Oil Spill Contingency Plans. Although Azerbaijan has yet to prepare a plan, AiOC is working with industry and government to support spill response preparedness.

**ES9.2.2 Cumulative Residual Impacts from the ACG Phase 3 Project**

**ES9.2.2.1 Offshore and onshore atmospheric emissions**

The ACG project partners are committed to assessing, and where practical, reducing the projects Green House Gas (GHG) emissions. The Phase 3 HSE Design Standards included the following relating to the control of GHGs:

• Evaluation of options to reduce flaring, combined with the development of operational flare policy, aligned with ACG FFD;
• Maximization of energy efficiency in line with BPEO;
• Challenge and justification of well testing requirements;
• Minimisation of combustion and fugitive emissions; and
• Prevention of hydrocarbon gas disposal by continuous venting.

As a result of these Design Standards the ACG FFD project (including Phase 3) has included a number of design measures to minimise GHG emissions:

• The cessation of routine flaring from the Chirag-1 platform (as part of EOP);
• Onshore flare gas recovery;
• Onshore inert purge gas;
• Centralised power offshore for the Azeri Field;
• No continuous flaring for production;
• Gas re-injection (as opposed to flaring) at the Azeri Field;
• External floating roof tanks at terminal;
• Use of Aero-derivative turbines;
• Electric motor driven export compression on Phase 3; and
Gas management measures, including provision of associated gas to SOCAR for use in the national grid in Azerbaijan

Considerable annual savings in GHG emissions have been made through the implementation of these measures, peaking at a saving of 1.3 Million Tonnes CO$_2$ Eq in 2011 (for combined all FFD phases together). In addition to the measures outlined above the following further measures will be implemented in order to ensure the minimisation of GHG emissions from the Phase 3 project:

- Operational mechanisms, such as optimisation of energy efficiency, leak detection programmes, monitoring and maintenance programmes;
- Investigation of opportunities to integrate broader GHG reduction considerations into the projects’ environmental and community investment programmes; and
- Monitoring of developments within the UNFCCC for ideas that could have applicability to Azerbaijan.

**ES9.2.3 Wider Issues**

**ES9.2.3.1 Final disposal of wastes**

The management of waste is an issue for all BP activities due to the lack of available facilities for the reception, treatment (where required) and disposal of wastes in Azerbaijan. This problem is compounded by the fact that some types of wastes have not been produced in Azerbaijan to the scale that will result from the ACG and other BP operated developments, and therefore there has not been a requirement to develop disposal routes for them. Work is ongoing by the AzBU to define disposal routes for these wastes and ACG Phase 3 will align with and integrate into final disposal solutions.

BP’s waste production is predicted to peak around 2004, declining rapidly to around by the end of 2007 as projects move from construction to operation resulting in a decrease in the amount of waste generation. From 2008, waste production will become relatively constant until 2024. Current waste management practices are shown in Table ES.1.

**Table ES.1 AzBU Identified Primary Waste Disposal Routes**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Disposal Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous waste</td>
<td>Storage under controlled conditions</td>
<td>Serenja Hazardous Waste Facility</td>
</tr>
<tr>
<td>Non-hazardous waste</td>
<td>Re-use/recycling and where not possible, landfill</td>
<td>Various recycling routes (steel, paper, wood) or Balakhany Municipal Landfill</td>
</tr>
</tbody>
</table>

AzBU is currently working in conjunction with local agencies and authorities and with individual BP project teams to identify compliant interim and long-term waste management solutions for hazardous storage, reuse/recycling options, landfill sites and operations.

**ES9.2.3.2 Workforce Demobilisation**

The demobilisation of the workforce that will occur at the completion of the construction programme remains of medium residual significance due to the number of people that will be directly affected and the consequent socio-economic impact. Whilst those employed in earlier projects have been able to move onto subsequent BP construction programmes, after the construction period of Phase 3 there will be no further major BP construction programmes to which the workforce can transfer.

The Phase 3 mitigations that will be implemented to minimise the impacts of construction workforce demobilisation are as follows:
• The verification of socio-economic management measures assumed to be in place during the impact assessment; specifically the implementation of appropriate recruitment, employment and training procedures; contractor alignment and coordination in workforce management across the project;

• The alignment and integration of ACG Phase 3 into the framework of the BP AzBU established social management system and social investment programme, which includes the following key components:
  - Transparency & Communication: Clear communication to all workers on terms and conditions of contracts at start of work, including notification process, so that workers are aware of the length of their employment.
  - Inter-Project Management: Focus on planning and collaboration between projects to maximise alternative employment opportunities, and the transfer of skilled and non-skilled workers between existing and any new projects that arise.
  - Contribution and communication within the established Industrial Forum (IF) mechanism between the projects main contractors on behalf of ACG Phase 3.
  - Provision of Training & Guidance: Training &/or Business Development Centres will be established to supplement existing training and diversify skills, such as business development, computer and life skills. These will be available to workers and other locals.
  - Social Development: Existing social investment (SI) programmes will be used as a platform to launch capacity building, sustainable income generation and micro-enterprise projects to enhance the opportunity for individuals, or groups close to BP-operated projects to generate their own income.
  - Linkages to External Activities: Engaging into and supporting where appropriate other NGO, IFI or Government strategies aimed at supporting economic development within the country and region.

• Development and proposal to AzBU of additional measures based on project experience to augment existing programmes.

ES9.2.3.3 Decommissioning

Local scientists raised the future decommissioning of ACG offshore facilities during stakeholder consultation (Section 8). The consideration of decommissioning, and more specifically the concern over the potential hazard to shipping posed by installations not completely removed from the seafloor, has therefore been considered in the ESIA process.

The ACG Phase 3 facilities have been designed so as to enable complete removal. According to the terms of the PSA, AIOC is required to produce a field abandonment plan for the ACG facilities one year prior to completion of 70% production of identified reserves. Whilst the PSA states that ownership of these facilities will pass to SOCAR on completion of the term of the PSA, AIOC will develop a Field Abandonment Plan which will present recommendations for project decommissioning based on a best practicable environmental options (BPEO) study of all available options. The financial aspects of Phase 3 decommissioning will be addressed by the contribution of a proportionate share of the revenue raised from the project by each of the AIOC partners, as defined by the PSA.

ES10 Conclusions

The ACG FFD Phase 3 project, as the last major phase of full field development of the oil and gas reserves in the ACG Contract Area, has the potential to deliver major economic benefits to Azerbaijan. The ACG FFD project, together with the linked investments including ACG Phases 1 and 2, EOP, the BTC project are collectively the largest investments ever committed in Azerbaijan. They will have a major positive effect on the national economy of Azerbaijan.
There are a number of residual environmental impacts that have been assessed as being of medium residual significance, although only two of these; the discharge of drill cuttings and oil spills are directly a result of the ACG Phase 3 project when considered in isolation with other projects in the region. The impact of drill cuttings discharge includes repeated physical impacts to the offshore benthic habitat over a 10-year drilling period. It is this timescale, rather than the extent of the impact, that is the reason for a ranking as medium significance. The potential impact of a large oil spill incident would be significant and justifies a medium ranking, however the likelihood of such an event occurring is very small.

In addition, a number of residual cumulative impacts have been identified when considering ACG Phase 3 together with other projects (such as ACG Phase 1 and 2). These include the onshore and offshore cumulative GHG emissions. For Phase 3 a number of design measures have been adopted to reduce the GHG contribution from the project.

A range of other issues have been identified, not as specific for ACG Phase 3, but as wider issues that are being addressed by the AzBU. These comprise final disposal solutions for waste, demanning of the construction workforce at the end of the onshore contracts, and decommissioning. A number of initiatives are being pursued with respect to these wider issues and management and mitigation measures will be in place by the time ACG Phase 3 is initiated.

On consideration of the above, the ACG Phase 3 project, within the context of ACG FFD, has the potential to make a very significant contribution to sustainable development in Azerbaijan. Importantly, the project could indirectly add impetus to the energy sector reform within Azerbaijan. This in turn should improve the population’s access to energy (gas and electricity) and result in the wider use of cleaner fuels.