

# **REPUBLIC OF CROATIA**

## **MINISTRY OF PHYSICAL PLANNING, CONSTRUCTION AND STATE ASSETS**

### **EARTHQUAKE RECOVERY AND PUBLIC HEALTH PREPAREDNESS PROJECT**

#### **TERMS OF REFERENCE**

#### **FOR CONSULTANCY SERVICES FOR CONCEPTUAL DESIGN REVIEW, MAIN DESIGN, DETAIL DESIGN AND BIDDING DOCUMENT DEVELOPMENT, AND DESIGN SUPERVISION SERVICE DURING CONSTRUCTION PHASE FOR CLINIC HOSPITAL CENTER ZAGREB**

Proc.ref.no.: MoPPCSA/ER&PHPP/C1.2.1/CS-QBS

#### **I. PROJECT BACKGROUND**

About the Project: The Republic of Croatia (RoC) with financing from the International Bank for Reconstruction and Development (IBRD) through the Loan Agreement (Loan No. 9127-HR) is implementing the Earthquake Recovery and Public Health Preparedness Project (Project). Project Development Objective (PDO) is to assist Croatia with earthquakes reconstruction efforts in Zagreb and the surrounding areas, Sisak-Moslavina County and Karlovac County, improve institutional capacity for reconstruction, and strengthen national systems for public health preparedness. The project implementation period spans between 2020 and 2024. The Project comprises three components: (1) Earthquakes Recovery and Reconstruction; (2) Public Health Surveillance and Preparedness; and (3) Project Management. Part of the loan funds are intended to be used for reconstruction of buildings in health and educational sectors that are damaged in earthquake. The project is implemented by the Ministry of Physical Planning, Construction and State Assets (MoPPCSA) and the Ministry of Health (MoH), in coordination with other institutions. The Project Implementation Unit of the MoPPCSA (PIU 1) is responsible for Component 1, as well as civil works under Component 2.

About Clinical Hospital Center (CHC) Zagreb: There are currently several buildings on the existing cadastral parcel - a hospital building for health purposes consisting of several above-ground volumes and a common underground part, and buildings with accompanying technical purposes. The buildings are of different sizes and heights. The main buildings are connected by internal underground corridors, as well as external vehicular and pedestrian areas. At the site of the "PHASE III" building in question are existing buildings in the capacity of a hospital pharmacy and kitchen that form one unit with other hospital buildings, and for the purposes of the procedure will be removed for most of it while maintaining existing warm connections with the rest of the hospital center. On the northern part of the parcel there is a parking lot that does not meet the needs of the hospital complex and new construction with its capacity, and for this reason the

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construction of the auxiliary building in question is planned in this place – an above-ground open garage.

CHC Zagreb is the largest and in terms of the number and diversity of health services provided by a unique health institution in the RoC. The Clinical hospital provides basic care and highly sophisticated medical procedures to healthcare users from all over Croatia and abroad. Since 2014, CHC Zagreb has been categorized as a "0 central national hospital" in which health activities of national importance are carried out and the most complex forms of health service provision are performed and is the only one in the RoC of this category. The status of the Central National Hospital awarded to the CHC Zagreb by the MoH is a great recognition, but also a guideline for future activities with the aim of maintaining and improving the quality of our services. Using the superior academic education of CHC employees, the hospitals solve a wide range of health problems, with the emphasis always placed on an interdisciplinary and individual approach to each user.

In addition to the basic health care provided, the hospital explores the latest methods of treatment, which, while respecting strict scientific criteria, we introduce into everyday work. This is evident through the fact that the hospital is the headquarters for 81 reference centers of the MoH, whose task is to continuously monitor and systematically promote certain areas of the medical profession in our country. The hospital focuses on educating its employees and educating future healthcare professionals. Therefore, the hospital has the largest database of clinical teaching of the Faculty of Medicine, University of Zagreb, and Polytechnic of Zagreb.

As the leading hospital institution in the RoC, CHC Zagreb is a pioneer in numerous medical procedures that were performed for the first time in this part of Europe and some in the world. CHC Zagreb continuously introduces new and innovative diagnostic and therapeutic procedures, while maintaining the status of the leading hospital institution in the RoC, which is gravitated to not only by citizens of the entire RoC, but also from neighbouring countries, and especially when it comes to demanding medical cases.

CHC Zagreb, as the Central National Hospital, has 1,795 beds contracted with the Croatian Health Insurance Institute for lying patients, 435 beds - chairs for day hospitals in 6 locations (Rib, Jordanovac, Petrova, Šalata, Bozidarevićeva and Gundulićeva) and 6,002 employees. Within CHC Zagreb there are 29 Clinics and Clinical Institutes. CHC Zagreb also has a Unified Hospital Emergency Room, Hospital Pharmacy and Croatian Tissue and Cell Bank (Cord Blood Bank, Human Milk Bank, Reproductive Tissue Bank and Tissue Bank).

According to the data for 2019, number of patients on an annual basis 1.576.625, number of patients hospitalized 69.293, number of patients in day hospitals 135.467, number of polyclinic

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patients 1.371.865, total number of services 4.939.203 and total number of surgical procedures 39.275.

Conceptual Design (details available in **ANNEX 1**): Conceptual Study for the new construction of selected facilities-key parameters, functional descriptions, and space demand for CHC Zagreb was completed in April 2018 by Solve Consulting from Wien, Austria. Conceptual design for CHC Zagreb hospital has been completed in January 2021 by Gradit from Zagreb.

The project consists of the Main Design of the new building that meets the requested requirements of the Client and complies with the existing Conceptual Design. The construction of this new hospital will contribute to the achievement of strategic goals defined by the documents of the MoH and the Government of the RoC, with the main motivation of solving the problem caused by earthquake damage while contribute to longer term resiliency of the hospital complex and continuous operation during an expected disaster. The new building is planned to be constructed within the existing hospital complex having a land of approximately 107.660 m<sup>2</sup>. In addition to the Project of the building, an open garage, and emergency helipad on the last level (**ANNEX 1**, page 66, drawing C22) are planned, resolving extremely difficult traffic situation on the hospital complex.

The "PHASE III" hospital building is located in the central part of the hospital complex next to the operating block building. It consists of a total of 8 floors – 2 basement, ground floor and 5 floors. The building has a rectangular floor plan with dimensions of approx. 95 m x 55 m, oriented northwards for a longer part. The projected total gross area is approximately 27,800 m<sup>2</sup>, placed on 8 levels: 2 basement levels, ground floor and 5 floors. In a separate building, on the same plot, has been designed open garage with gross area as of 31.370 m<sup>2</sup>, placed on 5 levels, emergency helipad on the last level (**ANNEX 1**, page 66, drawing C22), and access road. The conceptual design also contains a proposal for landscaping, as well as an optimal solution of idle traffic and a solution of the necessary infrastructure connectivity. All special conditions have been obtained, and the technical documentation is ready for the development of the main project. The Consultant shall study the existing conceptual study, hospital conceptual design, open garage conceptual design, emergency helipad conceptual design, access road design, landscaping design and traffic plan of the whole hospital complex.

In accordance with the developed Conceptual Design for reconstruction of CHC Zagreb Rebro it is planned to upgrade the hospital building "PHASE III" which includes various hospital facilities and construction of an auxiliary building – open above-ground garages, access road, emergency helipad, redevelopment of vehicular and pedestrian areas and traffic at rest all in the form of new traffic regulation.

- i. Medical facilities which are included:
  - Orthopedic clinic;

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- Dermatovenerology Clinic;
  - Eye Clinic;
  - Clinical Institute for Transfusion Medicine and Transplantation Biology with Tissue Banks.
- ii. Non-medical facilities which are included:
- Hospital pharmacy with warehouse and production;
  - Central Kitchen;
  - Educational facilities for students;
  - Central wardrobe;
  - Warehouses, Central Archives and Technical Areas and auxiliary building.

In order to continuously provide health care, it is necessary to move medical facilities to a new building from the location of Šalata (Orthopaedic Clinic, Dermatovenerology Clinic) and the Main Buildings Rebro (Clinic for Eye Diseases, Clinical Institute for Transfusion Medicine and Transplantation Biology with Tissue Banks). These medical facilities were damaged by the devastating earthquakes that hit the Republic of Croatia in 2020.

A building would be built in the central part of the CHC Rebro hospital complex next to the Operating Block building. It consists of a total of 8 floors - 2 basement, ground floor and 5 floors. The building has a rectangular, floor-plan shape measuring 95 x 55 m, a longer part-oriented northwards. The schedule of planned hospital facilities was made to achieve maximum functionality of each unit and to achieve the shortest necessary internal connections as well as contact to other facilities of the hospital complex. Projected total gross area approximately 27.800 m<sup>2</sup>.

- Eye Clinic - 870 m<sup>2</sup>
- Dermatovenerology Clinic – 1.805 m<sup>2</sup>
- Orthopaedic clinic – 3.796 m<sup>2</sup>
- Clinical Institute for Transfusion Medicine and Transplantation Biology with Tissue Banks – 3.063 m<sup>2</sup>
- Hospital pharmacy with warehouse and production – 3.300 m<sup>2</sup>
- Central kitchen and warehouses – 5.681 m<sup>2</sup>
- Auxiliary spaces (educational rooms, dressing rooms, archives, technical space, horizontal and vertical communications) – 8.733 m<sup>2</sup>

A new building with reconstruction would be built on the site where today there are non-medical facilities (Hospital Pharmacy with Warehouse and Production, Central Kitchen, Educational Premises for Students, Warehouses, Central Archives and Technical Premises) which are vital for the continuous provision of health care to patients.

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The construction of an auxiliary building (open above-ground garage, and emergency helipad on the last level (ANNEX 1, page 66, drawing C22)) with a total area of 31.370 m<sup>2</sup> is also foreseen, as well as access road. The open above-ground garage is located on the northern part of the hospital complex, in the place of an open parking lot. The intended users of the garage are health employees, visitors, and patients of the hospital complex. The main purpose of the building is a garage with 1.077 parking spaces for passenger cars, of which 54 places are provided for the disabled and people with reduced mobility.

Before the earthquake, medical and non-medical content covered a total of 21.482 m<sup>2</sup>.

i. Medical facilities

- Orthopaedic clinic – 6.240,00 m<sup>2</sup>
- Šalata 4 (Dermatovenerology Clinic) – 8.760,00 m<sup>2</sup>
- Eye Clinic – 1.540,00 m<sup>2</sup>
- Clinical Institute for Transfusion Medicine and Transplantation Biology with Tissue Banks – 505,00 m<sup>2</sup>

ii. Non-medical facilities

- Hospital pharmacy with warehouse and production – 1.537,00 m<sup>2</sup>
- Central kitchen and warehouses – 2.900,00 m<sup>2</sup>

The following clinics were affected by the earthquake: Orthopaedic Clinic, Dermatovenerology Clinic (at Šalata site) and Eye Clinic, and Clinical Institute for Transfusion Medicine and Transplantation Biology with Tissue Banks (at the Kispatićeva 12 site, Rebro).

The hospital currently has 207 beds (Eye Clinic – 67, Dermatovenerology Clinic – 45, Orthopaedic Clinic - 95).

Through project "PHASE III" of development of CHC Zagreb we plan 152 beds (Clinic for Eye Diseases - 36, Dermatovenerology Clinic 25, Orthopedics Clinic - 91).

Reducing bed capacity increases access to day hospitals and one-day surgeries. Any reduction of acute hospital resources and the redirection of patients to the resources of day hospitals represents a reduction in health costs and in the long term enables improvement and long-term sustainability of the quality of health service in the RoC and improves the standard of treatment and stay of patients.

The location of the newly planned structure is in the central part of the hospital circuit with a good connection to the connecting tunnel and short connections for internal deliveries, which is crucial

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for the kitchen and pharmacy. The location is also placed next to the operating block and provides direct connections of clinics to operating rooms.

The construction of the new building will allow:

- continuation of strategic development and unification of clinics of CHC Zagreb at the location Rebro;
- improving functionality and more efficient operation of CHC Zagreb;
- improving the quality of infrastructure and increasing the quality of health services of the clinics and institutes concerned;
- increasing the feeling of comfort of patients due to more comfortable hospital space
- improving working conditions for staff and teaching and research capacities of CHC Zagreb;
- reducing operating costs and increasing energy efficiency;
- reducing greenhouse gas emissions;
- introduction of an automatic temperature control system and space illumination.

In the current premises of the Eye Clinic, it is planned to expand the Oncology Clinic regarding gravity and increase the number of oncological patients in accordance with the National Strategic Framework against Cancer. Further, expansion of the Oncology clinic is also in line with the National Strategic Framework for Cancer as it envisions centralization of treatment in centers of excellence - as opposed to cancer being treated in small hospitals that cannot reach volumes of patients sufficient to promote excellence. The number of cancer patients in the world and the RoC is constantly increasing. The World Health Organization predicts that the world number of new cases will rise from 18 million in 2018 to 29,5 million per year in 2040, while the number of deaths will rise from 9,5 million to 16,4 million per year. Unfortunately, cancer is the leading public health problem in the RoC. Patients from all over Croatia are coming to CHC Zagreb for treatment, and the realization of this project will make better use of the resources at our disposal, reduce waiting lists for therapy and diagnostics, and establish better control of the disease for patients with malignant diseases.

In the current premises of the Clinical Institute for Transfusion Medicine and Transplantation Biology, it is planned to establish a National Center for Multiple Sclerosis Patients within the Neurology Clinic. Multiple sclerosis (MS) is a chronic, immune-mediated demyelinating disease of the central nervous system. The most common is non-traumatic disease of young adults, which leads to disability. With the establishment of the National Centre for Multiple Sclerosis Patients, it would represent a new centre of excellence. The establishment of a National Centre for People with Multiple Sclerosis would allow for full and timely treatment and monitoring of the patient with this disease. Personalized medicine would be implemented, based on an individualized approach in diagnosis and treatment, focused on the patient and based on their clinical characteristics and identifying which procedure, therapy will be effective in which patient based

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on different biomarkers. The result of this Center will contribute to reducing health costs and preventing comorbidity and mortality.

The premises of the Orthopaedic Clinic and the Dermatovenereology Clinic are owned by the Faculty of Medicine, University of Zagreb, and CHC Zagreb was only a user of the mentioned premises at the Šalata site.

Pharmacy, Central Kitchen and Storage Area remain in the same location.

The new building would be built on the site where the non-medical facilities are located today (Hospital Pharmacy with Warehouse and Production, Central Kitchen, Educational Premises for Students, Warehouses, Central Archives and Technical Premises).

## **II. SERVICES OBJECTIVE**

Under Component 1, sub-component 1.2. “Rehabilitation and Reconstruction of Health and Education Facilities” of this project, consultancy services for studies, Inception Report, Main and Detail Design, participation in Bidding Document (for construction phase) preparation and Design supervision will be financed, subject to this ToR.

The primary objective of this Consultant service is to support the MoPPCSA, MoH and CHC Zagreb to:

- (i) Carry out necessary surveys and investigations to confirm the results of geotechnical investigation and geodetical bases, which were found and made for the purposes of this Project.
- (ii) Prepare the construction drawings and design projects – Main and Detail Design (supported by using of Building Information Modeling (BIM) technology) with detailed elaboration of all basic requirements for the building, for "PHASE III" of development of CHC Zagreb, which are resilient and include Bill of Quantities, technical specifications, cost estimates and all necessary spatial/other plans. The project of the building must contain those corresponding projects of individual professions that, depending on the type of building, are necessary for the provision of a complete and harmonised technical solution of the building, the presentation of the placement of the building in space and the proof of compliance with the basic requirements for the building, as well as other requirements and conditions according to the enforced regulations. Architectural, construction, mechanical, electrical, plumbing (MEP), life and fire protection, heating, ventilation, and air conditioning (HVAC) projects deal more closely with individual structures or parts thereof or the design of the building and estimate the costs for its construction.
- (iii) Participate in process of preparation of Bidding Document for construction phase and prepare draft Bidding Document (for construction phase) based on Detail

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- Design (including drawings, textual parts, technical specification, Bill of Quantities, and other related documents for construction works bidding as well as non-structural elements) according to the enforced World Bank regulations.
- (iv) Perform design supervision over the construction works which are authorized to supervise. The Design supervision is the supervision service performed by the designer (or rather team of designers) that has produced the overall project documents, during the construction works and with regards to the intricacies of form-giving and construction, that cannot be unambiguously determined by the project documents but require additional engagement of designers on-site.

The Main and Detail Design, as well as Bidding Document for construction phase, shall be developed in accordance with all the relevant national environmental, Occupational (OHS) and Community Health and Safety (CHS) regulations and, World Bank Environmental and Social Policies (Environmental and Social Framework - ESF) requirements, the World Bank Environmental, Health and Safety Guidelines and Good International Industry Practice, the stricter ones prevailing. Inception Report, Main Design, Detail Design and Bidding Document shall be in line and consider, resulting measures and recommendations documented in the Environmental and Social Assessment documents (more precisely Environmental and Social Management Plan (ESMP) as indicated in ANNEX 4), which will be prepared in parallel with the Main and Detailed Designs.

### **III. SCOPE OF SERVICE AND TASKS**

Implementation of priority activities such as review of conceptual designs, data collection, geotechnical and geodetical survey, post-appointment BIM Execution Plan (BEP) and Common Data Environment (CDE) establishment must start as soon as feasible upon the Consultant's mobilization. The Consultant will utilize pre-existing resources (data, plans, studies, project documents, etc.) when preparing the Main and Detail Design.

Consultant will be responsible for preparation of Inception Report, Main Design, Detail Design and Bidding Document (including technical specification, Bill of Quantities, related documents for construction works bidding as well as non-structural elements) all in line with the BIM principles.

The Consultant is responsible to establish a design team who is experienced in the preparation of architectural, structural, seismic, electrical, mechanical, hydro installation projects, fire protection and safety at work measures study, environmental protection, hospital technology study, physics of the building and noise reduction project – especially for designing the helipads, infrastructure and landscaping projects, traffic simulation models (both for internal and external traffic), and collaboration with all other specialists required for hospital design. Design phase shall be in accordance with BIM principles as stated in ANNEX 3. The Consultant shall indicate the key staff



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to be assigned in the preparation of designs and documents by indicating positions planned to be assigned for each staff in their proposal (within post-appointment BIM Execution Plan – BEP).

The scope of service shall concern both to the Consultant as well as its sub-Consultant/parties. The obligations with regards to adhering to the national legislation, World Bank policies (Environmental and Social Framework - ESF), procedures and guidelines (e.g., WB EHSB, GIIP) and other relevant documents (ESMF, ESMP, SEP) shall be transferred from the Consultant to its sub-Consultant/parties in case of them being hired.

The Consultant shall prepare and complete all architectural and engineering designs using BIM according to the requirements from **ANNEX 3**. The Electrical Design minimally contains solutions of low and high current, and lightning-rod installation, both for the building and for the auxiliary building. The Main and Detail Design shall ensure that all basic requirements for the building are met - mechanical resistance and stability, fire safety, hygiene, health and the environment, safety and accessibility during use, noise protection, energy management and heat conservation, and sustainable use of natural sources. The designer will prepare all the necessary project documentation, the Main Design, necessary for obtaining a Building Permit and the Detail Design. The documentation in question must comply with the applicable laws and regulations, spatial planning conditions, and collected special conditions and Conceptual Design (**ANNEX 1**), Geotechnical Design, and hospital program. The technical part of the Main and Detail Design contains a graphical, non-graphical data and documentation. The textual part of the Main and Detail Design contains all technical, technological, and other data, calculations and solutions proving that the building will meet the basic requirements for the building and other requirements and conditions that the building must meet. Budgets and other appropriate methods, in accordance with a specific regulation or, for matters not governed by the regulation, according to the rules of the profession, demonstrate that a designed building with built-in construction products, installations and built-in equipment will meet the legal and World Bank policies requirements, including those of Environmental and Social Standards (ESSs), a part of ESF, WB EHSB and GIIP (stricter ones prevailing): mechanical resistance and stability, fire safety, hygiene, health and environment, safety and accessibility during use, noise protection, energy management and heat conservation, sustainable use of natural resources, which depends on the type of building.

Main and Detail Design will be developed in line with the Project ESMF, WB ESF, WB Environmental Health and Safety Guidelines (EHSB) and GIIP, in particular those on life and fire safety, energy conservation, water conservation, hazardous materials and hazardous waste management, noise impact protection, emergency prevention and response, noise, indoor air quality, traffic safety, OHS and other applicable, as well as Good International Industrial Practices and national regulation stricter ones prevailing. No E&S high-risk activities or impacts (as defined in the WB E&S Directive for IPF and ESMF) will be supported/financed or can be a result of the design (including downstream impacts in the implementation, operational and dismantling period).

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The Main and Detail Design shall comply with Eurocode 8: Design of structures for earthquake resistance and relevant national/international standards. The structural system of the hospital can be either steel or reinforced concrete. **The designs will cover seismic base isolators for an earthquake resistant hospital complex.** Also, other innovative measures such as dampers, etc. are required to be considered in the design process.

The design of the hospital shall be in accordance with the international standards, applicable EU Legislation and shall meet the technical requirements and the specific functions of the units as well as the requirements of the MoH. The Consultant is required to receive the approval of the Main and Detail Design from the Provincial Directorate of Health and the Ministry of Health.

All necessary approvals required by the relevant authorities or municipalities for the designs shall be received by the Consultant on behalf of the PIU, and the MoH.

Sustainability Assessments (similar to LEED or BREEAM systems) will also be part of the responsibility of the Consultant. It is expected that, a smart approach towards energy efficient and climate resilience design is followed.

Since any delay in the preparation and the completion of the Inception Report, Main Design, Detail Design and Bidding Document will directly affect planned commencement date for construction works and construction period, following the delivery of the completed and harmonised Main and Detail Design with their parts, requirements and needs of the Client and according regulations, obtaining a Building Permit and contracting contractors, the Consultant will prepare all graphical, non-graphical data, and documentation with due care and diligence during the envisaged periods not to cause any delay. All mentioned deliverables shall be prepared in coordination with MoPCCSA and considering requirements of the CHC Rebro Hospital and the MoH to assure the usage purpose of Health Facilities.

**TASK 1: Development of post-appointment BIM Execution Plan (BEP)**

Post-appointment BIM Execution Plan (BEP) is key document that defines the goals for the implementation of the BIM methodology in a project and shall be developed according to the requirements defined in the EIR (ANNEX 3) and in timely manner.

Submitted post-appointment BEP will be reviewed by the Client and approved or returned for revision and/or resubmission.

All deliverables during the project execution shall be in accordance with agreed post-appointment BEP.

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**TASK 2: Establishment and implementation of Common Data Environment (CDE)**

The Common Data Environment (CDE) enables efficiently and accurately sharing of the information between all project participants – including graphical (2D and 3D) information, models, non-graphical information, and documentation. CDE shall be established and implemented according to requirements stated in the EIR (ANNEX 3) and agreed post-appointment BEP, and in timely manner.

All project information and deliverables shall be shared through the project CDE according to requirements stated in the EIR (ANNEX 3) and agreed post-appointment BEP.

Consultant shall submit appropriate deliverables to the Client for approval through the CDE according to the EIR (ANNEX 3).

All deliverables will be reviewed by the Client and approved or returned for revision and/or resubmission according to the defined submission, review, approve and publishing processes defined in the post-appointment BEP.

**TASK 3: Analysis of the existing condition of the CHC Rebro Project and development of Inception Report**

Examine existing designs: Before the commencement of the design works, the Consultant will be responsible to review existing studies, Conceptual Design (ANNEX 1) and collect the existing inputs and examine the construction sites together with the documents and information provided by the Client to make required analyses and evaluations. The Consultant shall review all existing studies conducted for prior to commencement of the services including, structural assessments, earthquake damage assessment reports, geological and geotechnical studies, site plans, topographic and master plans as well as conceptual studies, conceptual drawings, initial and preliminary designs, and others. A comprehensive study on infrastructural systems (water, wastewater, sewage, electrical, mechanical, internal roads, landscaping etc), connection lines and tunnels, their adequacy to the context, and reliability, their performance and capacity etc. will be done by the Consultant. The needs of supplying all necessary infrastructure connections will be considered and an assessment report comprising all above studies will be submitted to the Client detailing the findings of the review of existing inbound documents.

Conduct additional surveys and studies and collect required data: Based on the review of the existing studies, and in consultation with the Client, the Consultant shall collect relevant data for design process. If additional data is required Consultant shall contact the relevant Authorities. The input data and documents for the development of the Main and Detail Design for the new hospital building shall be in accordance with national and international standards, applicable EU Legislation and meet the technical requirements and the specific functions of the units as well as the requirements of the MoH for all the architectural, structural, mechanical, and electrical designs

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together with the onsite and off-site infrastructural works. Main and Detail Design shall be developed in line with the Project ESMF, WB ESF, GIIP and WB Environmental Health and Safety Guidelines (EHSg), those on life and fire safety, energy conservation, water conservation, hazardous materials and hazardous waste management, noise impact prevention, emergency prevention and response, noise, indoor air quality and other applicable, as well as Good International Industrial Practices and national regulation, stricter requirements prevailing. All activities carrying with high-risk risks and impacts (as defined in the WB ESMF in any life-cycle phase of the sub-project) and land expropriation and/or involuntary resettlement shall be excluded from the design stage. The design process shall also consider the Project's requirements and EU and Bank's recommendations on Climate Change impact minimization as well as building's resistance to natural disasters and impacts attributable to Climate Change.

Limited geotechnical tests have been performed and Consultant will have access to the results. The Consultant will make new geotechnical investigation, by means of site surveys, soil tests, laboratory tests, and shall prepare the geotechnical report complying with the current regulations of MoPPCSA, if the review establishes that the existing results and documents are not sufficient and relevant for the development of the Main Design. Before the site surveys, soil tests, laboratory tests, the Consultant shall inform the Client in advance and take the approval from the Client about the location of the boreholes. Preparation works shall also be carried out in line with the WB ESF and be particularly mindful of OHS requirements, community health and safety as well as the sensitive location setting.

Existing infrastructure: The Consultant will collect and prepare documentation of existing infrastructure on the site (electrical lines, water and sewage pipelines, central heating pipelines etc.) that should be a part of Main Design documentation and important input data for all designers. There are currently several buildings on the construction site (a hospital pharmacy and kitchen, other smaller facilities) consisting of several above-ground volumes and a common underground part connected with other buildings with underground corridors. Therefore, the Consultant will collect documentation, textual and graphical parts, which should be part of Main Design documentation and important input data for design. The Consultant will also collect relevant environmental information, e.g., presence of asbestos, lead pipes, radon releases, historical contamination, etc. The Consultant will confirm that no additional land will be expropriated and that all construction activities will be within the existing footprint.

Examine site: Before the commencement of the design works, the awarded Consultant is expected to examine the construction sites and collect the required inputs and cadastral documents topographical survey, deed, layouts, cadastral extract, existing approvals issued for Conceptual Design prepared by Gradit d.o.o., occupation permits, plans, survey, etc to make the required analyses, evaluations, and design.

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Other Services: Water tanks, car parks, medical waste depots, watchman's cabins, heating centers transformer and generator buildings, access road, and helipad shall be considered within the scope of the project, and complete solution for medical gas and air-conditioning projects shall be prepared, as well.

Space program: Working with the Client, the Consultant will check once again the coordinated designed solution of the spatial layout of the functional parts of the building, with a list of all functional spaces, including evacuation routes and communication corridors, check the indicated surfaces necessary for each function performed in the space, as well as their functional requirements and interdependence with another space / function. As the Client previously coordinated this part, an overview, introduction, confirmation, and review will now be carried out, which will ultimately serve as the basis for further design and development of the Main and Detail Design.

**Universal design access: The needs of handicapped people will be reflected in all designs through adoption of universal design standards and fully adapt into the design.**

**Develop a Comprehensive Condition Assessment Report (Inception Report): A written narrative** with appropriate photographic material discussing the feasibility of the project, special problems and opportunities will be developed once this stage is completed.

Participate, as deem needed, in public consultations on the Project's environmental and social aspects (early public consultations). Ensure that all relevant feedback from the public consultation process is incorporated into design.

This task will be done in parallel with task 1 and task 2 as indicated in section IV.

**TASK 4: Development of the monthly reports**

Monthly reports shall be prepared in accordance with the EIR and post-appointment BEP (ANNEX 3) and in timely manner.

Monthly reports are the monthly meeting preparation material and shall be submitted through the CDE.

Submitted reports will be reviewed by the Client and approved or returned for revision and/or resubmission.

**TASK 5: Participation on the meetings**

The initial meeting, during which both the Client and the Consultant shall present their respective teams and agree on the forms of communication that they will use, the exact dates of monthly and other meetings etc. The initial meeting shall be held a few days after the date on which the contract

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governing the Consultant's engagement for the Services (hereinafter the Contract) enters into force.

Monthly meetings, which shall be held a few days after the submission of the monthly report by the Consultant and according to the agreed post-appointment BEP.

Ad-hoc meetings, which the Client or Consultant convenes or announces to the other party few days in advance in writing with a draft agenda for that meeting attached.

The Consultant shall prepare draft minutes of each meeting held and distribute them to the Client. The Client shall provide comments on those draft minutes.

**TASK 6: Preparation and holding BIM training and software licenses purchase**

The BIM Personnel included in project delivery must have adequate BIM knowledge and skills which need to be supported by valid certificates, diplomas, etc. If this is not met, project delivery team must acquire the necessary BIM knowledge and BIM skills. Thus, if necessary, training and education needs of the project delivery team involved in the production, analysis and review of the BIM models shall be assessed and recorded according to the requirements in the EIR (ANNEX 3).

BIM training materials shall be prepared, and BIM training shall be hold in accordance with the EIR and post-appointment BEP (ANNEX 3) and in timely manner.

In the training program Consultant shall include up to 10 additional persons (Client's staff) who must acquire knowledge and skills in BIM software.

The training program shall also include training of all involved project participants to use the established CDE.

The Consultant shall also purchase 4 licenses for BIM software which will be used for BIM model creation (domain specific models and federated BIM model) and for all BIM uses delivery.

**TASK 7: Development of Main Design (including textual and graphical part, other studies necessary for obtaining Building Permit, specifications, and consolidated cost estimates)**

The Consultant shall prepare the models, designs, drawings and documentation at the level of development of the Main Design (specified in the ANNEX 3), for all architectural structural, electrical, mechanical, HVAC, fire protection, security system, elevator, physics of the building, etc. components of the Public Health Facilities in accordance with the approved Conceptual Design and submit to the Client for approval together with the required calculations, reports and

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implementation details considering technical requirement and international and national specifications in compliance with the building codes.

The Consultant will also consider the development and results of the Technological Project/Study (Medical and Non-Medical Equipment Design), which is an integral part of the Main Design regard to the specificity of the purpose of the building, and when elaborating the entire Main Design, the characteristics and requirements of this equipment will be considered in its entirety. In other words, all parts of the Main Design will be aligned with each other.

In addition to meeting requirements of national and EU regulation, the Main Design will also include requirements of WB ESF, WB EHSG and GIIP on energy efficiency, indoor air quality, and other relevant sectors, as well as stricter one prevailing. The design shall consider the Project's requirements of relevant national environmental and community and occupational health EU and safety regulations Bank's recommendations on Climate Change impact minimization as well as building's resistance to natural disasters and impacts attributable to Climate Change.

Main Design and other studies necessary for obtaining Building Permit for the CHC Rebro Project, will mandatorily include, but not be limited to:

1. Architectural Design (in line with the BIM environment – **ANNEX 3**)
2. Structural Design (in line with the BIM environment – **ANNEX 3**)
3. MEP and HVAC Design including Project of Medical Gases (in line with the BIM environment – **ANNEX 3**)
4. Electrical and Mechanical Substation Design (in line with the BIM environment – **ANNEX 3**)
5. Mechanical Sprinkler Design (in line with the BIM environment – **ANNEX 3**)
6. Elevators Design (in line with the BIM environment – **ANNEX 3**)
7. Architectural Landscape and Horticulture Design (in line with the BIM environment – **ANNEX 3**)
8. Technical Protection System Design (in line with the BIM environment – **ANNEX 3**)
9. Geodetical Design (in line with the BIM environment – **ANNEX 3**)
10. Helipad Design (in line with the BIM environment – **ANNEX 3**)
11. Non-Medical Equipment Design including Technological Study of Non-Medical Equipment (in line with the BIM environment – **ANNEX 3**)
12. Medical Equipment Design (in line with the BIM environment – **ANNEX 3**)
13. Geotechnical Design (in line with the BIM environment – **ANNEX 3**)
14. Consolidated Cost estimates of all Designs (included in the separate projects and consolidated in the Architectural Project)
15. Physics of the Building and Noise Reduction Study

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16. Fire Measures Study
  17. Work Safety Study
  18. Building Energy Efficiency Study and Building Energy Certificate
  19. Obtaining all required approvals, certificates and permits, including Building Permit and obligations in obtaining a building act, in accordance with positive regulations

To effectively manage the project information, information model needs to be divided into its component parts according to the agreed data segregation and breakdown structure in the post-appointment BEP. The Main Design parts can be arranged through several project books/folders, i.e., some of the above projects contain several folders. The Main Design will necessarily contain the following parts, under the projects listed above.

All data on the building or part therein, as well as calculations and solutions, depending on the tasks of the profession in accordance with a special law, are contained in the relevant projects of individual professions, namely in:

- technical description;
- evidence of compliance with basic and other requirements, calculations of mechanical resistance and stability, hydrodynamic and thermodynamic calculations, calculations of thermomechanical systems and equipment, physical properties and others, and other calculations and appropriate methods proving that the building was designed in accordance with the provisions of the enforced regulations (evidence of compliance with basic and other requirements);
- quality control and assurance program with conditions for fulfilling the basic requirements for the building during construction and maintenance of the building (quality assurance procedures, testing program, etc.);
- special technical building conditions, specific technical conditions for the management of construction waste generated during construction and removal of the building or part therein, and specific technical conditions for the management of hazardous waste, if hazardous waste occurs during construction, use or removal of the structure and
- a statement of estimated construction costs, all in accordance with ESMP.

Each corresponding project of a particular profession must contain an account of the estimated construction costs for the part of the building to which it relates. Construction costs estimation shall be consolidated in the Architectural Design.

In the first map of the Main Design must be data for the calculation of municipal and water contributions in accordance with special regulations.



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The shape and size of the building or part of it, the installation and equipment when it is designed, as well as their mutual position and position in the space shall be graphically displayed according to requirements defined in the **ANNEX 3**.

Mandatory drawings and schedules for Main Design stage are defined in the **ANNEX 3**.

All models, projects, studies, and other relevant documentation shall be submitted to the Client electronically through the project CDE (according to the requirements stated in the EIR and agreed post-appointment BEP) and be relevantly signed by authorized persons (certified engineers).

The Consultant shall deliver all required documents related to Main Design in 5 hard copies in Croatian language while English versions will be submitted only through the CDE.

**TASK 8: Development of Detail Design (including textual and graphical part, technical specifications, and Bill of Quantities for Detail Design)**

The Consultant shall prepare the models, designs, drawings and documentation at the level of development of the Detail Design (specified in the **ANNEX 3**), for all architectural structural, electrical, mechanical, HVAC, fire protection, security system, elevator, physics of the building, etc. components of the Public Health Facilities in accordance with the approved Main Design and submit to the Client for approval together with the required calculations, reports and implementation details considering technical requirement and international and national specifications in compliance with the building codes.

In addition to meeting requirements of national and EU regulation, the Detail Design will also include requirements of WB ESF, WB EHSG and GIIP on energy efficiency, indoor air quality, and other relevant sectors, as well as stricter one prevailing. The design shall consider the Project's requirements of relevant national environmental and community and occupational health EU and safety regulations Bank's recommendations on Climate Change impact minimization as well as building's resistance to natural disasters and impacts attributable to Climate Change.

Detail Design for the CHC Rebro Project, will mandatorily include, but not be limited to:

1. Architectural Design (in line with the BIM environment – ANNEX 3)
2. Structural Design (in line with the BIM environment – ANNEX 3)
3. MEP and HVAC Design including Project of Medical Gases (in line with the BIM environment – ANNEX 3)
4. Electrical and Mechanical Substation Design (in line with the BIM environment – ANNEX 3)
5. Mechanical Sprinkler Design (in line with the BIM environment – ANNEX 3)
6. Elevators Design (in line with the BIM environment – ANNEX 3)

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7. Architectural Landscape and Horticulture Design (in line with the BIM environment – ANNEX 3)
  8. Technical Protection System Design (in line with the BIM environment – ANNEX 3)
  9. Geodetical Design (in line with the BIM environment – ANNEX 3)
  10. Helipad Design (in line with the BIM environment – ANNEX 3)
  11. Non-Medical Equipment Design (in line with the BIM environment – ANNEX 3)
  12. Medical Equipment Design (in line with the BIM environment – ANNEX 3)
  13. Geotechnical Design (in line with the BIM environment – ANNEX 3)

To effectively manage the project information, information model needs to be divided into its component parts according to the agreed data segregation and breakdown structure in the post-appointment BEP. The Detail Design parts can be arranged through several project books/folders, i.e., some of the above projects contain several folders. The Detail Design will necessarily contain the following parts, under the projects listed above.

All data on the building or part therein, as well as calculations and solutions, depending on the tasks of the profession in accordance with a special law, are contained in the relevant projects of individual professions, namely in:

- technical description;
- evidence of compliance with basic and other requirements, calculations of mechanical resistance and stability, hydrodynamic and thermodynamic calculations, calculations of thermomechanical systems and equipment, physical properties and others, and other calculations and appropriate methods proving that the building was designed in accordance with the provisions of the enforced regulations (evidence of compliance with basic and other requirements);
- quality control and assurance program with conditions for fulfilling the basic requirements for the building during construction and maintenance of the building (quality assurance procedures, testing program, etc.);
- special technical building conditions, specific technical conditions for the management of construction waste generated during construction and removal of the building or part therein, and specific technical conditions for the management of hazardous waste, if hazardous waste occurs during construction, use or removal of the structure and;
- a statement of estimated construction costs, all in accordance with ESMP.

The shape and size of the building or part of it, the installation and equipment when it is designed, as well as their mutual position and position in the space shall be graphically displayed according to requirements defined in the **ANNEX 3**.

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Mandatory drawings, schemas and schedules for Detail Design stage are defined in the **ANNEX 3**.

Bill of Quantities for Detail Design shall be made in line with the requirements (including structure) defined in the EIR (**ANNEX 3**).

Bill of Quantities for medical and non-medical equipment should be separately extracted according to level of development stated in the EIR (**ANNEX 3**).

All models, projects, studies, and other relevant documentation shall be submitted to the Client electronically through the project CDE (according to the requirements stated in the EIR and agreed post-appointment BEP) and be relevantly signed by authorized persons (certified engineers).

Detailed technical specifications of works, materials, systems, and equipment which must be provided by the Consultant. As part of the construction contract, the contractor will elaborate the construction documentation, all based on the completed design: the obtained Building Permit, the Main Design, and the Detail Design (including developed technical specifications and Bill of Quantities). Based on Bill of Quantities (for Detail Design stage), the future contractor will offer works and the necessary project documentation. The quality of technical specifications is key to the success of the project in the construction phase. It is about specifying all the requirements over materials, works, system and equipment.

**TASK 9: Development of Bidding Document (for construction phase)**

Bidding Document will be prepared based on Detail Design and related documentation.

Consultant shall be trained and ready to prepare the Bidding Document for construction phase in accordance with the BIM principles.

The Consultant shall participate in preparation of the Bidding Document related to the construction contract in accordance with the World Bank regulations and Standard Procurement Documents in parallel to the previous stages stipulated above. Bidding Document shall include but not limited to: BIM models, Technical Specifications, Bill of Quantities for Detail Design, final Detail Design, system/detailed drawings, etc., textual parts, relevant environmental and social documents as developed by the Client's environmental and social specialists.

The Consultant shall participate in preparation of the Bidding Document in close cooperation with the Client and with due care and diligence. Any of the items in these documents shall not contradict with each other and all material specifications shall be in accordance with the specifications of the Croatian standards and/or international standards.

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The Consultant shall prepare the BIM models, designs, plans, technical specifications, Bill of Quantities for Detail Design, medical and non-medical equipment list, Bidding Document, etc. and all additional technical documents in such a way that the necessity for variation orders during the construction stage is minimized.

The final version of the ESMP prepared for the sub-project shall become an integral part of the Bidding Document.

The Consultant shall make any reasonable modification to models, drawings, documents, reports, etc. as may be approved by the Client during the various stages of approval.

Formats of Bidding Document shall be in accordance with EIR and post-appointment BEP.

Upon the completion and approval of the design studies and Bidding Document stated above, the prospective Contractors will be invited by the Client with a public Procurement Notice for the submission of bids in accordance with the Bank Standard Procurement Documents.

MoPPCSA together with Rebro and MOH will be responsible for evaluation of bids.

**TASK 10: Services related to medical and non-medical equipment**

The Consultant shall separately indicate the staff to be assigned for preparation of lists for medical and non-medical equipment by indicating positions and planned services for each staff in their proposal.

The Consultant is responsible for the establishment of a design group for development of Medical Design and Non-Medical Equipment Design who is experienced in the assembly, installation, testing and commissioning of the medical and non-medical equipment.

The list of the medical and non-medical equipment shall be defined in coordination with MoH and CHC Rebro and discussed with the Client.

The Consultant is expected first to define the extent and type of the medical and non-medical equipment to be installed in the new hospital building in coordination with the MoH and CHC Rebro, and in accordance with the specifications of the first-class materials satisfying the Croatian standards, applicable EU Legislation, if not international standards. Thus, the Consultant shall consult with the CHC Rebro and MoH to assess its requirements regarding the medical and non-medical equipment to be procured and then compile and submit a detailed list and cost estimates of the proposed list of the medical and non-medical equipment together with draft room equipment lists and room equipment layouts by comparing with already constructed in other hospitals in

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Croatia. Such room equipment lists/layouts will also indicate the furniture that will be necessary for the support and use of the whole sort of equipment specified.

Room equipment lists and layouts will be prepared by the Consultant and shall follow the Main and Detail Design of the relevant health facilities. On these layouts, necessary furniture in connection with the non-medical equipment to be installed shall also be shown as mentioned above. Required level of development for Medical and Non-Medical Equipment Design is defined in the **ANNEX 3**.

During the preparation of the final documents in relation with medical and non-medical equipment, the Consultant shall also consider the mechanical, electrical, and other engineering designs of the buildings and make necessary revisions on such designs accordingly to minimize the problems which might be faced during the installation and assembly of the medical and non-medical equipment in the health facilities.

Consultant is also responsible for coordination with MoH and CHC Rebro regarding installation and meeting the condition for the construction of the medical equipment.

The delivery time schedule for the medical and non-medical equipment (including furniture) shall also be provided by the Consultant to avoid any interruption in the construction progress.

All documents connected with the medical and non-medical equipment shall be part of Medical Design and Non-Medical Equipment Design and be in accordance with the requirements in the TASK 7, TASK 8, EIR (**ANNEX 3**) and agreed post-appointment BEP. Medical and non-medical equipment shall also be included in Bill of Quantities as stated in TASK 7, TASK 8 and EIR (**ANNEX 3**).

**TASK 11: Design supervision (during construction phase)**

Each of the engineers included in the design (architect, civil engineers, mechanical engineers, electrical engineers, etc.) shall perform design supervision over the construction works which are authorized to supervise. The Design supervision is the supervision service performed by the designer (or rather team of designers) that has produced the overall project documents, during the construction works and with regards to the intricacies of form-giving and construction, that cannot be unambiguously determined by the project documents but require additional engagement of designers on-site.

The Design supervision involves professional management and control of the full and consistent realisation of the design adopted, in all the elements that are an integral part of the Main and Detail Design as mandatory parts of the project documentation, as well as in all the elements that are,

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pursuant to the legislation, not obligatory part of the project documentation serving as the basis for the work construction and being a significant project determinant adopted by the Client.

The participation of project designers (or rather the team of project designers) that has produced the overall project documentation in the work construction stage or rather in performing the tasks of the design supervision, is of crucial importance for good design realisation and correct interpretation and clarification of design solutions defined by project documentation.

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

- i) The Consultant shall perform the design supervision service over the work construction with regards to details of form-giving and construction; project clarification and finding solution variants if the intervention and screening of the AS-IS situation yield differences with regards to the presumed situation based on which the Main and Detail Design have been developed, all in accordance with the Project documentation that is an integral part of this Contract. Design supervision involves the service of supervision, professional guidance, and control of the full and consistent realisation of the accepted design in all its elements, and clarification of design solutions defined by project documentation.
- ii) Office work developing design variants in case that, due to the discovered AS-IS situation, the design offered needs to be changed, at the request of the civil works expert supervisor or the Client.
- iii) Promptly inform the Client, expert construction supervisor and Contractor about all the errors that have arisen during the construction, especially the ones deviating from the project documents.
- iv) Collaborate with the expert construction supervisor in resolving certain technical issues, which also includes the need to modify parts of the Detail Design solutions. This refers to the design interpretation and work performance control in terms of whether the works are conducted in accordance with the design, production of additional sketch details not included in the Detail Design, as needed, and production of additional design solutions with regards to AS-IS situations during the work performance to ensure a smooth and uninterrupted workflow.
- v) Giving instructions to the Contractor for correct, good, and as cost-effective as possible work performance according to the approved designs and possible subsequent amendments and in accordance with the modern building technology, valid legislation, quotas and standards.
- vi) Mandatory participation in the technical control process and the process of the issuance of the Usage Permit.
- vii) Reviewing, for the purpose of obtaining consents, all the work and construction drawings prepared by the Contractor, double-checking their conformity to the World Bank

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Environmental and Social Standards, with the World Bank Environmental, Health and Safety Guidelines and with Good International Industry Practice, OHS, environment and other relevant legislation, WB policies, WB EHS, GIIP, and documents (ESMP- Environmental and Social Management Plan, SEP - Stakeholder Engagement Plan).

viii) Performance of other works, if so, authorised by the Client.

The Client may ask the Consultant to perform other tasks that conform to the above-mentioned scope.

**TASK 12: Other duties of the Consultant**

In addition to the duties outlined in the preceding paragraphs relating to the Project components, the Consultant shall also carry out the following duties on behalf of the Client:

- i) Investigate and obtain available data and information relating to the Project and to the specific components thereof.
- ii) Co-operate with and assist the Client as may be required in obtaining consents from outside persons having rights or powers in connection with the Project works for such works.
- iii) Application to the local or other relevant authorities for the principal issues regarding the design of project components.
- iv) Prepare the necessary documents required for obtaining the Building Permit or other relevant authority and assist the Client.
- v) Provide recommendations to the Client by making necessary evaluations on investigations or tests that might be required for the proper designing of the works covered by the project.
- vi) Make any reasonable modification to documents, reports, etc. as may be approved by the Client during the various stages of approval.
- vii) Attend any meetings reasonably requested by the Client and provide any information or evidence reasonably required by the Client at any inquiries in connection with the Project.
- viii) Since the similar construction works may also be supervised by other Consultant in other sites, the Consultant shall co-operate with the other Consultant and join the meetings whenever required by the Client.
- ix) The Consultant shall take necessary measures for environmental, community and health and safety aspects and work closely with experts preparing ESMP for the sub-project.
- x) Awarded Consultant and their nominated sub-Consultant (if applicable) shall have a local branch office in Zagreb for the construction of works (corresponding letters, printing or plotting of project document, etc.).
- xi) The Consultant is expected to utilize their existing resources to cover any accommodation for the Consultant' staff; vehicles, drivers, fuel and vehicle maintenance, unskilled labour needed as helpers for surveys and quality control.
- xii) The Consultant shall nominate technical auditor in line with local legislation.

#### IV. SUBMISSION AND TIME SCHEDULE FOR DELIVERABLES, CONTRACT DURATION, AND REPORTING REQUIREMENTS

During the design phase Consultant shall prepare and submit appropriate deliverables (designs, details, calculations, reports, specifications, models, studies, and other documents) to the Client for approval. All deliverables shall be submitted through the CDE according to the requirements in the EIR and post-appointment BEP.

Time schedule for deliverables is as follows (days listed below are calendar days):

No	Name of deliverables	Days/Months	Responsible for submitting	Responsible for reviewing and approving	Timeline for approval
1	Post-appointment BIM Execution Plan – BEP (according to the requirements stated in the ToR and EIR)	fifteen (15) days after Commencement of Services	Consultant	Client	fifteen (15) days after submission
2	Common Data Environment (CDE) (according to the requirements stated in the EIR and agreed post-appointment BEP)	fifteen (15) days after agreed post-appointment BEP	Consultant	Client	fifteen (15) days after submission
3	Inception Report (according to the requirements stated in the ToR)	thirty (30) days after Commencement of Services	Consultant	Client	fifteen (15) days after submission
4	Monthly report (according to the requirements stated in the ToR, EIR, and agreed post-appointment BEP)	monthly	Consultant	Client	fifteen (15) days after submission



5	BIM training materials and software licenses (according to the requirements stated in the ToR, EIR, and agreed post-appointment BEP)	thirty (30) days after Commencement of Services	Consultant	Client	fifteen (15) days after submission
6	Main Design (including BIM models, textual parts, studies, drawings, QTO, and BoQ for Main Design stage, according to the requirements stated in the TASK 7, EIR, and agreed post-appointment BEP)	ninety (90) days after delivery of Inception report	Consultant	Client	fifteen (15) days after submission
7	Permits (obtaining all required approvals, certificates and permits, including Building Permit)	thirty (30) days - target	Consultant	Client	fifteen (15) days after submission
8	Detail Design (including BIM models, textual parts, studies, drawings, QTO, and BoQ for Detail Design stage according to the requirements stated in the TASK 8, EIR, and agreed post-appointment BEP)  Obtaining the Client's approval of the Detailed Design	ninety (90) days after approval of Main Design by relevant public authorities	Consultant	Client	fifteen (15) days after submission

	Bidding Document for execution phase (including documentation in TASK 9, EIR, and agreed post-appointment BEP)				
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Consultant shall ensure completion of the Consultant’s services on time and without any delay. Also, all deliverables prepared in connection with the service (plan, workshop, study, dispositions, designs, details, calculations, reports, specifications) shall immediately upon completion be submitted to the Client for its review and approval. The Client will review and approve or return deliverables for revision and/or resubmission within ten (10) working days or any other period defined by the Client upon receiving each of the deliverables.

In the Contract, the Consultant shall assign all intellectual property rights of its work to the Client, including intellectual property rights of any deliverable which Client finds unacceptable and for which it refuses payment.

The estimated period for providing the services is nine (9) months for all services apart from design supervision. It is planned that the Consultant shall provide the services of design supervision during the execution of the works, which means until the Taking-Over Certificate for the Works is issued, which also includes the period of implementation of the technical control until obtaining the use permit.

**V. CONSULTANT FIRM’S MINIMUM QUALIFICATION AND EXPERIENCES**

The Consultant shall be a firm or association of firms in the form of a joint venture or sub consultancy with following qualifications (in case of joint venture only the experience of lead Consultant firm and joint venture members is considered for evaluation of Expressions of Interest):

- proven general experience in production of project documentation for construction works (Main Design, Detail Design) in the last ten (10) years;
- proven specific experience in production of project documentation (Main Design, Detail Design) for at least five (5) construction projects in the last ten (10) years. Acceptable projects are investments of at least EUR 15 million;
- experience in production of project documentation for construction works for hospital facilities/buildings (public or private) in the last ten (10) years is considered as an advantage - projects which are being considered are investments for facilities/buildings of at least total gross area of 15.000 m<sup>2</sup>;

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- experience in using BIM in production of project documentation for construction works for hospital buildings is considered as an advantage - only hospital designs using BIM with issued Building Permits can be used as relevant qualifications;
  - due to complexity of legal framework of the project, the Consultant will provide evidence that the lead firm or joint venture member has experience providing design services using BIM (**ANNEX 3**) in Croatia or the region (European Single Market countries only);
  - experience with providing design service within European directives legal framework and metric system is mandatory;
  - the Consultant shall demonstrate average annual turnover during the last three (3) years (2018, 2019 and 2020) of at least 3.000.000 EUR per year.

The credibility of mentioned experience shall be presented in a list of at least five (5) project references within last ten (10) years with description of services provided (including information on contract value, contracting entity/client, project location/country, period of providing the services, value of investment, percentage carried out by consultant in case of association of firms or subcontracting and main activities) and accompanied by certificates of orderly fulfilment of the contracts verified by other party from such contracts.

The credibility of mentioned experience for using BIM shall be presented in a list of minimum three (3) reference hospital projects designed using BIM from the past ten (10) years that will contain the Main Design relevant information, country/province, project value, provided consultancy (in much detail as possible, but still concise), and other important technical attributes.

As proof for the required annual turnover the Consultant shall submit official financial statements which contain relevant data (e.g. Profit and Loss Statement, Annual Financial Report, Audit Report etc.).

The Consultant shall have the organizational capacity (it is expected that the Consultant shall have at least twenty (20) employees/sub-contracted experts for performing activities under this service) to perform this service as well as available appropriate skills among staff. It is expected that the Consultant submits information on their organizational capacity in their Expression of Interest.

Consultants may associate with other firms to enhance their qualifications but should indicate clearly whether the association is in the form of a joint venture and/or a sub-consultancy. In the case of a joint venture, all the partners in the joint venture shall be jointly and severally liable for the entire contract, if selected. If the formation of an association is proposed, the rationale for, and benefits to the assignment of, the arrangement should be explained (outline proposed management coordination of the arrangement, including the role of each firm). Joint venture qualification parameters will be considered as a sum of individual qualifications of joint venture members.

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Joint venture members must fulfil the following minimum qualification requirement subject to fulfilment of 100% qualification criteria as given above - each member shall meet not less than 10% of the qualifying criteria for annual turnover above on average for the last three (3) years (2018, 2019, 2020). This requirement is only for purpose of shortlisting.

## **VI. TEAM COMPOSITION AND QUALIFICATIONS OF KEY EXPERTS**

Key experts must have sufficient competences, the staffing should comprise the skills and qualifications listed in this section, to fulfil the stated outputs and objectives.

Key experts may be from any of the joint venture members or subcontractors (or engaged otherwise by a leading company).

It is expected that the core team shall comprise of following key experts who meet listed qualification criteria:

- i. **Team Leader / Main Architect / Designer** shall have:
  - university degree in architecture;
  - minimum fifteen (15) years of experience in design;
  - minimum ten (10) years as main designer/main architect;
  - experience in leading design management of two (2) or more public projects in size larger than 25.000 m<sup>2</sup>;
  - proven communication skills and ability to work with Government counterparts and management;
  - proven competency in participatory approach;
  - direct skills experience in at least one of the technical aspects of the services.
  
- ii. **Co-Team Leader / Healthcare Design Expert** shall have:
  - minimum ten (10) years of experience in definition and design of healthcare facility layouts, principles, specifications, and relevant building requirements.
  
- iii. **Senior Architect** shall have:
  - university degree in architecture;
  - at least ten (10) years of professional experience in architectural design in public buildings;
  - experience in designing hospitals at least two (2) objects of 15.000 m<sup>2</sup> or more;
  - minimum three (3) years of working experience in BIM.
  
- iv. **Senior Structural Engineer - Seismic and High-Rise Expert** shall have:

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- university degree in civil engineering;
  - at least 10 (ten) years of experience in design of similar public buildings;
  - relevant experience in seismically active areas where Peak Ground Acceleration PGA/(g) is above 0,15 in 10% Exceedance Probability in 50 years, according to Seismic Hazard Harmonization in Europe (SHARE).
- v. **Mechanical Engineer 1** shall have:
- university degree in mechanical engineering;
  - relevant experience in hospital design may be considered as advantage;
  - at least fifteen (15) years of professional engineering experience in mechanical design of public buildings.
- vi. **Electrical Engineer 1** shall have:
- university degree in electrical engineering;
  - at least fifteen (15) years of professional engineering experience in electrical design of public buildings.
- vii. **Hospital Technology Specialist** shall have:
- university degree in architecture or engineering;
  - at least ten (10) years of professional experience in hospital technology design for hospitals of a similar size and complexity as described in this ToR.

Following experts are considered non-key experts who meet listed qualification criteria:

- i. **Mechanical Engineer 2** shall have:
- university degree in mechanical engineering;
  - at least ten (10) years of professional engineering experience in mechanical design of public buildings;
  - minimum (3) years of working experience in BIM.
- ii. **Electrical Engineer 2** shall have:
- university degree in electrical engineering;
  - at least ten (10) years of professional engineering experience in electrical design of public buildings;
  - minimum three (3) years of working experience in BIM.
- iii. **Environmental Specialist** shall have:
- university degree in environmental engineering or science, biology or relevant technical or natural sciences;

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- at least five (5) years of experience in environmental safeguards, environmental assessments, and similar.
- iv. **Social Specialist** shall have:
- university degree in social sciences;
  - at least five (5) years of experience in social safeguards, social impact assessments, community outreach/consultations, and similar.
- v. **Fire Prevention Specialist** shall have:
- local licence as Fire Prevention Specialist;
  - at least ten (10) years of professional experience in fire prevention practice.

Team Leader / Main Architect / Designer will be responsible for the integrity and coordination among all projects and designers, as well as leading and being responsible for the performance of all Consultants under this ToR.

In addition to the minimal required project staff defined above, the Consultant shall assess and provide other sufficient design and supporting staff.

## **VII. INPUT DOCUMENTS AND SUPPORT TO BE PROVIDED BY THE CLIENT**

Input documents provided by the Client are Conceptual Design (**ANNEX 1**) and already issued approvals and permits (Cro: posebni uvjeti gradnje, **ANNEX 2**).

The Client shall, where possible, assist the Consultant in obtaining approvals, permissions from State Authorities in respect of the Services to be performed.

MoPPCSA will also provide support in obtaining data, maps and supporting materials from other Ministries.

The Consultant shall return to the Client all documents if any received from the Client following the completion of the Services to be performed.

## **VIII. OFFICIAL LANGUAGE**

The language for communication and for project deliverables (graphical data, non-graphical data, and documentation) shall be English while the language of the Building Permit application shall be Croatian.

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## **IX. LIST OF ANNEXES**

### **ANNEX 1 – Conceptual Design**

#### **RECONSTRUCTION OF CHC ZAGREB – REBRO / Upgrade of III. phases of the hospital building and construction of auxiliary buildings - above-ground garages**

(REKONSTRUKCIJA CHC ZAGREB – REBRO / Dogradnja III. faze bolničke zgrade te izgradnja pomoćne građevine – nadzemne garaže)

#### **CONCEPTUAL DESIGN**

(IDEJNI PROJEKT za utvrđivanje posebnih uvjeta i uvjeta priključenja)

Conceptual Design prepared and submitted by Gradit doo is due to its size attached to this TOR as a separate .pdf file “KBC Rebro\_Faza III i garaza\_IP\_dorada 2.11.2021.\_potpis.pdf”.

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## **ANNEX 2 – Already issued approvals and permits (posebni uvjeti gradnje)**

As stated in the Conceptual Design, in Annex 1.



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## **ANNEX 3 – Exchange Information Requirements (EIR)**

### **1. INTRODUCTION**

Building Information Modeling (BIM) is a process for creating and managing information on a construction project throughout its whole life cycle. In doing so, BIM model is the basis of BIM process which represents physical and functional characteristics of a facility. Thus, BIM model integrates all the graphical and non-graphical data and enables a centralized repository as well as place for sharing information among project stakeholders. The Client demands BIM usage on this project to enable improved design and construction coordination and collaboration; cost and risk reduction; space and facilities management.

#### **1.1. Document purpose**

The Exchange Information Requirements (EIR) is an important element of BIM implementation on the project level and is used to set out clearly to the project team what information (models, documents, and data) is required at each stage of the project. In first instance, during the design stage, the project BIM Execution Plan (BEP) will provide a detailed account of how the deliverables stated in the EIR are to be achieved, each team member's responsibility and allocation of said deliverables according to discipline and specialism. Thus, the EIR set out all information deliverables (models, documents, and data) including traditional project documents, surveys, reports, and appraisals.

Consultant shall adopt BIM for the planning and design of project, ensure all deliverables are in full compliance with the clauses of this EIR to achieve the objective to the satisfaction of the Client. Consultant shall cooperate and work closely with other project parties and the Client and its's representatives to ensure that the works and deliverables are in full compliance with the specified requirements of BIM and that the deliverables are submitted on time, high quality and within budget. Consultant is required to resolve any discipline-based and interdisciplinary conflicts in the BIM models and ensure the BIM models are accurate and verified.

#### **1.2. Responding to this document (EIR)**

This EIR should be responded via the pre-appointment and post-appointment BIM Execution Plan (BEP). Thus, the BEP is a direct response to the EIR. The pre-appointment BEP must be prepared by shortlisted Consultants during the preparation of their Technical Proposals (in the phase which takes place after evaluation of Expressions of Interest) while the post-appointment BEP is produced 15 days after Commencement of Services only by the contracted Consultant (as stated in previous section of this ToR). Therefore, any reference to the pre-appointment BEP in this document relates to the phase of preparation of Technical Proposals and all requirements on preparing the pre-appointment BEP will be part of the Request for Proposal (which is issued to shortlisted Consultants).

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During the phase of preparation of Expression of Interests interested Consultants should only elaborate their experience in using BIM as indicated in the Request for Expression of Interest.

### **1.3. General Project Information**

General project information is stated in the first paragraph of ToR (I. Project Background).

## **2. INFORMATION MANAGEMENT**

In this section general requirements for information management are stated.

### **2.1. Standards and classification**

The relevant standards for BIM usage on the project are listed below:

1. HRN EN ISO 19650-1:2019 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) -- Information management using building information modelling -- Part 1: Concepts and principles (ISO 19650-1:2018; EN ISO 19650-1:2018).
2. HRN EN ISO 19650-2:2019 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) -- Information management using building information modelling -- Part 2: Delivery phase of the assets (ISO 19650-2:2018; EN ISO 19650-2:2018).
3. HRN EN ISO 19650-3:2020 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) -- Information management using building information modelling -- Part 3: Operational phase of the assets (ISO 19650-3:2020; EN ISO 19650-3:2020).
4. HRN EN ISO 19650-5: 2020 Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) -- Information management using building information modelling -- Part 5: Security-minded approach to information management (ISO 19650-5:2020; EN ISO 19650-5:2020).
5. HRN EN ISO 16739: 2016 Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries (ISO 16739:2013; EN ISO 16739:2016)
6. HRN EN ISO 16739-1:2020 Industry Foundation Classes (IFC) for data sharing in the construction and facility management industries -- Part 1: Data schema (ISO 16739-1:2018; EN ISO 16739-1:2020).
7. HRN EN ISO 29481-1:2017 Building information models -- Information delivery manual -- Part 1: Methodology and format (ISO 29481-1:2016; EN ISO 29481-1:2017).
8. HRN EN ISO 29481-2:2016 Building information models -- Information delivery manual -- Part 2: Interaction framework (ISO 29481-2:2012; EN ISO 29481-2:2016).

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9. HRN EN ISO 12006-3:2016 Building construction -- Organization of information about construction works -- Part 3: Framework for object-oriented information (ISO 12006-3:2007; EN ISO 12006-3:2016).
  10. HRS CEN/TS 17623:2021 BIM Properties for lighting -- Luminaires and sensing devices (CEN/TS 17623:2021).
  11. HRN EN ISO 23387:2020 Building Information Modelling (BIM) -- Data templates for construction objects used in the life cycle of any built asset -- Concepts and principles (ISO 23387:2020; EN ISO 23387:2020).
  12. ISO 15686-4:2014 Building Construction — Service Life Planning — Part 4: Service Life Planning using Building Information Modelling.
  13. BS 1192-4:2014 Collaborative production of information Part 4: Fulfilling employer's information exchange requirements using COBie – Code of practice.
  14. [http://docs.buildingsmartalliance.org/MVD\\_COBIE/](http://docs.buildingsmartalliance.org/MVD_COBIE/).

The classification system which will be used on the project must be comply with the ISO standard:

1. HRN EN ISO 12006-2:2020 Building construction -- Organization of information about construction works -- Part 2: Framework for classification (ISO 12006-2:2015; EN ISO 12006-2:2020).

Acceptable classification system which could be used are e.g., Uniclass (<https://www.thenbs.com/our-tools/uniclass-2015>) or OmniClass (<https://www.csiresources.org/standards/omniclass/standards-omniclass-about>).

When defining Level of Information needed and Level of Development listed standards should be apply:

1. HRN EN ISO 17412-1:2020 Building Information Modelling -- Level of Information Need -- Part 1: Concepts and principles (EN 17412-1:2020).
2. BIMForum (2021) Level of Development Specification [Online]. Available at: [https://bimforum.org/resources/Documents/BIMForum\\_LOD-Spec-2021\\_Public-Comment-Draft\\_2021-11-29.zip](https://bimforum.org/resources/Documents/BIMForum_LOD-Spec-2021_Public-Comment-Draft_2021-11-29.zip).

## 2.2. BIM uses

The BIM uses in the design phase are listed below:

1. Design authoring is a process in which 3D software (design authoring tools and audit tools) is used to develop a BIM model based on criteria that is important to the translation of the building's design.

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2. Design reviews is a process for stakeholders to view a model, images, and drawings from the models or animated walk-throughs of the project, provide feedback and validate numerous design aspects such as meeting the Client's requirements.
  3. Drawing generation is a process of using BIM to produce 2D drawings while all 2D drawings shall be generated from the BIM authoring software and tools directly. A registration list showing the relationship between the information models and 2D drawings shall be created to indicate whether each 2D drawing is generated from the BIM or not. Any 2D drawings which are produced from non-BIM authoring software or tools shall be prepared in accordance with the standards for 2D drawings. In case any drawing is not created natively in the BIM authoring software it should be linked to the information models.
  4. Quantity Take-Offs (QTO) generation is a process in which BIM is used to assist in the generation of accurate QTO and Bill of Quantities (BoQ).
  5. Engineering analysis (structural, ventilation, lightning, energy, fire, civil and other analysis) is a process that uses the information model to assist, analyse and optimise different design options to determine the most effective engineering solution to meet design codes and Client's requirements.
  6. Sustainability evaluation is a process in which a BIM project is evaluated based on sustainable criteria (e.g., Leadership in Energy and Environmental Design – LEED). Process may include energy simulations, calculations, etc.
  7. Code validation is a process in which code validation software is utilized to check the model parameters against project specific codes.
  8. 3D coordination/Clash detection is a process in which model elements are analysed using clash detection software to detect potential conflicts in design to update the design and eliminate potential system collisions prior to starting on site.

### **2.3. Common Data Environment (CDE) establishment and implementation**

The Common Data Environment (CDE) is a means of allowing information to be shared efficiently and accurately between all members of the project team –including graphical information (2D and 3D), models, non-graphical information, or documentation. Consultant shall establish (implement, configure and support) the project's CDE to serve the overall requirements of the project and to support the collaborative production of information. Thus, Consultant must take over the hosting, management, and support of the project's CDE. CDE establishment and implementation methodology shall be stated in the BIM Execution Plan. It is important to note that all versions of the data in CDE (BIM models, project information, reports, drawings, etc.) are the property of the Client.

A CDE shall be implemented according to the requirements in the ToR and be utilised throughout the project stages specified by the Client. Individual login accounts with appropriate permissions

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for each person using the CDE shall be provided to the involved project parties (e.g., Client, Project Manager). Consultant also have responsibilities for testing established CDE.

The project's CDE shall:

- enable each information container to have a unique ID, based upon an agreed and documented convention comprised of fields separated by a delimiter;
- enable each field to be assigned a value from an agreed and documented codification standard;
- provide a workflow for managing information process including status, revisions, and authorization control;
- provide a user-customisable workflow for document submission and approval;
- enable each information container to have the following attributes assigned: status (suitability), revision, authorization, and classification (in accordance with the framework defined in ISO 12006-2);
- enable the ability for information containers to transition between states;
- enable the recording of the name of user and date when information container revisions transition between each state;
- enable controlled access (security) at an information container level;
- provide data storage in a secure cloud-based or on-premises environment;
- provide a user-customisable security access right control and management system;
- provide a user-customisable sectional / categorizable structure;
- support uploading, downloading, information models and documentation to facilitate retrieval of document attributes to support the CDE processes, including as a minimum – the document identifier (number), title, revision, version, and status codes (suitability);
- support review, comment, and mark-up procedures for information models and documentation formats in the agreed proprietary and open file delivery formats and versions as documented in the BEP;
- allow access from portable devices and web applications;
- contained encryption for data security;
- provide sufficient capacity to store all files throughout the project stages;
- installed with anti-virus software and maintained with updated security patches by the operating system or environment that the CDE resides on;
- provide dashboards for presenting the BIM progress information to the different levels of users;
- provide an issue tracking system, including the issue registration, logging, update, and email notification to the selected user account;
- provide off-site backup of all project files including information models, documents, and data;

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- provide a feature of project archive that all project files and information shall be archived in Client's preferred media and transferred to the Client upon the completion of the design stage and construction stage respectively or as and when requested by the Client during the contract period;
  - provide a full audit trail of the information stored in the CDE.

When defining CDE implementation strategy within the BEP, standard for metadata including status codes, revision codes, authorization codes, and classification code should be proposed. Proposed standards must be in accordance with the ISO 19650 series of standards. Overview of the CDE implementation strategy must be proposed in pre-appointment BEP, while detail establishment and implementation process will agree in post-appointment BEP. In doing so, the CDE must contain four identified functional sections: work in progress (WIP), shared, published, and archive. The shared environment may also be split into shared (Consultant) and Client shared to support workflows for:

- check, review, and approve (shared) process by task team;
- review, approve, and authorization (published) process by lead Consultant;
- review and accept (shared/published) process by Client.

## **2.4. Security**

The project BEP should set out the process for monitoring, managing, and complying with the Client security mandate, including adherence to any standard or processes for data sharing. The following security standards should be followed in respect of the proposed BIM project, defined in accordance with the business impact levels (Not Protectively Marked, Protected Restricted, Confidential). All the information about the project must not be shared with third parties and must be considered as confidential, until the Client decides otherwise.

A data security protocol should be established to prevent any possible data corruption, virus infections, and data misuse or deliberate damage by project team members, other employees, or outside sources. Adequate user access rights should be established to prevent data loss or damage during file exchange, maintenance, and archiving. BIM project data residing on network servers should be subjected to regular back-ups.

All supply chain organisations are required to adopt the security requirements as detailed in the post-appointment BEP.

- all project information must be shared via the project CDE;
- the use of CDs, USB drives is not permitted;
- the use of other online document exchange tools is not permitted;
- project documents must not be shared via email;

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- all CDE users must have their own username and password;
  - the Consultant have confirmed their company security standards as part of the BIM Capability Assessment.

## **2.5. Planning of work and data segregation**

To effectively manage the information model, it needs to be divided into its component parts. This is defined as an information breakdown structure which is a pre-determined method to identify manageable units of information to be used across a project life cycle. The high-level breakdown starts at the three identified components of an information model which are graphical model, non-graphical information, and documentation. Organization of the information in the BIM model should relate to the requirements related to required Level of Information Needed (specified in addition).

The BIM model should be properly segregated per discipline and spatial-wise (e.g., project, buildings, disciplines, levels, zones, systems, elements) and should include all the necessary element attributes and properties, to be ready for the accompanying BIM uses, but also to be usable for the further project phases, the clash detection analysis, the production of the QTO, etc. Further, specific attributes shall be linked to the model elements. The library of BIM objects used in the BIM models must be organised and categorised according to the classification system compliant to the ISO 12006-2. Also, BIM objects sheets for all BIM objects used in the BIM models prepared according to the standard template provided by the Consultant and approved by the Client.

Due to the scale and complexity of the project, the Consultant may separate the project and discipline models by zone, by subdividing the project into separate areas or levels. These zones will aid each team to model their discipline more efficiently by reducing the individual BIM file sizes. The zones and the zone file name codes shall be determined by the Client during the scheme design stage when the overall scale and complexity of the project is understood.

The Consultant must propose Model Federation Strategy within pre-appointment BEP where should be identified proper information breakdown structure which will further enable creating and managing the federated BIM model. Proposed Strategy should be analysed in detail in post-appointment BEP.

Each model by discipline or federated must not exceed the limit of 500 Mb.

## **2.6. BIM Personnel**

There are commonly two key roles in a project with BIM adoption namely BIM Manager and CDE/Data/Document Manager.

1. The BIM Manager shall take lead on the BIM execution and oversee the BIM process of the project. It should be ensured that the BIM Manager shall work independently from the

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role of its respective discipline lead (e.g., BIM Coordinators). It is desirable that the named BIM Manager has a minimum university degree (or equivalent) in an appropriate architectural, engineering, surveying, building or construction-related discipline and minimum of one years of practical experience in management of BIM projects of similar BIM requirements.

2. CDE/Data/Document Manager shall:
  - a. design and manage the CDE including processes and procedures;
  - b. establish, agree, and implement the rules of the information structure and manage the standards for the information model;
  - c. ensure compliance with information requirements and provide support on non-compliance;
  - d. manage the information model to meet integrity and security standards in accordance with the requirements of the EIR and agreed post-appointment BEP;
  - e. be a point of reference for all data/information management problems on the project;
  - f. make sure that all the information produced, and the model attributes are compatible with the standard methods and procedures of the project;
  - g. provide clear instructions to the project team on what information is requested, by whom and for what purpose, who will generate and manage the information, how often and what actions must be taken upon receipt of the information;
  - h. ensure that information and documents are strictly controlled and efficiently disseminated between the parties envisaged through the CDE;
  - i. customize and keep the collaborative platform updated, manage documents and service users;
  - j. ensure adequate transmission of documents.

It is desirable that the named CDE/Data/Document Manager has a minimum one year of practical experience in CDE implementation and management.

Further, when defining BIM Personnel, it is required that Consultant specify roles, and responsibilities for all project staff, including Key Experts and key BIM personnel (BIM Manager and CDE/Data/Document Manager).

Thus, in pre-appointment BEP should be given proposed organisation breakdown structure of delivery team and delivery team capability and capacity assessment.

All Key Experts, BIM Manager, CDE/Data/Document Manager, and additional staff shall be included in organizational breakdown structure defined in pre-appointment BEP and post-appointment BEP according to the requirements in the ToR and EIR. It is not required to appoint or name the BIM Manager and CDE/Data/Document Manager in the Expression of Interest or in



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the Technical Proposal, but it is mandatory that they are appointed and approved by the Client at least seven (7) days after commencement of services.

## **2.7. Collaboration process**

The success of a BIM enabled project delivery process is highly dependent upon the level at which the entire design team can collaboratively produce and manage information for the duration of the project. The project collaboration process shall be outlined in the pre-appointment BEP and should be sufficient to demonstrate competence and capability, while in post-appointment BEP details of collaboration process should be presented. All processes must follow ISO 19650 standard series, utilising the described information exchange through the CDE.

In doing so, it is recommended to use open data standards such as BIM Collaboration Format (BCF) used to exchange snippets of models with comment and mark-up can aid in this process whilst providing an audit trail of issues and resolutions.

Each discipline should develop a starter model for a partner discipline (e.g., defining the structural model in conjunction with the architecture). This shall be done in a separate model which can then be referenced as required to allow the development of the continued design.

The pre-appointment BEP response should include as a minimum detail of:

- description of the roles and relationships of the subjects involved in the project (recommended using flow diagrams);
- frequency and formats of information exchanges;
- format and extent of model sharing at every stage of the project;
- frequency and details of model review workshops and other collaborative working practices;
- frequency and details of design reviews using the federated model.

## **2.8. Coordination process**

Project quality and de-risking through model and information co-ordination is a key objective and requirement from Client. The purpose of this section is to define the project coordination process including quality control requirements. Proposal for Information Delivery Strategy should be part of pre-appointment BEP. Information Delivery Strategy shall include presentation of strategy for generation of all project deliverables (graphical, non-graphical data, and documentation) and their interconnections.

For interdisciplinary coordination, the models will be aggregated into a single federated coordination model, through the exchange of files. The BIM Manager shall manage the process of

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bringing all the various models together into a single federated model. This means a model consisting of linked but distinct component models and other data sources that do not lose their identity or integrity by being so linked. A change to one component model in a federated model does not create a change in another component model in that federated model. If all designers are using the same modelling platform, then this could be undertaken within the native file format, or through export into an open transfer format (e.g., Industry Foundation Classes - IFC). If different platforms are used project review tools should be used to integrate and validate merged models. There may be benefits in using specific review software, even if all team members are using the same platform. The method for creating and managing the federated model should be agreed and documented in the project post- appointment BEP. The Consultant must explain (with a diagram) how each of the model contribute to the overall Model Federation Strategy and thus present the strategy for federated model delivery. Client must always have an updated, read-only copy of the overall model.

The coordination of data and information between the different graphic models must be guaranteed through:

- clash detection (analysis and control of physical and information interferences);
- model and code checking (analysis and control of information inconsistencies);
- resolution of interferences and inconsistencies.

The project clash detection and avoidance process must be detailed in the project post-appointment BEP. This will include but not limited to software utilisation, responsibility service, outputs, technical query workflow, tolerance strategy, and clash resolution process. Delivery will be undertaken through regular sharing of model data (through the project CDE) as outlined in the post-appointment BEP in the form of native files and other agreed exchange formats. Prior to sharing all data shall be checked, approved, and validated.

The Appointment party should run clash detection analysis between specific model itself and between all pairs of disciplines in the BIM (coordination) model. Clash detection analysis should be performed for hard (when two or more components sharing the same place) and soft (when an element is not given the spatial or geometric tolerance) clashes. Details for performing clash detection analysis will be agreed and specified in the post-appointment BEP.

The coordinated or federated models, generated as the sum of the models from the individual disciplines and subjected to the process of controlling the inconsistencies that generate interference (clash detection), must be accompanied by a summary report, which will briefly describe the progress and the main problems, solved or to be solved, related to the model. The 3D federated model should be created using adequate BIM tool which enables clash detection process conducting (hard and soft clash detection, report creation, output verification, etc.).

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The Consultant must publish and share a federated model monthly as a preparation for the monthly report and meeting. Thus, the delivery of the reports will be in accordance with the publication of the models. The Clash Detection Report (as a part of monthly report) must show all the detected clashes and including the following information for each clash:

- the element IDs of the clash;
- the location of the clash;
- type of the clash;
- date and time of clash detection;
- a screenshot of the clash;
- any additional information relevant to the clash.

Once the clashes have been uniquely identified, it will be assigned to the responsible party, who will determine its resolution. The coordination activities of the interferences and inconsistencies found, both geometric and normative, must proceed until all those detected have been eliminated.

After the coordination phase of the models and establishment of final versions of models, the two-dimensional drawings (tender drawings) extracted from the models must be available to Client for approval. Working drawings must be extracted from the BIM model as needed during the project. Generation of listed drawings and schedules are mandatory for Main Design stage, but not limited to:

- general layout plans (including Medical and Non-Medical Equipment);
- blow up sections / elevations;
- details and schedule of drawings;
- MEP Design drawings;
- equipment schedules.

Generation of listed drawings is mandatory for Detailed Designs stage, but not limited to:

- detailed architectural drawings (including medical and non-medical equipment);
- elevation drawings (rooms);
- shop drawings and schemes;
- detailed structural drawings (formwork and reinforcement plans);
- detailed MEP drawings (including connection for medical and non-medical equipment);
- detailed HVAC drawings (including connection for medical and non-medical equipment);
- landscape and horticulture drawings.

Further, the BoQ should follow structure which enables clear connection of BoQ (cost items), QTO and 3D elements, but also allows automated quantity verification and control using BIM

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tools. BoQ should be model based and extracted from the BIM model in .xlsx and .pdf format. BoQ should be organized as follows:

1. type of work (e.g., preparation works, concreting works, brickwork, etc.);
2. type of element (e.g., walls, slab, beam, etc.);
3. specific element properties (e.g., wall thickness, cross section dimensions, etc.);
4. position of element (e.g., ground floor, first floor, etc.).

Every cost item in BoQ must have associated appropriate classification code which indicates the connection of the cost item and specific BIM elements.

Model-based QTO should be extracted from the established BIM models and must follow above defined structure of the BoQ. Further, every QTO item must be associated with appropriate cost item (through the same classification code) providing clear information about related quantity of each cost item. Thus, QTO item and BoQ item must consider the same elements within the BIM model.

## **2.9. Compliance plan**

Compliance plan should include:

1. Quality Assurance Plan
  - Quality Assurance Plan shall be included as part of the project information production methods and procedures in the BEP, outlining the quality assurance for the BIM process, BIM compliance and asset attributes checking. Quality Assurance Plan for BIM shall be established to ensure appropriate quality control on information and data accuracy.
  - The quality control deliverables as a part of the Quality Assurance Plan shall include the following contents: model compliance checking procedure and report according to the BIM standards, methods and procedures which are stated in the BEP, clash analysis procedure and clash analysis reports.
2. Design validation
  - Design validation shall be performed among concerned stakeholders such as design consultants, Client, relevant Government departments to provide their feedbacks to validate multiple design aspects by reviewing the models, documentation, etc. The deliverables shall include the following: design validation procedure and design validation report.
3. Compliance check of project deliverables
  - Compliance check of the deliverables shall be done before every submission by the personnel (recommended BIM personnel) of the Consultant working on the project

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and other personnel (recommended BIM personnel) of the Consultant independent from the project team.

- Irrespective of the checking parties selected above, the deliverables shall include the procedure of model compliance checking and model compliance checking report.

## **2.10. Training requirements**

The BIM Personnel included in project delivery must have adequate BIM knowledge and skills which need to be supported by valid certificates, diplomas, experience, etc. If this is not met, project delivery team must acquire the necessary BIM knowledge and BIM skills. Thus, if necessary, training and education needs of the project delivery team involved in the production, analysis and review of the project information model shall be assessed and recorded in the pre-appointment (overview) and post-appointment (details) BEP.

### **1. Training objectives**

- Training courses aim to enable the project participants to create, view, use and manipulate the BIM models and the deliverables according to project specific EIR for BIM implementation in a systematic and effective manner and enable the project participants to deliver the required BIM uses.

### **2. Training preparation and deliverables**

- A detailed BIM training plan shall be developed and provided by the Consultant for the approval of the Client.
- BIM training curriculums with details of each training course shall be developed and provided by the Consultant for the approval of the Client.
- Training venue shall be provided by the Consultant for the approval of the Client before the training. Each attendee shall be provided with a workstation with necessary BIM authoring software and tools and licenses for efficient hands-on exercise during the training.
- Training log sheet for the BIM training course shall be submitted to the Client for record after completion of the training courses. The training log shall list out the course information, including but not be limited to, description of the training course, date, duration, venue and attendee's name and position. The list of contents of the training log shall be commented and agreed by the Client. The training log shall be reviewed and updated.
- Video recording of the training course shall be provided by the Consultant for the approval of the Client.

### **3. Project training requirement**

- Project training course curriculum and materials shall be provided to the project team including the Client's staff and the design consultants to demonstrate the

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information retrieval from the selected BIM authoring software, tools and CDE and the implementation of BIM standards, workflow, and processes such as design coordination.

4. Personnel training requirement

- The Consultant is required to nominate his staff or other delivery team's staff to attend suitable BIM skill training courses and ensure their successful completion of the attended training courses.

In the training program Consultant shall include additional persons (according to the requirements in the ToR) who must acquire knowledge and skills in BIM software which will be used for project delivery in BIM environment. In case the Consultant does not need additional training, the Client's staff still needs to be trained according to agreed training program in post-appointment BEP.

The training program shall also include training of all involved project participants to use the established CDE.

### **2.11. Health and safety**

BIM process should support the project health and safety. This includes the utilisation of BIM to identify and reduce health and safety hazards/risks in design phase through early identification and mitigation. Residual hazards/risks should be communicated through the CDE and where possible within the model environment.

The post-appointment BEP shall include the following to demonstrate capability and competency:

- schedule of work stages and overview of key health and safety deliverables against each stage;
- confirmation of how information shall be stored and shared;
- requirements for disaster planning;
- approach to design authoring and model interrogation.

The model development and structured delivery of information should enable the following uses:

- design to construction coordination
- site logistics and site safety, plant and pedestrian segregation, traffic, and delivery management;
- installation management checklists;
- visual method statements;
- access to the BIM model by all subcontractors and visitors on site;
- completion of the health and safety file and asset information for soft landings, training etc.

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### **3. TECHNICAL MANAGEMENT**

In this section general requirements for technical management are stated.

#### **3.1. Hardware and software requirements**

The requirements for the software, hardware and network bandwidth for modelling, coordination and visualisation on workstation, desktop, notebook computers and mobile devices should be determined. The minimum requirement varies for different applications, project sizes and operating systems. The actual needs of a project must be determined on a case-by-case basis. The hardware and software to be used shall enable the project participants to deliver the required BIM uses in a productive and efficient manner. The specification and functional performance of the hardware shall refer to the requirements of the software to be adopted in the project. Thus, this section communicates any constraints or specific IT requirements, which may need additional resources or non-standard solutions. Technical limitations of production hardware and software systems should be identified and recorded in the pre-appointment BEP as proposed schedule of software (including versions), hardware, CDE and IT infrastructure. The proposed schedule should be shared for feedback before approval.

The Consultant should provide hardware specification inclusive desktop, notebook computers, mobile devices, BIM data servers, workstations and viewing platforms, etc. The specifications should include recommendations for the operating system, CPU, memory, video cards, hard disk space and network speeds. The following hardware specification should be considered in post-appointment BEP.

Further, the Consultant should identify versions of licensed operating systems as well as other IT limitations as these can all impact the authoring software versions to be used. It should also be recognised that specific authoring tools are not backward compatible and that the BIM and CAD software, along with versions, that will be used by the design team be agreed before starting the project. The models should be created using suitable BIM authoring software applications that allow the assembly of data-rich models and the production and checking of co-ordinated drawings and documentation. To allow for interoperability, the BIM authoring tools should be compliant with open data exchanges such as IFC. Also, inherent model data must be extractable in a .xls (or similar) format for information exchange purposes. In post-appointment BEP should also be stated the type of software resources to meet required BIM uses (e.g., design authoring software, model review software, BIM collaboration software, CAD software, BIM viewers, etc.)

Also, the Consultant shall confirm the CDE arrangement for the project. CDE shall consist of CDE function, process, and handover procedures.

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All deliverables according to project specific EIR for BIM shall comply with the hardware specifications and software versions approved by the Client during the contract period and at the time of delivery. The Consultant shall plan, manage, and supervise the processes for the upgrading of software and hardware changes throughout the project and shall indicate the cost in their tender submissions if any upgrade is needed during the contract period.

### 3.2. Data exchange formats

The BIM authoring software for the project shall support open format (include import and export). BIM models shall be submitted in editable format native of the BIM authoring application used for the project and open format IFC. Using of IFC file format is important for information extraction, verification, archive, and free model viewing purposes. The version of IFC format which is acceptable is IFC2x3 or higher.

The required delivery formats for file 3D and 2D graphical data, non-graphical data and documentation are outlined below:

- 3D graphical data                                 native formats, .ifc
- 2D graphical data                                 .pdf, .dwg
- Non-graphical data                                 .ifc, .xlsx (COBie data format)
- Documentation                                     .pdf, .doc

Method of data exchange is trust CDE as stated in previous text in this document.

To facilitate the flow of data and allow easier management of the model, each model by discipline or federated must not exceed the limit of 500 Mb as previously stated in the document.

The delivery team should identify and document their proprietary formats, open formats within the pre-appointment and post-appointment BEP.

### 3.3. Levels and coordinates

Information models shall be set up to match true world coordinates and elevation.

Coordination standards defined in the post-appointment BEP should include:

- the project origin point;
- the base point;
- the rotation angle of the project should reflect True North (if Project North is created it should only be used for identified sheet views and not used for any model coordination);
- datum information;
- other necessary information (e.g., offset information, intersection of grids, etc.);
- ground floor;
- International System of units – SI.



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If a model is produced in a local co-ordinate system due to software functionality or limitations, the BIM coordinator or modeller that produced the file shall be responsible for providing clear instruction and documentation as to the origin x, y, z and bearing translations accompanying their BIM submission. Each discipline shall be conscious that referenced data has been produced from the perspective of the Client and may not be changed.

### **3.4. Level of Information Need (LOIN)**

Level of Information Needed (LOIN) is used to describe model elements and not models as a whole. An element has only progressed to a given LOIN when all the stated requirements have been met. According to ISO 17412-1 the LOIN refers to the three components of the information model which are graphics, information, and documentation. Graphics refers to the graphical representation which deals with geometric representation, symbology, and visualisation and in this project should be analysed. Information identifies the properties (requirements, specifications, product definitions, object methods, parametric parameters, materials, generic or manufactured product criteria, etc.) to be attached to each type of object to meet the intended uses. Documentation identifies the properties to be attached to each type of object to meet the intended uses.

Detailed specification of Level of Development (LOD) of the model elements which will be used in this project is aligned with BIM forum document LOD Specification 2021. LOD definition which will be used in this project defines graphics and information which depicts proper element.

LOD specification for Main Design:

- |   |         |
|---|---------|
| 1. Architectural Design                                   | LOD 300 |
| 2. Structural Design                                      | LOD 300 |
| 3. MEP and HVAC Design including Project of Medical Gases | LOD 200 |
| 4. Electrical and Mechanical Substation Design            | LOD 200 |
| 5. Mechanical Sprinkler Design                            | LOD 200 |
| 6. Elevators Design                                       | LOD 200 |
| 7. Architectural Landscape and Horticulture Design        | LOD 200 |
| 8. Technical Protection System Design                     | LOD 200 |
| 9. Geodetical Design                                      | LOD 300 |
| 10. Helipad Design  | LOD 300 |
| 11. Non-Medical Equipment Design                          | LOD 200 |
| 12. Medical Equipment Design                              | LOD 200 |

LOD specification for Detail Design:

- |                         |         |
|-------------------------|---------|
| 1. Architectural Design | LOD 400 |
| 2. Structural Design    | LOD 400 |

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3. MEP and HVAC Design including Project of Medical Gases	LOD 400*
4. Electrical and Mechanical Substation Design	LOD 400*
5. Mechanical Sprinkler Design	LOD 400*
6. Elevators Design	LOD 200
7. Architectural Landscape and Horticulture Design	LOD 200
8. Technical Protection System Design	LOD 400*
9. Geodetical Design	LOD 400
10. Helipad Design	LOD 400
11. Non-Medical Equipment Design	LOD 300
12. Medical Equipment Design	LOD 200

\*Or the first lower if not applicable to the specific BIM elements.

The LOD Responsibility Matrix should be used to prepare the post-appointment BEP. This involves defining both graphical representation of elements and information to be achieved at each stage so that the project team can produce a high-quality model with appropriate information. More detailed instruction of LOD will be agreed in post-appointment BEP where Consultant must represent the data model for each phase of the project.

#### **4. COMMERCIAL MANAGEMENT**

In this section general requirements for commercial management are stated.

##### **4.1. Information exchange**

The Client must communicate the timing and content complete information exchanges between the delivery team and Client. Further, information exchanges should be aligned with work stages. Through the different stages, it is necessary that all the information exchange should happen within a CDE.

At a project level, the frequency of required information exchanges should be defined in the post-appointment BEP (within the project Master Information Delivery Plan – MIDP) and should be in accordance with the specified data exchange formats, milestones, and defined project deliverables.

For the entire duration of the contract, the lead Consultant is responsible for adequacy and compliance of information exchanged by any sub-Consultant with the contents of this document.

##### **4.2. Project deliverables (related to the BIM environment)**

The required project deliverables are listed below (requirements for each project deliverable have been stated in previous part of this document):

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1. pre-appointment BEP;
  2. post-appointment BEP;
  3. BIM Models of the Main Design and Detail Design (each discipline shall carry out its own BIM model with geometries and alphanumerical information according to required LOD at particular project stage) – agreed versions and final models;
  4. federated BIM model of the Main Design and Detail Design – agreed versions and final model (after solving the clashes);
  5. monthly report (including Design Review Report);
  6. drawings generated from BIM models of the Main Design and Detail Design - as needed during the project and final version of drawings;
  7. model-based BoQ with belonging model-based QTO reports, technical specification and other related documentation – extracted from the established BIM models of the Main Design and Detail Design.

#### **4.3. Ownership of the data in CDE**

During the project, the Consultant must produce, in addition to the documentation, all the files in native format and in the related exchange formats (e.g., IFC) with the relative copyrights, to allow Client any future revisions of the same. All versions of the data in CDE (BIM models, project information, reports, drawings, etc.) are the property of the Client. Furthermore, all project deliverables shall be in accordance with the law and the requirements included in other contractual documents (inclusive EIR).

#### **4.4. Acceptance criteria**

Acceptance criteria are defined in previous sections in the ToR.

#### **4.5. Responsibilities matrix**

The purpose of this section is to bring to the attention of the project team the allocation of roles associated with the management of the model and project information. Consultant (lead Consultant and task team) should identify (within an Information Management Service Matrix) the information management roles and assigned to them the information management functions. The matrix shall identify at least a simplified approach of which of the roles is responsible for each task, by indicating a tick or cross against the matrix. Ideally, the tasks should be allocated using a full RACI responsibility service approach indicating either:

- Responsible for undertaking activity (R);
- Accountable for activity completion (A);
- Consulted during activity (C);
- Informed following activity completion (I).

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In doing so, Consultant should define project delivery and information management roles with their responsibilities and authority within pre-appointment BEP. In post-appointment BEP, the responsibilities matrix shall be updated with the names and contact details of the individuals fulfilling the necessary project and task roles. The authorities for the different roles related to the production and management of information models shall be defined in the responsibility matrix.

#### **4.6. BIM capability and capacity assessment**

The Client should provide a delivery team and task team capability summary assessment along with a proposed risk register and mobilisation plan, including training requirements if such a need is identified through the assessments. The assessment must be part of pre-appointment BEP and shall include:

- details of BIM workload and resourcing (delivery and task teams);
- proposed approach;
- BIM capability assessment;
- Information and Communication Technologies (ICT) capability assessment;
- information delivery capability assessment;
- capacity assessment;
- security assessment.

Where delivery and task teams do not have the appropriate skills, software, or resource available, this should be mitigated through risk assessment, procurement, and training preferably through the mobilisation stage. Any identified risks would be carried through to the Risk register and where possible, mitigated through the mobilisation activity.

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## **ANNEX 4 – Detailed Specifications for Environmental and Social aspects**

The World Bank developed an Environmental and Social Framework (ESF) setting out the World Bank's commitment to sustainable development through application of Bank Policy (defined in the ESF) and a set of Environmental and Social Standards (ESSs) that are designed to support borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity.

The ESS set out the mandatory requirements that apply to the borrower and projects. They present set of obligatory guidelines and instructions with the main objective to foster efficient and effective identification and mitigation of potentially adverse environmental and social impacts that may occur in the development projects, with proper stakeholder engagement and sustainable management. WB ESS, supported by WB Group Environmental, Health and safety Guidelines (ESHG) and Good International Industry Practice (GIIP) are applied in parallel to the national policies where, as a rule, the stricter one prevails.

There are 10 ESSs, of which 7 are relevant for this project, as recognized in Environmental and Social Management Framework (ESMF) prepared for the Project. Those are: ESS1 (Assessment and Management of Environmental and Social Risks and Impacts), ESS2 (Labor and Working Conditions), ESS3 (Resource Efficiency and Pollution Prevention and Management), ESS4 (Community Health and Safety), ESS6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources), ESS8 (Cultural Heritage) and ESS10 (Stakeholder Engagement and Information Disclosure).

During the site visit to the CHC Rebro and desk research, potential E&S risks identified include, but are not limited to: prevalence of asbestos, stability of buildings, construction waste, noise, dust, sensitive recipients (hospital and related disturbance of users of facilities, ensuring quality service, safety, and similar), disease spread control, medical waste, etc. In addition, in the case of the new building, garage and helipad at Rebro hospital, the risks also include traffic and connectivity issues, safe approach for helicopters as well as safety and life quality of residents in vicinity to the future helipad (which may be compromised by strong winds and increased levels of noise in the operational phase). All construction activities are likely to occur within the existing footprints of the existing building premises so no additional land will be required.

Therefore, a separate E&S Assessment (ESA) is to be prepared during design phase. More concretely, in the case of CHC Rebro, Environmental and Social Management Plan (ESMP) related to design and civil works must be prepared, World Bank approved and publicly consulted prior to bidding for construction works. It will be an integral part of bidding and contracting documentation for construction works. The ESMP will be prepared with extended scope – it will refer to all recognized potential impacts and will focus in more details especially on the potential significant impacts, such as noise (during operational phase due to helipad), traffic flow (during

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construction), waste management (during construction and operational phase) and radon. Moreover, emphasize will be put on quality stakeholder engagement.

Consultant will be obliged to present to the Client descriptions of compliance of Main and Detailed Design with the relevant World Bank Environmental and Social Standards, World Bank Environmental, Health and Safety Guidelines and Good International Industry Practice and the measures and recommendation from the ESMP and relevant feedback from the public consultation process.

Regarding stakeholder engagement, it will be defined in ESMP, SEP and specific site consultation plan. At least one public consultation should take place in the Detailed Design phase.