

Terms of Reference
Preparation of Feasibility Study (FS), Environmental and Social Impact Assessment (ESIA), Detailed Design and Works Supervision of hill lakes
(Proc. Ref.: G-GP-CS-FA)

1. Project Background

The Republic of Lebanon (the Borrower) represented by the Council for Development and Reconstruction (CDR) has received a loan from the International Bank for Reconstruction and Development (IBRD) in the amount of US\$ 200 million toward the cost of the Green, Agri-food Transformation for Economic Recovery Project (Gate).

The GATE Project aims to improve the resilience of farmers and Small and Medium Enterprises (SMEs) in the Lebanese agri-food sector. The project is designed to facilitate access to finance, support climate-smart investments, and restore critical infrastructure services to sustain and enhance the agricultural value chain. Through targeted interventions, it seeks to increase agricultural productivity, strengthen food security, and promote sustainable economic growth. The project is structured into key components focusing on value chain investments, infrastructure development, enabling regulatory improvements, and knowledge management.

The Project is structured into five main components, each designed to strengthen the resilience of Lebanon's agri-food sector and support farmers and SMEs:

- Component 1: Climate Smart Investments in Agri-food Value Chains
- Component 2: Climate-Smart Infrastructure and Services for Agri-Food Sector Development
- Component 3: Improving the Enabling Environment and Restoring Support Services for Agri-food Sector Development
- Component 4: Project and Knowledge Management
- Component 5: Contingency Emergency Response Component

The Green Plan has been delegated by the CDR to implement and manage the Subcomponent 2.1.

This sub-component – Improving rural community infrastructure for agriculture (US\$28 million) – focus on financing of water storage with a capacity below 100,000 m³, small community and farmer-led irrigation networks to increase resilience to water scarcity exacerbated by climate change and climate smart rehabilitation of agricultural roads and other demand-driven agricultural subprojects to improve livelihoods of agricultural communities and increase climate resilience.

The Green Plan, intends to apply part of the proceeds of the project for the consultancy services of consultancy firms to undertake the preparation of feasibility studies, environmental and social impact assessment (ESIA), and detailed design and works supervision for the hill lakes.

The assignment will be carried out under a combination of lump-sum and time-based contract arrangements.

2. Objectives of the Assignment

The project foresees the selection of around 30 hill lakes, generally ranging from 20,000 to 100,000 m³, to support agricultural resilience, water harvesting, and improved irrigation service delivery.

The objectives of the assignment are:

® Phase 1: Preparation of the feasibility study and preliminary design and Environmental and Social Screening Application.

® Phase 2: Preparation of the Economic and Social Impact Assessment (ESIA), detailed design and Tender Documents.

® Phase 3: Works Supervision of hill lakes.

Note: The implementation of the second and third objectives of this assignment (preparation of ESIA and the detailed design and tender documents and works supervision) will depend on the outcome and the approval of the GP on the feasibility study and preliminary design.

3. Scope of Services

The Consultant shall provide all professional, technical, and advisory services necessary for the successful implementation of the assignment for the selected hill lakes. The scope of services shall include, but not be limited to:

Phase 1: Preparation of Feasibility Study, Preliminary Design and Environmental and Social Screening Application

The Consultant shall carry out a preliminary design and feasibility study to assess the technical, economic, environmental, and social feasibility of the project. The study shall enable the Client to evaluate the viability of the proposed project and, where applicable, select the most advantageous alternative prior to commencing the detailed design phase. The Consultant shall consider all relevant factors influencing the overall project, including socio-economic, technical, environmental, and financial aspects.

The assessment shall take into consideration all factors influencing the project, including technical, social and environmental and financial aspects.

At the end of Phase 1, two (2) possible scenarios may apply for each hill lake:

Case 1: The feasibility study concludes that the proposed hill lake is feasible. Following the Green Plan's approval of the feasibility study and upon its specific instructions, the Consultant shall proceed with Phase 2 of the assignment, including the preparation of the detailed design and the Environmental and Social Impact Assessment (ESIA).

Case 2: The feasibility study concludes that the proposed hill lake is not feasible. Following the Green Plan's acceptance of the feasibility study, the assignment shall be discontinued at the end of Phase 1, and the Consultant shall be remunerated only for the services effectively performed under Phase 1. In such case, the Consultant shall not be entitled to any additional payment, compensation, or claim arising from the discontinuation of the assignment.

This phase includes the followings tasks:

Task 1: Rapid Preliminary Assessment of Site Feasibility

At the commencement of the assignment, the Consultant shall organize a site visit involving experts specialized in geological, geotechnical, hydrological, and civil engineering aspects. The purpose of this visit is to conduct a rapid preliminary assessment of the feasibility of the proposed hill site, with particular focus on the geological, geotechnical, and hydrological conditions.

The Consultant shall prepare a **concise technical note** within two (2) weeks from the day following the date of notification of the commencement order or contract.

Deliverable – Task 1: Concise Technical Note on the Rapid Preliminary Assessment of Site Feasibility for the Hill Lake.

Following the rapid assessment and submission of the Concise Technical Note:

- Case A: If the proposed hill lake is deemed not feasible based on the Concise Technical Note approved by Green Plan, Phase 1 shall terminate at this stage. The Consultant shall be remunerated only for the services duly performed and the Concise Technical Note submitted in accordance with the Contract. The Consultant shall not be entitled to any additional payment, compensation, or claim arising from the discontinuation of the assignment.
- Case B: If the proposed hill lake is deemed feasible based on the Concise Technical Note approved by Green Plan, Phase 1 shall continue with the below subsequent studies and investigations specified under Phase 1.

Task 2: Topographic Mapping of the Site

Following the identification of the location of the proposed hill lake, the Consultant shall undertake a topographic survey and prepare corresponding topographic maps of the selected hill lake site at the required scales as indicated below. the Consultant shall undertake the following tasks, including but not limited to:

a. Establishment of control points:

The Consultant shall liaise with the relevant authorities to identify national grid points from DAG (Direction des Affaires Géographiques) or secondary permanent and reliable established control points to serve as reference points for the geodetic network to be used. The selected reference points shall be subject to prior approval of Green Plan technical team.

The Consultant shall use appropriate surveying equipment, including dual-frequency GNSS receivers (Base and Rover), Total Stations with an angular accuracy of 0.5" or better, automatic and digital leveling instruments, laser scanners, and drones, as required,

The Consultant shall establish a permanent control network within the project area using a combination of GNSS Static Network and High-Precision Traverse methods to provide reliable horizontal and vertical control for all subsequent topographic surveys. GNSS static observations shall be carried out for a minimum duration of 120 minutes per session at each control point, with simultaneous observations on all points, followed by a 20-minute interval before a second observation session to allow different satellite geometry and constellation conditions.

A minimum of five permanent survey monuments shall be established outside the future lake limits and referenced to the Lebanese National Grid and Mean Sea Level Datum. The monuments shall consist of reinforced concrete structures with brass survey markers

installed on site. These control points shall serve as reference markers for project implementation and as the basis for the topographic surveys to be carried out by the Consultant prior to commencement of the works. They shall also serve as a reference for any future surveys and potential claims.

The Consultant shall provide calibration certificates, issued within the previous twelve (12) months by an accredited laboratory, for all survey equipment to be used under the assignment and shall obtain the approval of Green Plan technical team prior to its use on site. The Consultant shall also submit the curriculum vitae (CVs) of the Chief Surveyor and who will carry out the survey works under this assignment.

b. Topographic Lake site mapping:

The Consultant shall survey and prepare a topographic map of the proposed hill lake site using a grid system with 1 m intervals, at a scale of 1:500 and with a maximum contour interval of 0.25 m, or as directed by Green Plan technical team. Additional breakline points shall be collected at all terrain discontinuities. The prepared map shall extend sufficiently beyond the limits of the proposed lake to cover the storage area, the perimeter, the dam footprint, and any additional areas required by Green Plan technical team.

The final topographic survey shall achieve a maximum positional accuracy of ± 15 mm for planimetric coordinates (X, Y) and ± 5 mm for elevations (Z). The density and distribution of survey points shall be determined in coordination with Green Plan technical team to ensure adequate representation of the existing ground surface and all relevant features. Cadastral plot boundaries shall be shown on the topographical plan based on the officially stamped cadastral drawings. Any interference or overlap between the proposed hill lake layout and the cadastral boundaries shall be clearly identified and highlighted on the site/layout plan. All topographical plans shall be prepared using the Lebanese National Coordinate Reference System and Datum (Lebanese Stereographic Projection).

The topographic plan shall show all natural and artificial features, landmarks, and existing site conditions.

Contours shall be generated at appropriate intervals to ensure an accurate representation of the terrain, and a Civil 3D Digital Elevation Model (DEM) shall be developed from the survey data.

The layout plan shall cover a corridor extending at least 20 m on each side of the proposed alignment (minimum corridor width of 40 m) and shall show all natural and artificial features within the surveyed area, including but not to be limited to, trees, rocks, existing facilities, corridors, asphalted and unpaved roads, tracks, lighting poles, electrical infrastructure, and other relevant elements. The aforementioned features shall be modeled in Civil 3D, with relevant linear features such as roads, retaining walls, channels, curbs, fences, and other terrain discontinuities represented as feature lines and incorporated as breaklines into the Civil 3D Surface/DTM to preserve the existing terrain geometry.

The Consultant shall prepare cross-sections at a scale of 1:100 along the proposed pipeline route at every significant change in terrain slope, land use, existing structures, utility crossings, or alignment. The spacing between consecutive cross-sections shall not exceed 5 m. Each cross-section shall be referenced by its corresponding chainage measured from the start of the longitudinal profile and shall extend at least 20 m on each side of the proposed pipeline alignment.

The topographic survey shall also include detailed topographic layout plans around special structures, such as valve chambers, pressure relief chambers, thrust blocks, support

structures, and other hydraulic appurtenances. These layout plans shall be prepared at a scale of 1:100, with contour intervals of 25 cm, and shall cover an area of not less than 0.5 ha, or as directed by the Green Plan technical team. The plans shall show all existing natural and artificial features, including trees, rocks, existing structures, springs, watercourses, irrigation channels, conveyance lines, paths, corridors, roads, manholes, water lines, retaining walls, transformers, fences, box culverts, overhead cables, visible underground utilities, telecom poles, septic tanks, wells, irrigation hydrants, water tanks, and any other relevant features.

c. Topographic site mapping for the area upstream of the lake:

The topographic survey shall also cover the potential water conveyance alignments from the springs and the primary and/or secondary watersheds contributing water to the hill lake. The layout plan shall be prepared at a scale of 1:5,000 or an appropriate larger scale, as required. Where available, the stream network shown on DAG 1:20,000 topographic maps or any other reliable source may be used as a basis, provided that the source is documented in the metadata.

The task shall include the preparation of a topographic layout plan and longitudinal profile for the proposed water conveyance alignment to the hill lake, at a horizontal scale of 1:1,000 and a vertical scale of 1:100, or as directed by Green Plan technical team. Permanent benchmarks shall be established on site using steel bars or reinforced concrete monuments, and their locations shall be agreed upon with the Green Plan technical team prior to installation.

In all cases, the final layout shall be verified through field survey. The longitudinal profile shall be prepared at a horizontal scale of 1:1,000 and a vertical scale of 1:100. Springs and primary and secondary watersheds shall be shown on separate layout plans using an appropriate base map and scale.

d. Topographic site mapping for the area downstream of the lake: water conveyance to beneficiary plots:

The topographic survey shall also cover the main pipeline conveying water from the hill lake to the irrigated plots. It shall identify the exact locations of the sub-main pipelines, outlets to the irrigated plots, hydraulic appurtenances, and any proposed pressure-reducing structures. The survey shall also determine the elevation differences between the lake outlet and the irrigated plots.

The layout plan shall be prepared at a scale of 1:1000. The longitudinal profile shall be prepared at a horizontal scale of 1:1000 and a vertical scale of 1:100.

Deliverables – Task 2: Topographic Report

The Consultant shall submit a Topographic Survey Report documenting the survey methodology, equipment used, survey control, data processing, QA/QC procedures, and survey results.

The report shall include all relevant topographic drawings, profiles, cross-sections, survey control documentation, digital survey files, CAD files, metadata, and other supporting documents required under this Task.

Annex A: Topographic layout plan of the hill lake, dam footprint and surrounding buffer zone in DWG, DXF, and Civil 3D formats, including the digitized official cadastral parcels (XREF/underlay), parcel numbers, and schedule of affected parcel areas.

Annex B: Longitudinal and transverse profiles of the hill lake.

Annex C: Layout plans and longitudinal profiles of the conveyance system from the springs and primary and/or secondary watersheds to the hill lake.

Annex D: Layout plans and longitudinal profiles of the conveyance system from the hill lake to the beneficiary plots.

Annex E: Cross-sections (scale 1:100) along the proposed pipelines and/or concrete canals upstream and downstream.

Annex F: Survey control documentation, including control point coordinates in CSV format (Point ID, Easting, Northing, Elevation, Description), GNSS static observation raw data, processing reports, datum information, traverse closure reports, least-squares adjustment reports, and levelling reports.

Annex G: Quality Assurance and Quality Control (QA/QC) documentation, including the survey methodology, equipment used, calibration certificates, network adjustment statistics, residual errors, traverse closures, levelling misclosures, GNSS processing summaries, and the accuracy assessment demonstrating compliance with the specified tolerances.

Annex H: Raw survey data and processing files, where UAVs, laser scanners, or other remote sensing technologies are used, including point clouds, orthophotos, DSM, DTM, camera calibration reports, Ground Control Point (GCP) reports, flight logs, and flight authorization records, where applicable.

Annex I: CAD layer naming convention.

Annex J: Metadata for all digital files, including the coordinate reference system, datum, projection, units, software version, and date of creation.

Task 3: Hydrological, Geological and Geotechnical Studies

Task 3.1: Preliminary hydrological study

A hydrological study of the site and the adjacent basins shall be carried out using all available data and 1:10,000 or 1:20,000 topographic maps to identify runoff and snowmelt flow paths, the boundaries of the contributing watersheds, groundwater flow conditions, and the location of nearby springs and streams.

The objective of this study is to estimate the volume of water that can be collected and conveyed to the hill lake, either directly or through suitable surface drainage works designed to harvest runoff that would otherwise not reach the lake.

As hill lakes are, in most cases, not located on natural watercourses, the study shall identify, based on the site's topographic conditions, the most suitable measures for harvesting and conveying runoff from the surrounding watershed to the lake.

The hydrological study of the drainage basin(s) contributing to the hill lake shall include the collection and analysis of the most recent and relevant climatic data, including rainfall, temperature, wind, and evaporation.

The study shall estimate surface water runoff based on annual and seasonal inflows for dry, average, and wet years, including a critical drought scenario.

The Consultant shall estimate flood flows for return periods of 5, 10, 20, and 50 years. The selected design flood shall be justified based on the lake size, embankment height, and downstream hazard classification. Return-period flood estimates shall be used for the

preliminary design of hydraulic structures and spillways, while reservoir yield and filling reliability shall be assessed through a continuous or seasonal water-balance analysis.

Hydrological calculations shall be carried out using recognized methods, such as empirical methods, the Rational Method, Gradex, synthetic hydrographs, and appropriate hydrological modelling software. More than one method shall be applied, where applicable, to verify the results and increase confidence in the adopted values.

Annotated 1:10,000 or 1:20,000 topographic maps shall be included in the study, showing the drainage basins, locations of streams and springs, and other relevant features.

The hydrological assessment shall cover the full contributing watersheds(s) to the proposed hill lake, as defined through topographic analysis and field verification, in order to calculate the runoff and inflows to be used in subsequent detailed studies, particularly for determining the available water quantities. The study shall also include an assessment of the flows of springs that may potentially contribute to the lake, including the identification of existing water rights associated with these springs and the most suitable potential conveyance routes within the public domain.

The Consultant shall review available historical records and conduct repeated flow measurements during the study period, where practicable, to assess seasonal variability. Where long-term data are unavailable, conservative assumptions and sensitivity analysis shall be applied. Existing studies shall also be reviewed, and available data may be collected from reliable local stakeholders, subject to confirmation and documentation of the source.

The hydrological study shall also assess sedimentation risks and propose appropriate mitigation measures, where required, to minimize sediment inflow and preserve the effective storage capacity of the hill lake.

Task 3.2: Preliminary geological study

The preliminary geological study shall include a geological survey and the preparation of a geological map at a scale of 1:1,000 covering the lake area, embankment and associated structures.

The preliminary geological study shall include at least two (2) geological cross-sections located along the most critical geological and engineering axis, including the deepest part of the proposed lake, the proposed embankment (dam) axis, suspected fault or karst zones, the spillway, the outlet works, and any unstable slopes.

These cross-sections and the geological plan shall identify and show all contacts points between permeable and impermeable strata, whether exposed or inferred, as well as faults, fractures, slopes, and all other relevant geological features necessary for the design and construction of the embankment and associated structures, based on the findings of the geotechnical investigations.

A preliminary geological report shall be prepared covering the proposed hill lake site, the contributing watershed(s) and the surrounding areas. The report shall document the geological investigations carried out in accordance with the geological plans referred to above.

The report shall include the following, but not be limited to:

- A description of the geological formations within the study area.
- A description and interpretation of the stratigraphy, geological layers, discontinuities (including joints and fractures), and geological structures, including faults, folds (anticlines and synclines), bedding orientation (dip and strike), stratigraphic sequence, and rock

hardness characteristics, together with the identification of any geological features that may affect the design and construction of the proposed hill lake.

- A description of the nature, condition, and characteristics of the geological strata, including their cohesion, together with the Consultant's interpretation, conclusions, and recommendations.

- A description of the geological investigation methodology adopted, including the justification of the type, locations, and depths of the proposed investigations at the dam site, lake area, surrounding areas, diversion works (where applicable), and the conveyance route between the diversion structure and the hill lake. The description shall also include the equipment used, the density and distribution of boreholes and other field investigations, and the proposed field investigation and laboratory testing programme, including the type, quantity, and quality of the tests to be carried out on the collected samples. The locations of the geological sections shall be identified in coordination with the GP engineer, who may request additional sections, where deemed necessary.

- The report shall not be limited to a descriptive presentation of the findings. The Consultant shall analyze and interpret the investigation results and provide conclusions and recommendations relevant to the design and construction of the proposed hill lake and its associated structures.

Task 3.3: Preliminary geotechnical survey

The preliminary geotechnical and hydrogeological study shall identify the geotechnical and mechanical characteristics of the foundation soils, fill materials, and potential construction materials, including the shear strength parameters required for stability calculations and assessments of excavations, embankments, and fills. The study shall also assess groundwater conditions, including groundwater levels, seasonal variations, springs, seepage zones, potential leakage paths, interactions with nearby wells or springs, and the suitability of the basin for lined or unlined storage. Particular attention shall be given to stability assessments, especially in cases involving deep excavations in hilly terrain.

Considering that the study may not proceed to the subsequent phase if the site is deemed unsuitable following the feasibility study, the geotechnical investigations required at this preliminary design stage shall be limited to the following:

1. A minimum of eight trial pits shall be excavated. The exact number and locations of the trial pits shall be defined in the specific ToR for each hill lake based on site conditions. The pits shall be distributed to adequately characterize the site, including at least two pits within the lake area along its axis and at least one pit along each relevant axis, in coordination with the GP Engineer.

2. Soil samples shall be collected from the above-mentioned trial pits and subjected to laboratory testing, including natural moisture content, grain size analysis, Atterberg limits, and Standard Proctor tests. Additional tests shall be performed where required, including permeability tests, soil classification, shear strength tests (triaxial and / or direct shear), consolidation/oedometer tests, SPT and/or pressure meter tests, chemical / aggressivity tests, and clay liner suitability tests. The final testing programme shall be determined based on site conditions and the requirements of the GP Engineer.

If the site is selected and deemed suitable, additional geotechnical investigations may be carried out during the detailed design phase, where necessary.

The Consultant shall prepare a preliminary geotechnical report including, but not limited to, the following:

- A summary of the geotechnical investigations carried out and the main findings, with particular attention to issues affecting the stability of excavations.
- Technical justification for the recommended type of hill lake (excavation or fill) considered the most suitable for the site conditions.
- Preliminary sketches for the proposed fill (including material composition, slopes, cutoff trench, stripping, and other relevant features) and excavation (including slopes, protection measures, and measures to enhance stability).
- A plan-view map showing the limits of the proposed hill lake with the locations of the trial pits superimposed on the proposed hill lake layout.
- Trial pit logs.
- Preliminary slope stability analyses for critical excavation and fill sections, including preliminary seepage assessment, settlement risk, and foundation preparation requirements.
- An assessment of the suitability of excavated materials for reuse and recommendations for any additional investigations required prior to the detailed design stage.
- The report shall not be limited to a descriptive presentation of the findings. The Consultant shall analyze and interpret the results and provide recommendations relevant to the design and construction of the hill lake.

Deliverables – Task 3: Hydrological, Geological and Geotechnical Studies comprising:

D 3.1 Preliminary hydrological study (layouts including)

D 3.2 Preliminary geological study (layouts including)

D 3.3 Preliminary geotechnical study (layouts including)

Task 4: Feasibility Study

The locations of the proposed hill lakes will be selected based on identified beneficiary needs and a preliminary assessment undertaken by the Green Plan. The Consultant shall carry out a feasibility study for each proposed hill lake to assess its overall viability, validate the proposed site, determine the optimal storage capacity, identify the most appropriate technical and engineering solution, and assess the environmental and social constraints and risks associated with the proposed development, based on the findings of the preceding studies.

The feasibility study shall cover, among others:

- Confirmation of the proposed site selection;
- Determination of the optimal lake size and location;
- Identification of the appropriate construction method, including excavation, dike/embankment, and lining;
- Identification of the required appurtenances and other associated structures;
- Preliminary environmental and social review of the proposed site to identify any environmental and social constraints associated with the proposed development; and
- Preliminary environmental and social risk classification of the proposed subproject in accordance with the GATE Project Environmental and Social Management Framework (ESMF) and the applicable World Bank Environmental and Social Standards (ESSs).

The objective of this study is, first and foremost, to enable the Green Plan to assess the overall technical and economic viability of each proposed hill lake and determine whether the project should proceed. Where the proposed hill lake is considered viable, the study shall enable the Green Plan to confirm the proposed site, determine the optimal lake size and storage capacity, identify the most appropriate technical and engineering solution, and establish the associated investment requirements, taking into account the environmental and social constraints and risks identified through the preliminary environmental and social review.

The Consultant shall assess the investment costs, operation and maintenance costs, costs associated with increased agricultural production, and other potential economic benefits. The Consultant shall apply recognized engineering economic analysis methods to evaluate the project, including the calculation of the Internal Rate of Return (IRR), based on an appropriate discount rate and payback period.

The Consultant shall consider all relevant factors, particularly topographical, geological, hydrological, environmental and social conditions, and shall develop and compare alternative technical scenarios. These alternatives may include, for example, a single larger lake requiring deeper excavation versus two or three smaller lakes providing the same total storage capacity with lower excavation depths, in order to identify the most technically and economically appropriate solution.

In order to optimize the final construction cost of the hill lake, and considering the high cost of geomembrane lining, the Consultant shall consider and evaluate all feasible waterproofing solutions, including clay lining and geomembrane lining. All technically viable waterproofing alternatives shall be studied with the objective of minimizing, as far as possible, the overall construction cost of the hill lake while ensuring adequate water retention performance and taking into consideration relevant environmental and social constraints and risks.

The study shall include a detailed cost estimate for each alternative to allow a comprehensive technical, economic, environmental, and social comparison and enable the Green Plan to select the most appropriate and cost-effective solution.

The Consultant shall conduct an agro-economic study to analyze the different options for the efficient use of the additional water resources made available by the hill lake. This study shall assess, among others, options such as increasing water availability for currently irrigated plots, modifying existing cropping patterns, and expanding the cultivated area through the use of additional available water. The assessment shall also consider the risks to agricultural production under drought conditions and the potential environmental and social implications of the different options.

The different options for allocating and distributing the available water from the hill lake shall be studied in coordination with the Green Plan and the Water Users Association, taking into consideration equitable and sustainable water distribution among beneficiaries, as well as relevant environmental and social considerations.

Deliverables – Task 4: Feasibility Study Report for the Hill Lake.

Task 5: Preliminary Design Report

The Preliminary Design Report shall consolidate the reports prepared under the preceding tasks and shall incorporate the comments and recommendations provided by the Green Plan. The report shall include a layout plan, prepared at a scale of 1:1,000, incorporating the

findings of the preceding studies and showing the proposed hill lake, associated structures, auxiliary facilities, and irrigation network.

In addition, the Preliminary Design Report shall comprise, but not be limited to, the following:

1. A preliminary report presenting the initial calculations and assessment of the stability of the dam embankment.
2. The plans and technical specifications relevant to the drainage structures of the foundation, the earth dam body, and the area in front of the dam, in addition to the inlet and upstream conveyance system, sediment-control structure, siphon system, reinforced-concrete outlet reservoir/chamber, emergency overflow, energy dissipation structures, safe downstream spillway route, access road, fencing, safety provisions, erosion protection measures, and the main irrigation network, where applicable.
3. The plans and technical specifications relevant to the prevention and control of seepage and leakage, including measures to ensure the watertightness and stability of the lake.
4. The plans and technical specifications relevant to the lake and the surrounding slopes.
5. The plans and technical specifications relevant to the outlet works and bottom washout facilities.
6. The plans and technical specifications relevant to the spillway.
7. Bills of Quantities (BoQs) and preliminary cost estimates for all the above-mentioned structures and works.
8. A technical risk register identifying, at a minimum, hydrological uncertainty, seepage and leakage risks, karst conditions, slope instability, unsuitable foundation conditions, sedimentation, flood and spillway risks, constructability constraints, access difficulties, material availability, and required mitigation measures and/or further investigations.

The above-mentioned components of the Preliminary Design Report shall provide sufficient engineering details to enable the assessment of the embankment stability, determination of the required works, identification of potential risks and constraints, and preparation of a reliable preliminary cost estimate.

Deliverable – Task 5: Preliminary Design Report

Task 6: Preparation of Environmental and Social Screening Application

Upon approval by the Green Plan of the feasibility study under Case 1, the Consultant shall undertake the environmental and social screening in accordance with Lebanese Ministry of Environment (MoE) Decree No. 8633 dated 16 August 2012 and the World Bank Environmental and Social Framework (ESF).

The Consultant shall be responsible for the technical and administrative coordination and follow-up with E&S specialist of the GATE Project and the MoE throughout the screening process.

The Consultant shall carry out, at a minimum, the following activities:

- Prepare the Environmental Screening Application in accordance with the requirements of the MoE, including all supporting documents required under Decree No. 8633/2012, and submit it to Green Plan for review and approval;

- Follow up on the submission of the Environmental Screening Application to the MoE, including addressing comments and providing any additional information or revisions required, until the MoE issues its screening decision.

Deliverable Task 6: A Complete Environmental Screening Application

2. Phase Two: Preparation of Environmental and Social Impact Assessment, Detailed Design of the Hill Lakes and Tender documents

This phase is intended to complete the study and detailed design of the variant selected by Green Plan at the end of Phase One and to prepare all technical documents, calculations and drawings required for the tendering, construction, control and supervision of the Works.

It shall include the preparation of the full ESIA, ESMP and any other required environmental and social instruments in accordance with Lebanese Decree No. 8633/2012, the World Bank ESF and the Project ESMF. The findings and mitigation measures arising from these instruments shall be incorporated into the detailed engineering design and tender documents.

The Consultant shall also prepare the complete tender documents, including technical specifications, Bills of Quantities, drawings and applicable ESHS requirements, and provide technical assistance during the tendering and bid evaluation process.

A. Preparation of Detailed Design Works

A. Detailed Engineering Design

The Consultant shall prepare the detailed design for the feasible hill lake selected by Green Plan at the end of the first phase, including all technical documents, design calculations and drawings necessary to define the Works and subsequently prepare the tender documents for their construction.

The Consultant shall carry out the detailed design of the Lake at the selected site, based on the on the dimensions and elevations established during the first phase and approved by Green Plan. The drawings shall be sufficiently detailed to define, without ambiguity, the Works to be executed, including, in particular, the excavations, fills, concrete structures, spillway, inlet structure and all components of the irrigation network.

The detailed engineering design shall take into account the findings and recommendations of the geotechnical investigations and other technical studies undertaken for the project, including, but not limited to, the stability of the dam, lake slopes, excavations and fills; impermeability and seepage control of the lake, dam and associated structures; seismic resistance; hydrological safety, flood routing, freeboard and spillway capacity; settlement of the dam, foundation and structures; durability and structural safety; constructability and temporary works; operation and maintenance; access; and public and animal safety.

The Consultant shall be responsible for the completeness, accuracy, and technical adequacy of the detailed design, design calculations, drawings, specifications, and other design documents prepared under this assignment. The Consultant shall ensure that the design is suitable for the intended purpose and complies with the applicable technical, environmental, social, health and safety requirements and approved project parameters.

Task 1: Detailed Geotechnical Investigations and Geotechnical Study

The Consultant shall complete the geotechnical study of the site and lake, taking into account the findings of the preliminary geotechnical investigations. The Consultant shall provide the

necessary site access, water supply, field measurements and daily records, and shall mobilize, install and relocate the sounding equipment as required for the investigation.

The Consultant shall carry out vertical and inclined soundings to depths of up to 10 m, with recovery of samples of a minimum 50 mm diameter, together with the required Lejeune or Lefranc permeability tests and SPT or Ménard mechanical tests. The number and location of soundings shall be determined according to the lake area and site conditions.

The Consultant shall also carry out physical and mechanical laboratory testing on representative samples, including samples from soft foundation layers, areas requiring waterproofing treatment and areas requiring slope-stability assessment, and shall analyze the results and provide the corresponding geotechnical recommendations.

The laboratory testing shall include, as applicable:

a. Physical laboratory tests: Specific weight, specific dry weight, natural water content, soil texture including granulometric and sedimentometric analysis, soil classification, permeability, consolidation (oedometer), chemical aggressivity, clay linear suitability, Atterberg limits, and Proctor compaction tests.

b. Mechanical laboratory tests: Shear strength tests (Cisaillement) – تجارب القص على العينات, triaxial compression tests (Triaxial) – تجارب الضغط الثلاثي الأبعاد على العينات المستخرجة, and oedometer tests (Essai Oedometrique) – تجربة الضغط على العينات المستخرجة.

The Consultant shall determine the applicability, type and number of each investigation and laboratory test based on the encountered soil conditions and the requirements of the detailed design, while ensuring that the specified minimum number of samples is tested.

The Consultant shall carry out additional boreholes where required by the site conditions, including at high embankments, weak or compressible soils, groundwater, suspected karst or fractures, rock foundations, unstable slopes, spillway and outlet structures, and other critical or complex geotechnical locations. The Consultant shall determine the need for supplementary sampling and laboratory testing based on the investigation findings.

The Consultant shall determine the required dimensions and slopes of excavations and fills according to the nature and compactness of the soils, and shall establish the geotechnical characteristics required for the detailed design, including soil identification, physical and compaction characteristics, shear strength, compressibility where necessary, and permeability.

The Consultant shall determine the appropriate waterproofing/seepage-control system for the lake and shall establish the required stability calculations for fills and excavations, together with the hydraulic calculations and design analyses for the proposed hydraulic structures, including the inlet, pipe or siphon and spillway. The Consultant shall clearly state the assumptions and calculation methods adopted.

The Consultant shall analyze the investigation results and identify potential geotechnical problems, treatment measures and solutions, including soil treatment and compaction requirements and potential borrow-material sources within a radius of 50 km, with assessment of available quantities, required volumes, unit costs and compaction requirements. The Consultant shall select the lake lining/seepage-control system through a technical and whole-life-cost comparison of compacted clay, HDPE geomembrane and other technically viable alternatives, considering permeability, material availability, quality control, constructability, durability, settlement tolerance, leakage risk, maintenance, protection requirements and expected service life

Deliverable – Task 1: A Geotechnical Report

The Geotechnical report shall contain all geotechnical information gathered from the in-situ and laboratory investigations undertaken for both the preliminary and detailed design, together with the results and findings of the geological studies, geotechnical investigations, surface excavations and soil testing.

The report shall include a plan showing the limits of the lake and the locations of test pits and boreholes; borehole and test-pit logs; a summary of the investigations and findings; complete soil classification, mechanical and water-pressure test results; records of difficulties encountered during the investigations; water-level records; descriptions of soil layers encountered in longitudinal trenches; and laboratory test graphs and results certified by the responsible laboratory.

Based on the investigation findings, the report shall also contain the revised geological interpretation, plans, profiles and sections identifying the surface and deep boundaries between permeable and impermeable layers and their characteristics, the thickness and properties of impermeable layers, suitable areas for the construction of auxiliary structures, slope stability conditions around the lake, the quality and thickness of potential borrow-material layers, and the ground conditions at the dam location, together with relevant observations and recommendations.

The report shall form an integral part of the detailed design and shall subsequently be incorporated into the tender documents, given the importance of the geotechnical conditions and investigation results to the implementation of the Works.

Task 2: Detailed Engineering Design Works

The Consultant shall carry out all studies, analyses and design activities necessary to complete the detailed engineering design of the selected hill lake and associated Works. The Consultant shall, in particular:

- Carry out the engineering, foundation and structural studies of the dam and associated structures.
- Design the dam and its associated auxiliary structures, including the overflow structure, spillway, siphon or outlet system, reinforced-concrete outlet reservoir, washout systems, inlet, mechanical room, distribution chamber, valves, air-release devices, control chambers, thrust blocks, pipe supports and other required structures.
- Determine the excavation requirements, embankment materials and their sources, dam geometry, slopes and waterproofing arrangements.
- Design the drainage and seepage-control systems beneath and around the dam according to the geological and geotechnical conditions.
- Assess the stability of the dam and adjacent slopes, including under seismic conditions, and address unstable and permeable areas.
- Assess potential flood risks and incorporate the required hydraulic safety measures.
- Address, where applicable, high-altitude, snow and ice conditions and associated risks, including snowmelt, freeze-thaw effects, seasonal access limitations, erosion during thawing and slope instability.
- Design the lake waterproofing system, including the HDPE geomembrane system where selected, together with the associated installation and quality-control requirements.

- Define the conveyance and distribution network and the locations of users.
- Assess and, where justified, design wildlife platforms, animal watering facilities, green belts and human and animal safety measures.
- Establish the construction phases and implementation programme, including the proposed construction sequence and estimated durations.
- Prepare the complete detailed engineering design necessary for the implementation of the Works.

Deliverables – Task 2: Detailed Design Report and Design Package

At the end of this phase, the Consultant shall submit a detailed design report and associated design package containing the outputs of the studies, analyses and design activities under Task 2. The package shall include, but not be limited to:

1. Detailed Design Report

□ Presenting the design basis, site conditions, design criteria, proposed engineering solutions and their technical justification, including:

- Topography, climatology, hydrology, geology and geotechnical conditions.
- Site selection and justification.
- Lake closure/embankment, waterproofing and foundation treatment.
- Inlet, spillway, outlet, washouts and associated structures.
- Conveyance and irrigation/distribution network.
- Applicable environmental, wildlife and safety measures.

2. Design Calculation Notes

- Providing the calculations supporting the adopted design, including hydrological, hydraulic, structural, geotechnical, stability, seismic, seepage, drainage and waterproofing calculations, as applicable. The notes shall state the assumptions, design standards, input data, return periods, safety factors, software used and final adopted design values.

3. Construction Drawings

Complete drawings, sufficiently detailed for direct use in construction, including:

- Hill lake layout, excavation and fill limits and setting-out information.
- Dam, lake closure/embankment and foundation plans, sections and details.
- Inlet, spillway, outlet, washouts and auxiliary structures.
- Conveyance and irrigation/distribution network.
- Waterproofing/HDPE geomembrane details, where applicable.
- Applicable environmental, wildlife and safety details.

4. Technical Specifications

Project-specific requirements for materials, workmanship, construction, excavation and fill, waterproofing/geomembrane installation, welding, testing, quality assurance and other applicable technical requirements.

5. Bill of Quantities and Cost Estimate

Detailed Bill of Quantities and Price Breakdown/Cost Estimate covering all Works required for implementation.

6. Construction Work Programme

Work Programme presenting the construction phases, sequence and estimated durations, with the necessary justification of the proposed construction sequence.

Task 3: Design Report on the inlet structure (Where applicable)

A. Site Investigation and Data Collection

The Consultant shall:

- Conduct a site investigation to determine the most suitable intake location, considering runoff, springs and snowmelt collection, intake or diversion structures, sediment exclusion, conveyance pipes or channels, inlet erosion protection, energy dissipation, isolation, and maintenance requirements;
- Undertake the necessary geotechnical investigations to assess soil permeability and foundation conditions, including their implications for the feasibility and selection of lakeshore or offshore intake structures.

B. Hydraulic Design and Analysis

The Consultant shall:

- Determine the required intake capacity based on the project's long-term water requirements, including appropriate allowances for future expansion or increased demand;
- Design the intake to enable selection of the best available water quality, taking into consideration seasonal variations and operating conditions;
- Perform the necessary hydraulic calculations to ensure adequate intake capacity, flow conditions, velocities, head losses, and overall hydraulic performance.

C. Structural and Operational Design

The Consultant shall:

- Design appropriate energy dissipation measures at the inlet to prevent localized scour and erosion;
- Prepare the intake design and the relevant layout, showing the water source, intake structure, conveyance system, inlet structure, connection to the lake, and associated structures.
- Incorporate appropriate measures for backflow prevention to prevent contaminated or foreign water from re-entering the lake.

D. Construction Methodology

The Consultant shall:

- Propose a construction methodology that ensures safe execution of the works and minimizes impacts on the lake water quality. Where applicable, this may include the use of temporary bunds to isolate the work area from the lake and prevent sediment and turbidity from entering the main water body.

Deliverable – Task 3: Design Report of the Inlet Structure

Task 4: Design of the Conveyance Pipe from the Hill Lake to the Users

Task 4.1: Design of the conveyance pipe from the hill lake to the users

The Consultant shall:

- Carry out the detailed design, studies and hydraulic calculations for the irrigation network conveying water from the hill lake to the end users, based on farm drip or mini-sprayer irrigation systems. The primary network shall be designed for underground installation, where applicable.
- Design the main irrigation distribution system, including all transmission pipelines, mainlines, hydrants, flow-control devices, valves, appurtenances and associated hydraulic structures required for the efficient operation of the irrigation scheme.
- Develop the irrigation operation strategy, including irrigation calendars, operating hours, irrigation rotation schedules, service zones, hydrant operating sequences, simultaneity assumptions, diversity factors and peak-demand scenarios, and determine the appropriate hydraulic design and network capacity accordingly.
- Coordinate the irrigation network capacity with the available water resources, taking into account usable reservoir storage, seasonal inflows, environmental and operational drawdown limits, outlet works capacity, conveyance constraints, irrigation scheduling and projected irrigation demand throughout the irrigation season.
- Establish the design arrangements required to achieve equitable water distribution, including discharge allocation to hydrants, operating pressure requirements, allowable pressure variations, flow measurement and operational control mechanisms, taking into account the approved irrigation schedule.

Deliverable – Task 4.1: Design of the Conveyance Pipe from the Hill lake to the Users

The Consultant shall submit a complete irrigation network design package comprising the detailed network drawings and supporting design documentation, hydraulic calculations and hydraulic model, including model files, outputs and network simulation results, irrigation demand assessment, irrigation operation strategy, water resources and network capacity assessment, water distribution and performance assessment, and a consolidated detailed irrigation network design report presenting the design basis, analyses, calculations, modelling results and conclusions of the assignment.

Task 4.2 Pipeline route selection and layout

4.2.1 Route selection criteria

The Consultant shall select the pipeline route in coordination with the GP Engineer based on:

- Avoidance of sensitive environmental areas, including wetlands, springs, forests, and other environmentally sensitive areas.
- Crossing requirements, including roads, watercourses, existing infrastructure, and other obstacles.

- Minimization of physical disturbance to agricultural land, crops, and existing land use, and minimization of impacts on landowners, land users, farmers, and other affected persons.

- Land ownership, cadastral verification, and access rights. The Consultant shall verify land ownership through official cadastral records, prepare cadastral mapping of all proposed facilities and pipeline routes, identify all required rights-of-way and easements, confirm legal access for construction and future operation and maintenance, and obtain written confirmation, where required, of route availability from the relevant authorities and/or landowners before finalizing the design.

The Consultant shall consider topographic, hydraulic, environmental, social, technical, construction, operation and maintenance, and cost considerations in selecting and optimizing the pipeline route

4.2.2 Network layout

The Consultant shall prepare a detailed network layout plan showing:

- Alignment of the main transmission line from the lake outlet and the distribution pipelines serving the irrigation areas.

- Position of each hydrant point with a unique identification number.

- Location of all control, isolation, air-release, washout/drain, and pressure-regulation valves and stations.

- Location of filtration units and flow and pressure monitoring devices forming part of the irrigation network.

- Location of any pressure-break tanks, chambers, thrust blocks, and other special structures required by the design.

Hydrant identification and service definition: Each hydrant shall be assigned a unique identification number, and its design documentation shall specify the design flow rate, minimum operating pressure, service area, associated beneficiary(ies), and designated irrigation/operating zone, with clear linkage to the corresponding cadastral plots and irrigation schedule.

4.2.3 Hydraulic design

a) Design flow requirements

The Consultant shall determine the design flow requirements of the irrigation network based on the identified irrigation demand, crop water requirements, irrigation areas, irrigation scheduling, system efficiency, and the proposed method of water distribution and application.

The Consultant shall establish the design flows for the main transmission pipeline, distribution pipelines, and individual hydrants, taking into account the operational requirements and the proposed irrigation schedule.

b) Hydraulic Calculations and Network Analysis

The Consultant shall be responsible for carrying out all necessary hydraulic calculations to ensure the proper design and functionality, and operational reliability of the irrigation system. This shall include but not limited to:

- Flow rate estimation based on crop water requirements and system efficiency.

- Assessment of head losses in pipelines, including both friction and minor losses.

- Pipe sizing that balances technical performance with economic feasibility.
- Network analysis to verify pressures and flows across the system using appropriate hydraulic modeling tools.

The Consultant shall ensure that all calculations are consistent with recognized engineering standards and best practices, and that results are clearly documented to support design decisions.

c) Pipe Sizing

The Consultant shall determine the appropriate pipe diameters for all sections of the irrigation network based on the hydraulic calculations and network analysis, taking into account the required flow rates, velocities, pressure conditions, head losses, and overall system performance.

The Consultant shall document the selected diameters and associated flow rates, velocities, and pressure ratings in a general pipe sizing schedule consistent with the design requirements and good engineering practice.

4.2.4 Pipe materials and specifications

The Consultant shall select the most appropriate pipe material for each section of the irrigation network based on hydraulic, structural, operational, environmental, and life-cycle performance requirements.

Material selection shall consider, as applicable, operating pressure, surge conditions, external loading, ground conditions, exposed crossings, structural supports, constructability, durability, corrosion resistance, maintenance requirements, and whole-life cost.

The Consultant shall provide a technical justification for the selected pipe material for each pipeline section and demonstrate its compliance with the applicable international standards.

e) Network Appurtenances

The Consultant shall specify, size, locate, and integrate all necessary appurtenances forming part of the irrigation network, including:

- Valves for isolation, control, and pressure regulation: Appropriate types, sizes, pressure ratings, and locations required for the safe, reliable, and efficient operation of the irrigation network.
- Filtration units: Filtration units forming part of the irrigation network, based on the water quality characteristics and the requirements of the downstream irrigation system. The appropriate filtration type, capacity, filtration level, configuration, location, backwashing arrangements, and operational and maintenance requirements shall be determined, ensuring that the filtration units are hydraulically compatible with the irrigation network.
- Hydrants: Hydrants at farmer plot boundaries, with adequate spacing, accessibility, hydraulic performance, and suitability for the intended irrigation operation.
- Flow and pressure monitoring devices: Appropriate devices required to monitor network performance and operational reliability.
- Thrust blocks and structural supports: Structural measures required at critical points of the pipeline.
- Washout and air-release valves: Appropriate locations, types, and sizes based on the hydraulic analysis and pipeline profile.

The Consultant shall ensure that all appurtenances are appropriately sized, hydraulically compatible with the irrigation network, accessible for operation and maintenance, and fully integrated into the overall design.

4.2.5 Underground installation

The Consultant shall define general trenching, bedding, installation, and backfilling requirements to ensure safe and durable pipe laying, consistent with international best practices. Special provisions shall be made for road crossings, watercourse crossings, and other critical structures.

4.2.6 Special structures

Where required based on the hydraulic and topographic conditions, the Consultant shall propose and design special structures such as pressure-break tanks, air-valve chambers, and other structures necessary to ensure the safe and reliable operation of the irrigation network

4.2.7 Drawings required

The Consultant shall prepare all detailed drawings required for the primary irrigation network, including, but not limited to, network layouts, hydraulic zoning plans, longitudinal profiles, typical cross-sections, hydrants, valve chambers, thrust blocks, filtration and pressure regulation facilities, road and watercourse crossings, pipe supports and anchoring, joints, washouts and drainage, pressure-break tanks, pumping stations where applicable, and pipeline marking and identification.

The Consultant shall also prepare the corresponding pipe and valve schedules, cadastral and easement plans, and other drawings and schedules necessary to clearly define the irrigation network, its components and associated works.

All drawings and spatial data shall be provided in CAD format (AutoCAD 2018 or later) and PDF format and shall use the National Official Grid (Stereographic) Reference System, which shall be clearly identified on every drawing.

4.2.8 Technical specifications required

The Consultant shall prepare the following technical specifications for inclusion in the tender documents:

The technical specifications shall include, but not be limited to, general requirements and scope of work, HDPE pipes – materials and manufacturing, ductile iron pipes – materials and manufacturing where applicable, pipe fittings and joints, valves and appurtenances, filtration units, pressure regulators and flow meters, trench excavation and bedding, pipe installation, backfilling and compaction, road and watercourse crossings, hydrant installation, valve chambers and structures, thrust blocks and anchoring, pipeline marking and identification, testing and commissioning requirements, and quality assurance and quality control requirements.

The Consultant shall prepare the testing and commissioning requirements for the Works, defining the tests to be carried out, applicable testing procedures and standards, testing frequency, acceptance criteria, and the documentation and certificates required for acceptance of the Works.

The Consultant shall prepare the quality assurance and quality control requirements for the Works, defining the required inspections, material approval and certification procedures, inspection and testing plans, quality control procedures, non-conformity and corrective action procedures, and the quality records and documentation to be maintained by the Contractor.

Deliverable – Task 4.2: Primary Irrigation Network Design Package

The Design Package shall include the overall network layout showing all pipelines, hydrants, valves, filtration units, and other network structures; detailed alignment plans and longitudinal profiles for all pipeline routes; and the relevant cadastral information and identification of the plots and beneficiaries served by the network.

The Design Package shall also include the hydraulic design report, comprising the design criteria and assumptions, flow rate calculations, head-loss calculations, pipe sizing and sizing schedules, and network analysis results showing pressures and flows across the system.

The Design Package shall further include the technical specifications for the materials, equipment, and installation works; detailed construction drawings in CAD and PDF formats, as listed in Section 2.3.8; and priced and unpriced Bills of Quantities for the primary irrigation network. The Consultant shall also prepare an Operation and Maintenance Manual covering the primary irrigation network and its appurtenances.

The approved network layout, alignment plans, longitudinal profiles, detailed drawings, technical specifications, and unpriced BOQ shall be incorporated, as applicable, into the Tender Documents for the Works.

Task 5: Environmental and Social Impact Assessment (ESIA)

5.1 The objectives of the ESIA are to:

- Identify and assess the potential environmental and social risks and impacts associated with the Project, taking into account the Project's location, design, construction, operation, and relevant alternatives.
- Establish the environmental and social baseline conditions of the Project area and identify sensitive environmental and social receptors.
- Identify the applicable environmental and social requirements, including the World Bank Environmental and Social Framework (ESF) and applicable Lebanese legislation and regulatory requirements.
- Identify and assess the potential direct, indirect, cumulative, and residual environmental and social risks and impacts of the Project.
- Consult relevant stakeholders and incorporate relevant local knowledge, concerns, and site-specific information into the environmental and social assessment, as appropriate.
- Develop appropriate measures to avoid, minimize, mitigate, and manage identified environmental and social risks and impacts, including the preparation of the Environmental and Social Management Plan (ESMP).
- Define the environmental and social monitoring and reporting requirements necessary to assess the effectiveness of the proposed mitigation and management measures.
- Identify any remaining environmental and social risks and impacts and provide clear conclusions and recommendations to inform the Project's design, implementation, and environmental and social management.
- Identify and assess potential environmental and social risks and impacts associated with the Hill Lake subprojects taking into account the Project's location, design, construction, operation, and relevant alternatives.

- Conduct a rigorous review of site selection and conceptual designs to ensure environmental and social viability;
- Analyze feasible alternatives, including site location, technical design, and construction methodologies;
- Define specific mitigation and monitoring measures to manage identified risks following the mitigation hierarchy;
- Ensure full compliance with Lebanese regulatory requirements and the World Bank Environmental and Social Standards (ESSs);
- Conduct meaningful, inclusive stakeholder engagement and consultation activities;
- Prepare a detailed ESMP that includes clear institutional responsibilities and measurable performance indicators.

5.2 Applicable standards and requirements

- a) The Consultant shall ensure that the ESIA complies with all applicable Lebanese laws and regulations, including Lebanese Decree No. 8633/2012, and is prepared in accordance with ESS1 and the applicable requirements of the other relevant World Bank Environmental and Social Standards (ESSs), as well as the applicable World Bank Group Environmental, Health, and Safety (EHS) Guidelines;
- b) The Consultant shall ensure consistency with the applicable requirements and commitments set out in the GATE Project environmental and social instruments, including the Environmental and Social Management Framework (ESMF), Stakeholder Engagement Plan (SEP), Labor Management Procedures (LMP), Resettlement Policy Framework (RPF), and Environmental and Social Commitment Plan (ESCP), as applicable;
- c) The Consultant shall apply Good International Industry Practice (GIIP), including relevant internationally recognized technical standards and practices applicable to the Project.

5.3 ESIA preparation

Following the environmental screening process, the Ministry of Environment (MoE) will determine whether an ESIA or IEE is required. In either case, the Consultant shall prepare the required assessment in accordance with the Lebanese Decree No. 8633/2012, the World Bank Environmental and Social Framework (ESF), and the requirements of the Terms of Reference.

Where the Ministry of Environment (MoE) determines that an ESIA is required, the Consultant shall, as part of the ESIA process, first prepare the Scoping Report in accordance with Decree No. 8633/2012. The Scoping Report requirement therefore applies specifically to the ESIA scenario and it is not intended as a separate or duplicate requirement. The Consultant shall be responsible for all technical and administrative coordination with, and follow-up before, the Ministry of Environment throughout the scoping and ESIA review process.

The Consultant shall – in coordination of the E&S specialists of the Project, undertake the following tasks for the preparation and completion of the ESIA:

- a) Review the applicable legal, institutional, and regulatory frameworks, including Lebanese EIA Decree No. 8633/2012 and the applicable requirements of the World Bank Environmental and Social Framework (ESF);

- c) Prepare a detailed description of the Project and its main components, including the hill lakes, associated embankments or retaining structures, water sources and catchments, conveyance systems, and auxiliary infrastructure;
- d) Establish the environmental baseline conditions relevant to the Project, including climate, soil conditions, geology, hydrology, hydrogeology, biodiversity, air quality, noise, and existing water quality conditions;
- e) Establish the social baseline conditions relevant to the Project, including demographics, livelihoods, land use, vulnerable groups, agricultural activities, cultural heritage, and community infrastructure;
- f) Assess feasible alternatives, including site, design, and construction methodology alternatives, as well as the no-project alternative;
- g) Identify and assess the environmental and social risks and impacts associated with the Project throughout its life cycle, including throughout its life cycle, including construction and operation phases, and assess direct, indirect, and cumulative impacts, as applicable;
- h) Assess climate change risks, water resource sustainability, water quality, sedimentation, and potential inundation and flood risks associated with the Project;
- i) Undertake stakeholder engagement and consultation activities in accordance with applicable Lebanese legislation, ESS10, and the GATE Stakeholder Engagement Plan (SEP), and incorporate relevant stakeholder concerns, recommendations, and site-specific information into the ESIA, as appropriate;
- j) Assess occupational health and safety risks and labor management issues in accordance with applicable Lebanese legislation and ESS2, and assess community health and safety risks in accordance with applicable Lebanese legislation and ESS4;
- k) Assess project-related Sexual Exploitation and Abuse and Sexual Harassment (SEA/SH) risks, including consultation with women and vulnerable groups, mapping of available GBV service providers and referral pathways, and preparation of proportionate SEA/SH prevention and response measures in accordance with applicable Lebanese legislation and the relevant requirements of the World Bank Environmental and Social Framework, including ESS2, ESS4, and ESS10. Where the SEA/SH risk assessment identifies elevated risks, the Consultant shall recommend appropriate institutional arrangements, including specialized GBV/SEA/SH expertise or referral service providers, as necessary for the effective implementation of the proposed mitigation measures;
- l) Identify appropriate measures to avoid, minimize, mitigate, and manage the identified environmental and social risks and impacts, including the identification and assessment of any significant residual risks and impacts;
- m) Prepare the Environmental and Social Management Plan (ESMP) as an integral component of the ESIA, including mitigation measures, monitoring requirements, institutional responsibilities, reporting requirements, emergency preparedness and response measures, implementation costs and recommendations for incorporation of Environmental, Social, Health and Safety (ESHS) requirements, including SEA/SH prevention and response measures, into the works bidding and contract documents;
- n) Prepare an environmental and social monitoring program defining the monitoring parameters, locations, frequency, responsibilities, reporting requirements, and corrective action arrangements necessary to assess the effectiveness of the proposed mitigation and management measures;

o) Prepare the ESIA conclusions and recommendations, including the key findings of the assessment, significant residual risks and impacts, and the measures required for the effective environmental and social management of the Project.

5.4 Stakeholder engagement and consultation

The Consultant shall carry out stakeholder engagement activities as an integral part of the Hill Lakes Project ESIA process, in accordance with ESS10, the GATE Project Stakeholder Engagement Plan (SEP), and the applicable requirements of Lebanese Decree No. 8633/2012.

The Consultant shall do, at minimum, the following tasks:

- Identify all relevant stakeholders, including affected communities, municipalities, farmers, land and water users, women, vulnerable and disadvantaged groups, local organizations, relevant governmental entities, and other interested parties.
- Planning, prepare, conduct, facilitation, document and reporting of stakeholder engagement activities under the ESIA process, in close coordination with the Green Plan Project Management Unit (PMU) Environmental and Social (E&S) specialists.
- Develop jointly the consultation content, agendas, and materials with them and submit the relevant consultation arrangements and materials to them for review and approval prior to the meetings.
- Prepare a Stakeholder Engagement Plan for the ESIA, where required.
- Ensure that stakeholder engagement activities are conducted in an inclusive, culturally appropriate, and gender-sensitive manner, providing women, vulnerable and disadvantaged groups, and other stakeholders with safe, confidential, and meaningful opportunities to participate.
- Ensure that the Project Grievance Mechanism (GM), including available reporting channels and complaint procedures and, where appropriate, confidential reporting and referral arrangements for SEA/SH-related complaints, is communicated to stakeholders during consultations.
- Maintain detailed consultation records, including attendance sheets, disaggregated by gender where feasible, minutes of meetings, photographs, comments received, and responses provided.
- Document the consultation feedback loop, demonstrating how stakeholder comments, concerns, and recommendations were considered and, where technically and economically feasible, incorporated into the project design, impact assessment, mitigation measures, or ESMP. Any feedback not incorporated shall be recorded together with the reasons for its non-incorporation.
- Transmit to the Green Plan a written record of relevant consultation findings, including stakeholder comments, concerns, recommendations, and relevant site-specific information, so that the engineering design may be reviewed and adjusted accordingly, where technically and economically feasible. Any consultation input that cannot be incorporated into the design shall be recorded, together with the reasons, in the consultation feedback-loop documentation submitted with the Draft and Final ESIA Reports.

All deliverables prepared under this process, including the Scoping Report, where applicable, as well as the draft and final ESIA/IEE, shall be submitted to Green Plan for review and approval prior to their subsequent submission to the Ministry of Environment

(MoE). The Consultant shall address all comments received from Green Plan and the MoE and revise the respective deliverables accordingly.

The Consultant shall be responsible for the technical and administrative coordination and follow-up with the Ministry of Environment throughout the applicable review and clearance process

Deliverables - Task 5 includes the below deliverables:

Task 5.A Scoping report (If an ESIA report is required by MoE)

Task 5.B Draft ESIA/IEE Report:

The Consultant shall prepare the Draft ESIA/IEE Report presenting the full assessment findings, including cumulative impacts and VEC analysis, where applicable.

Task 5.C Final ESIA/IEE report:

The Consultant shall prepare the Final ESIA/IEE Report, addressing all comments received from the Green Plan, the World Bank, and the MoE. The Final Report shall include, at a minimum:

- Non-Technical Summary in English and Arabic;
- GIS maps, drawings, and spatial data;
- Project Description and Context - Details the project's name, location, executing agency, and the consultant who prepared the report;
- Legal and Institutional Framework - Outlines applicable national laws and World Bank Environmental and Social Standards (ESS 1–10);
- Baseline Environment and Socio-Economic Profile - Documents existing environmental and socio-economic conditions in the project area prior to implementation, providing the reference point against which impacts are measured;
- Methodology and Impact Assessment Describes how impacts were identified and assessed. Covers a range of risks including labor and working conditions, resource efficiency and pollution, community health and safety, land acquisition and resettlement, biodiversity, and cultural heritage;
- Final stakeholder consultation records, including attendance sheets, minutes, photographs, comments received, and consultation feedback matrix;
- Environmental and Social Management Plan (ESMP), including implementable mitigation measures, monitoring programme, performance indicators, institutional responsibilities, implementation schedule, and cost estimates;
- SEA/SH Prevention and Response Measures, integrated within the ESMP;
- MoE Correspondence Log, including submissions, comments, and responses throughout the screening, scoping, and ESIA/IEE review stages; and
- Recommendations for incorporating Environmental, Social, Health and Safety (ESHS) requirements, including SEA/SH prevention and response measures, into the works bidding and contract documents.

Task 6: Preparation of Tender documents

The Consultant shall prepare the complete tender documents for the implementation of the Works based on the approved detailed design and in accordance with the applicable procurement and contract requirements in World Bank. The tender documents shall be sufficiently complete and coordinated to enable prospective contractors to understand the scope of the Works, prepare their bids, and execute the Works in accordance with the Contract.

The tender document package shall include the following documents: General Rules of Competition, General Technical Specifications, Particular Technical Specifications, Tender Drawings, Bill of Quantities, and Price Schedule.

The Consultant shall translate the approved detailed design into clear and measurable technical requirements and shall ensure that the tender documents cover all Works required for the construction of the Lake and its associated infrastructure, including, but not limited to, temporary water diversion works during construction; the hill lake and its associated facilities; the dam body and its foundations; the waterproofing and seepage-control system; horizontal and/or vertical drainage systems; dam-associated hydraulic structures, including the spillway, outlet and bottom outlet/washout; the conveyance pipeline and associated works; and all other works necessary for the complete implementation of the project.

The Consultant shall prepare the Bill of Quantities and Price Schedule based on the approved detailed design, ensuring that the item descriptions, quantities, units of measurement and unit rates are properly coordinated with the drawings and technical specifications.

The Consultant shall incorporate the applicable environmental and social requirements identified in the ESIA, ESMP and other approved environmental and social instruments into the tender and contract documents. The Consultant shall translate the identified mitigation measures and management requirements into clear and enforceable Contractor obligations and shall reflect them, as appropriate, in the technical specifications, Bills of Quantities, Conditions of Contract, Employer's Requirements, drawings and other relevant tender documents.

The tender documents shall include, but not be limited to, the requirements for preparation and implementation of the Contractor's Environmental and Social Management Plan (C-ESMP), environmental and social mitigation measures, environmental and social monitoring and reporting, Occupational Health and Safety (OHS), workers' health and safety, Workers' Code of Conduct, Grievance Mechanism, SEA/SH prevention and response measures, Chance Find Procedures, community health and safety, labor and working conditions, waste management, pollution prevention and control, traffic and access management, and any other measures or procedures identified in the approved ESIA, ESMP and applicable environmental and social instruments.

Where specific ESHS measures require resources or measurable quantities, the Consultant shall ensure that the relevant items are appropriately reflected in the Bills of Quantities and/or other applicable pricing and payment provisions, with clear measurement and payment requirements where appropriate.

The Consultant shall ensure that all technical, environmental, social, contractual and ESHS requirements are fully coordinated and consistently reflected in the Tender Drawings, technical specifications, Bill of Quantities, Price Schedule and Conditions of Contract, so that the Contractor's obligations are clearly defined, measurable and enforceable throughout implementation of the Works.

Deliverables – Task 6: Tender Documents

Task 7: Tender and Bid Evaluation Assistance

The Consultant shall provide technical assistance to Green Plan throughout the tendering process to facilitate clarification of technical matters arising from the tender documents and bids.

The Consultant shall review and respond to technical queries and requests for clarification raised by prospective bidders, through Green Plan, and shall provide the necessary technical clarifications and recommendations to ensure consistent interpretation of the tender documents. Where required, the Consultant shall propose amendments or corrections to the technical documents resulting from identified errors, omissions or inconsistencies, subject to Green Plan's review and approval.

Following submission of bids, the Consultant shall provide technical support to Green Plan in the evaluation of the technical aspects of the bids. This shall include reviewing bidders' technical submissions for compliance with the tender requirements, drawings, technical specifications, Bills of Quantities and other relevant technical documents; identifying deviations, qualifications and non-conformities; reviewing proposed construction methods, equipment, materials, work programmes and other technical information, where required; and preparing technical comments and recommendations for consideration by Green Plan.

The Consultant shall assist Green Plan in preparing responses to bidders' technical clarifications during the evaluation process and shall provide any additional technical information or analysis reasonably required to support the evaluation.

The Consultant's assistance shall be limited to technical matters. All procurement decisions, including determination of responsiveness, application of the applicable procurement procedures, and award of the Contract, shall remain the responsibility of Green Plan in accordance with the applicable procurement requirements.

Phase 3: Works Supervision of Hill Lakes

The Consultant shall provide construction supervision, project management, contract administration, quality control, testing, reporting, completion, provisional handover and Defects Liability period (DLP) services to ensure compliance with the Contract Documents, approved designs, specifications, applicable laws, standards and World Bank requirements.

The Consultant shall provide supervision services at the Site and from the offices located on Site provided by the Contractor.

The Consultant's responsibilities shall include, but not be limited to, the following:

1. Construction Supervision Responsibilities
2. Project Management and Contract Administration Responsibilities
3. Quality Control, Testing and Acceptance Responsibilities
4. Environmental, Social, Health and Safety (ESHS) Supervision Responsibilities
5. Site Records, Reporting and Documentation Responsibilities
6. Completion, Handover and Defects Liability period (DLP) Responsibilities

1) Construction Supervision Responsibilities

The Consultant shall remain responsible for the technical aspects of the design during construction and shall review and address any design-related issue, discrepancy, unforeseen site condition or required modification arising during implementation of the Works. Where modifications to the design are required, the Consultant shall prepare the necessary revised calculations, drawings, specifications and other technical documents and submit them to Green Plan for review and approval before implementation. The Consultant shall ensure that all approved design modifications are properly documented and incorporated into the relevant construction and as-built documentation.

1. The Consultant shall supervise the Contractor's execution of the Works in accordance with the Contract Documents, including the approved drawings and Tender Documents, and the General Conditions of Contract and applicable contractual requirements.

2. The Consultant shall be responsible for properly supervising the Works and verifying their conformity with the specifications, approved drawings, and Contract requirements. The Contractor shall remain responsible for the execution of the Works and their compliance with the Contract.

3. Review the Contractor's action plan and construction programme submitted for the implementation of the Works, provide comments, and recommend its acceptance to the Green Plan.

4. Monitor the implementation of the approved construction programme, regularly compare the actual progress of the Works with the approved schedule, identify any actual or potential delays, assess their causes, and recommend appropriate corrective measures to the Contractor and the Green Plan to facilitate the timely completion of the Works.

5. Analyze delays affecting the progress of the Works, including their impact on the critical path, review the Contractor's proposed recovery measures, assess requests for Extension of Time (EOT) in accordance with the Contract provisions, and submit reasoned recommendations to the Green Plan.

6. Review the Contractor's remarks, observations, technical submissions, and requests related to the Tender Documents and the execution of the Works, and provide recommendations and solutions that comply with the Contract requirements and protect the interests of the Green Plan.

7. Provide instructions and technical guidance to the Contractor in accordance with the Contract requirements.

8. Review and recommend approval of materials proposed for procurement by the Contractor, ensuring compliance with the specifications and requirements of the Tender Documents.

9. Review the tests conducted at the factory for manufactured materials and equipment and report on the results.

10. The Consultant shall notify the Green Plan representatives of all critical activities and major milestones of the Works, including, but not limited to, civil, hydrological, and geotechnical activities. The Consultant shall accompany the Green Plan representatives to the Site whenever requested.

11. The Consultant shall immediately notify the Green Plan of any urgent issue that may affect the cost, quality, safety, environmental performance, or progress of the Works. Such issues shall be reported within twenty-four (24) hours of identification and shall include, but

not be limited to, unexpected geological or geotechnical findings, groundwater or seepage problems, slope instability, karstic features, unsuitable foundation conditions, safety incidents, environmental incidents, major non-conformities, failed tests, required design modifications, potential claims or variations, delay risks, damage to adjacent properties, or any other issue that may significantly affect project performance.

12. Where necessary, based on site investigations or observations during construction, the Consultant may propose technical adjustments. The Consultant shall ensure that such adjustments are coordinated across the relevant disciplines, properly communicated, and submitted to the Green Plan for review and approval prior to implementation. In urgent cases where immediate action is required, the Consultant shall promptly inform the Green Plan and obtain the necessary approval before proceeding.

13. The Consultant shall provide qualified experts to supervise specialized Works requiring specific expertise. Such experts shall remain under the technical and financial responsibility of the Consultant.

14. Monitor the Contractor's obligations during the Defects Liability period (DLP) and verify the satisfactory rectification of defects identified during this period.

15. Follow up on defects, deficiencies, and outstanding issues identified after completion and ensure that the Contractor implements the required corrective measures.

2) Project Management and Contract Administration Responsibilities

1. Prepare all necessary technical and administrative documents and attend meetings related to the project to support the Green Plan.

2. Review the Contractor's remarks, observations, technical submissions, and requests related to the Tender Documents and execution of the Works, and provide recommendations and solutions that comply with the Contract requirements and protect the interests of the Green Plan.

3. Review and monitor procurement-related activities to verify compliance with the Contract requirements, including procurement schedules, technical submittals, suppliers, manufacturing, inspections, and delivery status.

4. Review and respond to the Contractor's correspondence within a timeframe appropriate to the urgency, complexity, and nature of the matter. Critical safety issues, work-stopping matters, or issues that may significantly affect the progress of the Works shall be immediately reported to the Green Plan.

5. Provide technical and contractual assessments of claims, disputes, and other contractual matters submitted by the Contractor, including reasoned recommendations to the Green Plan. Contractual decisions shall remain the responsibility of the Green Plan.

6. Monitor the Contractor's compliance with contractual obligations and provide recommendations to ensure proper implementation of the Contract requirements.

7. Review and evaluate proposed Variation Orders arising during the implementation of the Works. The Consultant shall assess their technical justification, verify quantities and unit rates, evaluate their impact on the scope, cost, quality, and construction programme, prepare the necessary technical and financial analyses and supporting documentation, and submit recommendations to the Green Plan for approval prior to implementation, except where otherwise provided under the Contract.

8. The Consultant shall not approve Variation Orders or authorize any major changes to the Works on behalf of Green Plan. The Consultant shall review and assess proposed Variation

Orders or changes, provide its professional advice and recommendations to Green Plan, and support Green Plan in making the relevant decisions. The Consultant shall have no decision-making authority on behalf of Green Plan, and any approval, authorization, or instruction concerning Variation Orders or changes to the Works shall remain the responsibility of Green Plan.

In emergency situations requiring immediate action to protect the Works, public safety, or the environment, the Consultant shall promptly notify Green Plan and provide its professional advice and recommendations on the measures to be taken. **The Consultant shall not issue instructions that create commitments or liabilities for Green Plan.**

9. Review and assess the prices proposed for additional Works or items not included in the Bills of Quantities, and provide Green Plan with the Consultant's professional analysis and recommendations to support Green Plan's decision-making.

10. Review interim payment statements for the Contractor in accordance with the approved templates of the Green Plan and submit them for review and processing.

11. Prepare and submit interim statements and comparative tables, where necessary, during the construction period.

12. Prepare minutes of meetings and follow up on agreed actions.

13. Provide the Green Plan with copies of all correspondence exchanged with the Contractor.

14. Provide the Green Plan with the necessary technical reports, records, information, and supporting documents related to the execution of the Works whenever required for contract administration, dispute resolution, or legal proceedings.

15. The Consultant shall perform all required tasks with due diligence, efficiency, and professionalism, in accordance with modern engineering practices, international standards applicable to the engineering profession, and good practices in the fields of engineering studies, construction supervision, and project management. The Consultant shall use appropriate techniques, equipment, and effective methods to perform the Services.

16. The Consultant shall promptly notify the Green Plan of any error, fraud, defect, or other issue identified during the execution of the Works, including any matter related to the Contractor's performance. Failure to timely report such issues may result in action by the Green Plan in accordance with the Contract.

17. The Consultant shall not be entitled to receive any commission, brokerage, or other financial benefit from any Contractor, supplier, or third party in relation to the execution of the Works.

18. The Consultant shall attend meetings at the Green Plan premises whenever requested by the Green Plan and shall provide the necessary technical support and information related to the execution of the Works.

19. Prepare and submit periodic reports to the Green Plan and respond to the Contractor's letters within a timeframe appropriate to the urgency and complexity of the matter. The Consultant shall immediately notify the Green Plan of any critical safety issue or matter that may stop or significantly affect the progress of the Works.

3) Quality Control, Testing and Acceptance responsibilities

1. Review and recommend approval of materials proposed for procurement by the Contractor, ensuring compliance with the specifications and requirements of the Tender Documents.
2. Review and recommend approval of the equipment proposed by the Contractor and verify its suitability and compliance with the Contract requirements.
3. Inspect materials delivered to the Site or manufactured for incorporation into the Works and verify their quality through the required laboratory tests carried out at the Contractor's expense.
4. Review and verify the Contractor's proposed methods for transportation, handling, and storage of materials and equipment.
5. Review the tests conducted at the factory for manufactured materials and equipment and report on the results.
6. Monitor the implementation of all required tests on materials and verify the proper execution of the Works, including tests related to soils, clays, rocks, sand, gravel materials, cement, water lines, and other materials required by the Contract.
7. Ensure that tests are performed at the Site, in local laboratories, or in university laboratories approved by the Green Plan, and verify that test results comply with the required specifications.
8. Monitor inspections, tests, and verification activities carried out on equipment, materials, and construction works.
9. Coordinate and inspect construction activities to ensure proper integration between the different work components.
10. Monitor the installation of temporary and permanent structures in accordance with approved drawings, specifications, and construction requirements.
11. Monitor drilling and excavation Works and identify the appropriate foundation layer in accordance with the results of the relevant scientific study.
12. Review and recommend approval of equipment delivery, installation, testing, and commissioning procedures, and attend required inspections and tests.
13. Verify that materials, equipment, and executed Works comply with the Tender Documents, approved drawings, specifications, and Contract requirements; identify non-conformities, defects, failed tests, or corrective measures required.
14. Review and verify the Contractor's proposed technical adjustments, amendments, and modifications before implementation to ensure compliance with Contract requirements and approved specifications.
15. Maintain accurate records of laboratory and field tests, inspections, verification activities, and acceptance records, including verification of compliance with required specifications.
16. Verify the accuracy and completeness of inspection, testing, and acceptance records related to the Works.
17. Inspect and verify the completion of civil Works, electromechanical Works, and electrical equipment, participate in inspections, testing, and commissioning procedures prior

to handover, and prepare the necessary acceptance certificates and records for review and approval by the Green Plan.

18. Verify that all executed Works have been completed in accordance with the approved detailed design drawings, specifications, instructions, and Contract requirements prior to acceptance.

19. Verify completion of all outstanding Works, defects, non-conformities, and corrective measures identified during construction and ensure that they are properly addressed before final acceptance.

4) Environmental, Social, Health and Safety (ESHS) Supervision Responsibilities

In accordance with the World Bank Environmental and Social Framework (ESF), applicable Lebanese legislation, and building directly on the Environmental and Social Management Plan (ESMP) prepared under Task 2.4 and the Environmental, Social, Health and Safety (ESHS) requirements incorporated into the tender documents under Task 2.5, the Consultant shall provide dedicated and continuous Environmental, Social, Health and Safety (ESHS) supervision throughout the construction period. The Consultant shall monitor the Contractor's compliance with the ESMP, contractual ESHS obligations, applicable environmental and social instruments, and relevant legal and regulatory requirements, and shall support the Green Plan in ensuring effective implementation of environmental and social mitigation measures throughout the execution of the Works. This shall include, at a minimum:

(a) Dedicated ESHS supervision capacity

1. The Consultant's site supervision team shall include a dedicated Environmental and Social (E&S) Specialist as well as OHS Specialist (see Section 7, Team Composition & Qualifications), reporting to the Team Leader, with authority to inspect works, review the Contractor's C-ESMP implementation, and recommend corrective action;

2. The E&S and OHS Specialists shall verify that the Contractor has mobilized its own qualified EHS/ESHS Officer(s) as required by the tender documents, and that the Contractor's C-ESMP has been reviewed, accepted in accordance with the contract and implemented throughout construction.

(b) Monitoring of ESMP implementation and compliance with the Project ESCP

1. Systematic monitoring of the Contractor's implementation of and compliance with the ESMP mitigation measures, contractual Environmental, Social, Health and Safety (ESHS) obligations, and applicable environmental and social instruments, and verification of compliance with the relevant commitments under the Project Environmental and Social Commitment Plan (ESCP), using the monitoring indicators and reporting formats defined in the Final ESMP.

2. Reviewing the Contractor's periodic ESHS reports, monitoring records, the implementation of the Contractor Environmental and Social Management Plan (C-ESMP) and any supporting management plans and procedures required under the Contract, and verifying compliance with all contractual Environmental, Social, Health and Safety (ESHS) obligations.

3. Conducting regular ESHS site inspections, at least weekly during active construction and more frequently during high-risk or critical construction activities, such as excavation, dewatering, or concrete works, and document the inspections through checklists and photographic records.

4. Monitoring of occupational health and safety (OHS) performance, including Contractor compliance with personal protective equipment (PPE) requirements, site safety procedures, and emergency preparedness and response arrangements.
5. Monitoring of community health and safety measures, including control of dust, noise, public access to the construction site, construction traffic (where applicable), site security, and other community safety measures identified in the ESMP.
6. Monitoring of labor management practices, including Contractor compliance with the Labor Management Procedures (LMP), workers' grievance mechanism, and, where relevant, working and living conditions of workers.
7. Monitoring implementation of environmental mitigation measures relating to biodiversity, cultural heritage (including implementation of the Chance Find Procedure), water resources and watershed protection, erosion and sediment control, waste and spoil management, in accordance with the ESMP.

(c) Grievance mechanism and stakeholder engagement during construction

1. Monitoring the operation of the project-level Grievance Mechanism (GM) established by the SEP and verifying that it remains accessible, functional, and adequately publicized to workers and surrounding communities throughout construction.
2. Recording, tracking, and reporting on grievances received and their resolution, and verifying that the Contractor's Worker Grievance channel is operational.
3. Supporting the Green Plan in any construction-phase stakeholder engagement or disclosure activities required under the SEP.

(d) SEA/SH risk management

1. Verifying the Contractor's implementation of the Code of Conduct and the SEA/SH prevention and response measures specified in the ESMP and the Contract, including the signing of the Code of Conduct by all workers, the delivery of induction and refresher SEA/SH training, the designation of a functioning Contractor SEA/SH focal point, and the establishment and effective operation of the Contractor's Worker Grievance Mechanism (WGM), including confidential procedures for receiving and referring SEA/SH-related complaints;
2. Verifying that a survivor-centered, confidential SEA/SH reporting and referral pathway remains available, accessible, functional, and distinct from, while linked to, the general worker and community Grievance Mechanism (GM), including verification of up-to-date contact details for local GBV service providers.
3. Periodically (at minimum quarterly) reviewing implementation of SEA/SH prevention measures, awareness and training records, and any SEA/SH-related grievances or community feedback received through the Project Grievance Mechanism (GM) or stakeholder engagement activities.
4. Immediately notify the Green Plan, through the established incident reporting protocol, of any SEA/SH allegation or incident requiring reporting, while strictly maintaining confidentiality and ensuring that no personally identifiable or unnecessary sensitive information is disclosed.

(e) Incident reporting and non-compliance management

1. Establishing and operating an ESHS incident notification and reporting protocol, including immediate notification of the Green Plan of any environmental incident, accident, fatality, or serious injury, and preparation of incident investigation reports.
2. Issuing formal ESHS non-compliance notices to the Contractor where deficiencies are identified, tracking corrective action, and, in the ESHS Specialist's professional opinion and recommending to the Green Plan appropriate contractual remedies (including withholding of payment or suspension of works) for serious or repeated non-compliance, consistent with the contractual provisions established under Task 5 (phase 2).
3. Verifying rehabilitation/restoration of any temporarily disturbed areas (borrow areas, access tracks, laydown areas) prior to final handover, consistent with the ESMP.

(f) ESHS reporting

1. Preparation of a dedicated ESHS section in each periodic progress report (see Section 9, Reporting), summarizing compliance status, incidents, grievances, corrective actions, and monitoring data against the ESMP indicators.
2. Preparation of a standalone ESHS Compliance Report at project completion, to be annexed to the Final Completion Report, documenting the Contractor's implementation of the ESMP, compliance with contractual ESHS obligations, overall environmental and social performance during construction, verification of the relevant commitments under the Project ESCP.

During the Defects Liability Period (DLP), the Consultant shall address and follow up on any environmental or social defect, incident, or issue related to the completed works, should such an issue arise.

5) Site Records, Reporting and Documentation Responsibilities

1. Organize and maintain a Daily Site Log for the Works, signed daily by the Consultant's authorized representative, recording the Site activities, resources, executed Works, progress, problems encountered, quantities and measurements, material and equipment deliveries, inspections and tests, technical instructions, modifications, and other significant events affecting the Works. The Consultant shall ensure that the records are accurate, complete, and supported by the necessary evidence.
2. Maintain comprehensive and accurate records of construction activities, inspections, tests, instructions issued to the Contractor, technical submissions, approvals, non-conformities identified, corrective measures implemented, modifications, variations, and acceptance activities related to the Works.
3. Prepare and submit weekly reports to the Project Manager at the Green Plan summarizing the Works carried out, progress achieved, problems encountered, and recommendations.
4. Prepare and submit periodic reports to the Green Plan and respond to the Contractor's letters within a timeframe appropriate to the urgency and complexity of the matter.
5. Immediately notify the Green Plan of any critical safety issue or matter that may stop or significantly affect the progress of the Works.
6. Provide the Green Plan with the necessary technical, environmental, social, health and safety (ESHS) reports, records, information, and supporting documents related to the execution of the Works, including those required under the ESIA, ESMP, and other applicable environmental and social instruments, whenever required for contract

administration, dispute resolution, legal proceedings, or project closure, and submit such documents within the timeframe specified by the Green Plan.

7. Prepare minutes of meetings and follow up on the agreed actions.
8. Provide the Green Plan with copies of all correspondence exchanged with the Contractor and maintain complete records of such correspondence.
9. Prepare and submit interim statements and comparative tables, where necessary, during the construction period.
10. Attend meetings at the Green Plan premises whenever requested by the Green Plan and provide the necessary technical support and information related to the execution of the Works.
11. Prepare and submit the final report on the construction Works during the Defects Liability period (DLP) following the temporary/interim handing-over of the Works and its approval by the Green Plan. The Consultant shall remain responsible for the accuracy, completeness, and compliance of the final report and related documents with the Contract Documents, specifications, and Tender Documents.
12. Maintain and provide all records, test results, inspection reports, completion documents, and supporting evidence required by the Green Plan for the review and acceptance of the Works.
13. Transfer to the Green Plan ownership of all documents, reports, drawings, records, data, and other project deliverables prepared or collected during the performance of the Services.
14. Provide supporting evidence for all quantities, measurements, inspections, tests, approvals, and certifications recorded during the execution of the Works.

6) Completion, Handover and Defects Liability period (DLP) Responsibilities

1. Inspect and verify the completion of the Works, including civil, electromechanical, and electrical Works, and verify that all executed Works comply with the approved detailed design drawings, specifications, instructions, and Contract requirements prior to acceptance.
2. Participate in the required inspections, testing, commissioning, and acceptance procedures prior to handover of the Works, and prepare the necessary acceptance certificates and records for review and approval by the Green Plan.
3. Support the Green Plan during the review and acceptance process by ensuring that all required records, test results, inspection reports, completion documents, and other supporting information are available.
4. Verify the completion of all outstanding Works, defects, non-conformities, and corrective measures identified during construction, and ensure that they are properly addressed before final acceptance.
5. During the Defects Liability period (DLP), monitor the Contractor's obligations and the performance of the completed Works, follow up on defects, deficiencies, and outstanding issues, verify the satisfactory implementation of required corrective measures, and promptly report to the Green Plan any issue affecting the operation, quality, safety, or compliance of the Works.
6. Prepare and submit the final report on the construction Works during the Defects Liability period (DLP) following the temporary/interim handing-over of the Works and its approval by the Green Plan. The Consultant shall remain responsible for the accuracy, completeness,

and compliance of the final report and related documents with the Contract Documents, specifications, and Tender Documents.

7. Maintain and provide the records, reports, technical documents, test results, and supporting information required for final acceptance and project closure.

8. Prepare the final documentation required for project closure following completion of the Works and the Defects Liability period (DLP).

9. Transfer to the Green Plan ownership of all documents, reports, drawings, records, data, and other project deliverables prepared or collected during the performance of the Services.

N. B.: Where the Terms of Reference use expressions such as “not limited to,” “among others,” or “at a minimum,” these shall refer to activities and inputs reasonably required to complete the assignment and achieve its objectives and deliverables, and shall be considered part of the Consultant’s scope of services.

3. Key and Non-Key Experts

The Consultant shall provide a suitably qualified and experienced team with the expertise necessary to successfully perform the assignment, including the studies, detailed engineering design and supervision of the Works. The Consultant shall propose the following Key Experts, who shall meet the minimum requirements specified below. The qualifications and experience of the Key Experts will be evaluated as part of the technical proposal at the subsequent stage of the selection process.

Key expert 1: Team Leader

- Education: A minimum Bachelor’s degree in Civil Engineering, Water Engineering, Hydrogeology, or a closely related engineering discipline.
- Professional experience:
 - Minimum fifteen (15) years of experience in the design and supervision of infrastructure projects.
 - Experience in the design and supervision of at least seven (7) similar water infrastructure projects, including hill lakes, dams, or similar projects, during the Water past fifteen (15) years.
 - Minimum seven (7) years of experience in managing and coordinating multidisciplinary engineering teams and assignments.
- Languages: Proficiency in English and Arabic.

Team expert 2: Design engineer

- Education: A minimum Bachelor’s degree in Civil Engineering, Engineering, Hydrogeology, or a closely related engineering discipline.
- Professional experience: Experience in the design of water and irrigation infrastructure, demonstrated through at least seven (7) relevant projects during the past ten (10) years.
- Language: Proficiency in English and Arabic.

Key expert 3: Supervision Engineer / Site Engineer

- Education: A minimum Bachelor’s degree in Civil Engineering or a closely related engineering discipline.

- Experience in the supervision of infrastructure projects, demonstrated through at least ten (10) relevant projects.
- Experience in the supervision of at least three (3) water infrastructure projects during the past ten (10) years.
- Language: Proficiency in English and Arabic

Expert 4: Environmental and Social Specialist

- Education: A minimum Bachelor's degree in Environmental Engineering, Environmental Science, Social Sciences, Sociology, Environmental and Social Management, Agricultural Sciences, or another relevant discipline. Additional certification or specialized training in environmental and social safeguards is an asset.
- Professional experience:
 - Experience in the preparation of at least five (5) ESIA's / IEE during the past ten (10) years.
 - Experience in preparing of at least two (2) of the following social instruments: SEPs, LRP and / or RAPs, Grievance Mechanisms) over the past five (5) years in international financing project.
 - Experience in E&S supervision of civil works, demonstrated through participation in at least five (5) construction and / or infrastructure projects during the past ten (10) years, including projects financed by the World Bank or other international financing institutions and/or implemented in accordance with Lebanese E&S legislation. Experience in water infrastructure projects is an asset.
- Language: Proficiency in English and Arabic.

Expert 5: Occupational Health and Safety (OHS) Specialist

- **Education**
 - A Minimum Bachelor's degree in Engineering, Environmental Science or another relevant discipline. Professional certification in Occupational Health and Safety, such as NEBOSH, IOSH, OSHA, or equivalent, is required.
- **Experience:**
 - Experience in occupational health and safety management, demonstrated through participation in at least five (5) construction and / or infrastructure projects during the past ten (10) years, including projects financed by the World Bank or other international financing institutions and/or implemented in accordance with Lebanese OHS legislation. Experience in water infrastructure projects is an asset.

Expert 6: Procurement Expert

- · **Education**
 - A Minimum Bachelor's degree in Civil Engineering in engineering, management or relevant discipline.
- **Experience:**
 - A minimum of ten (10) years' experience in the relevant field.

Non key experts:

In addition to the Key Experts listed above, the Consultant shall provide mandatory Non-Key Experts necessary for the proper performance of the assignment. The Consultant's team shall include at least **an experienced Geotechnical Engineer and Topographer**. The qualifications of these Experts will not be evaluated during the selection process. However, the Consultant shall ensure that they possess appropriate qualifications and relevant experience for the tasks assigned to them.

4. Deliverables

The table below summarizes the deliverables and reports to be prepared and submitted by the Consultant during the assignment period.

Payments shall be made based upon submission and approval of the deliverables specified in the table below, issuance of the relevant Certificate of Acceptance, where applicable, and submission of a duly compliant official invoice by the Consultant.

Payment shall be made in United States Dollars within thirty (30) days following the date on which the relevant deliverables - final version where applicable – have been approved by the Green Plan and the duly compliant invoice has been submitted.

Phase	Task	Content	Time of submission
Phase 1: Preparation of feasibility study and Social and Environment Screening Report	Task 1: Rapid preliminary assessment of site feasibility	One (1) hard copy and two (2) soft copies.	- Draft version: two (2) weeks from the day following the receiving of notification of award by Green Plan. - Final version: two (2) working days after receiving the GP comments.
	Task 2: Topographic Report	Three (3) hard copies and two (2) soft copies.	- Draft version: five (5) working days following the approval of the rapid assessment. - Final version: two (2) weeks after receiving the GP comments.
	Task 3. Hydrological, geological and geotechnical studies comprising three (3) deliverables D 1: A preliminary hydrological study D 2: A preliminary geological study D 3: A preliminary geotechnical study	One (1) hard copy and two (2) soft copies of each deliverable	- Draft version: six (6) weeks following the approval of the rapid assessment. - Final version: two (2) weeks after receiving the GP comments.
	Task 4: Feasibility Study	One (1) hard copy and two (2) soft copies.	- Draft version: Six (6) weeks following the approval of the rapid assessment. - Final version: Two (2) weeks after the review period by GP.

	Task 5: Preliminary design report	One (1) hard copy and two (2) soft copies.	- Draft version: Six (6) weeks following the approval of the rapid assessment. - Final version: Two (2) weeks after the review period by GP.
	Task 6: Environmental and Social screening Application	Two (2) hard copies	- Draft version: one (1) week following the approval of preliminary design - Final version: one (1) week after receiving comments on draft (if any)
Phase 2: Preparation of Detailed Design and Environment and Social Impact Assessment	Task 1: Detailed geotechnical report	One (1) hard copy and two (2) soft copies.	- Draft version: Twelve (12) weeks following the approval of FS and preliminary design. - Final version: Three (3) months after receiving the GP comments.
	Task 2: Detailed design report and design package	One (1) hard copy and two (2) soft copies.	- Draft version: Twelve (12) weeks following the approval of FS and preliminary design. - Final version: Three (3) weeks after receiving the GP comments.
	Task 3: Design Report of the inlet structure	One (1) hard copy and two (2) soft copies.	- Draft version: Twelve (12) weeks following the approval of FS and preliminary design. - Final version: Three (3) weeks after receiving the GP comments.

	Task 4.1: Design of the conveyance pipe from the hill lake to the users	One (1) hard copy and two (2) soft copies.	- Draft version: Twelve (12) weeks following the approval of FS and preliminary design. - Final version: Three (3) weeks after receiving the GP comments.
	Task 4.2: Primary Irrigation Network Design Package	One (1) hard copy and two (2) soft copies.	- Draft version: Twelve (12) weeks following the approval of FS and preliminary design. - Final version: Three (3) weeks after receiving the GP comments.
	Task 5 A: Scoping Report (where an ESIA is required by the MoE):	Draft: One (1) hard copy and one (1) editable soft copy (MS Word and PDF). Final: Five (5) hard copies and one (1) editable soft copy (MS Word and PDF).	- Draft version: one (1) month following MoE's reply to the screening application. - Final version: two (2) weeks following receipt of comments from Green Plan.
	Task 5 B: Draft version of ESIA/IEE	One (1) hard copy and one (1) editable soft copy (MS Word and PDF) of ESIA.	- One (1) month from the day following the approval of the Scoping Report by the MoE (where an ESIA is required), or from the day following the MoE's screening decision requiring an IEE.
	Task 5 C: Final version of ESIA/IEE	Five (5) hard copies and one (1) editable soft copy (MS Word and PDF),	- One (1) month from the day following receipt of the consolidated comments from the GP, the WB Bank, and the MoE (as applicable) on the Draft ESIA/IEE Report.

	Task 6: Tender Documents (including drawings)	Number of hard copies and number of soft copies	- Draft version: Two (2) weeks following the approval of detailed design - Final version: Two (2) weeks after receiving the GP comments.
Phase 3: Supervision of works	Task 1: First Interim Report upon completion and approval of 30% of the works implemented by the Contractor.	One (1) hard copy and two (2) soft copies.	This report will be submitted upon completion and approval of 30% of the works implemented by the Contractor.
	Task 2: Second Interim Report upon completion and approval of 70% cumulative progress of the works implemented by the Contractor	One (1) hard copy and two (2) soft copies.	This report will be submitted upon completion and approval of 70% of the works implemented by the Contractor.
	Task 3: Provisional Acceptance Report upon completion and approval of 100% of the works implemented by the Contractor	One (1) hard copy. and two (2) soft copies.	This report will be submitted upon completion and approval of 70% of the works implemented by the Contractor.
	Task 4: Final acceptance Report	One (1) hard copy and two (2) soft copies.	This report will be submitted upon the final approval of the works at the end of Defects Liability period (DLP)

