**APPROVAL SHEET**

**TERMS OF REFERENCE**

**DEVELOPMENT OF SPATIAL MONITORING AND REPORTING TOOL**

**(SMART)**

**(Component 2.4)**

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The Republic of Indonesia

Mandalika Urban and Tourism Infrastructure Project (MUTIP)

**Terms of Reference**

**Development of Spatial Monitoring and Reporting Tool (SMART)**

**(Component 2.4)**

Table of Contents

[**1. Objective 3**](#_Toc67900940)

[**2. Project Funding 4**](#_Toc67900941)

[**3. Scope of Work 4**](#_Toc67900942)

[**4. Implementation Arrangements 7**](#_Toc67900943)

[**5. Reporting Requirements 8**](#_Toc67900944)

[**6. Time table, Reports and Outputs 8**](#_Toc67900945)

[**7. Payment Terms 9**](#_Toc67900946)

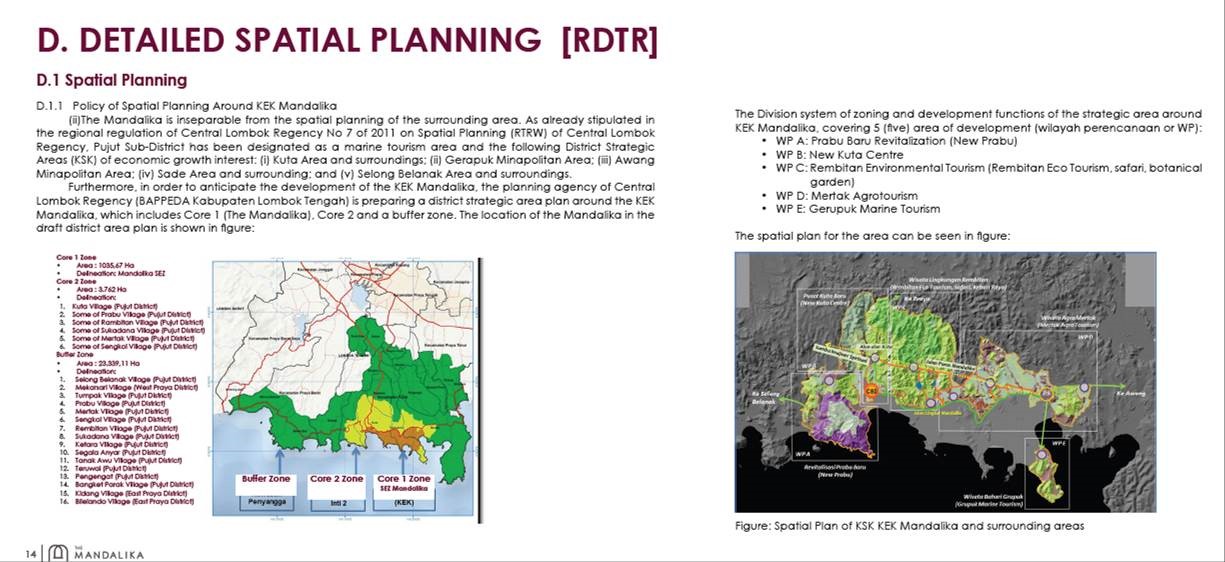
[**8. Key Personnel Expertise 9**](#_Toc67900947)

[**9. Qualification Requirements 11**](#_Toc67900948)

# Objective

* 1. The objective is ***to provide consultancy services for Development of Spatial Monitoring and Reporting Tool (SMART) using aerial survey to cover approximately 60 sq km area*** (Area of Interest or AoI)***.*** Aerial survey (to capture high spatial resolution imagery) for the ‘AoI or Project Area’ capturing baseline spatial data and perform change detection to identify spatial changes in land use, topography, land and marine related environment, infrastructure, building structures, in reference to the existing Master Plan (AoI).
  2. **Spatial planning around Mandalika.** In order to anticipate and control the induced development expected to occur around the Mandalika SEZ, the planning agency of Central Lombok Regency (BAPPEDA Kabupaten Lombok Tengah) is preparing a district strategic plan for the larger region around the SEZ, covering a “Core 1” (Mandalika SEZ), “Core 2” with several “areas of development” (wilayah perencanaan), and a buffer zone.

**Area of Interest (Map of Project Area to be surveyed for Spatial Monitoring)**



\*Surveys and model setup/simulations shall be done in accordance with existing Indonesian guidelines.

1. **Project Funding**

ITDC has received financing from the Asian Infrastructure Investment Bank (AIIB) toward the cost of the Mandalika Urban and Tourism Infrastructure Project (MUTIP), and intends to develop a Spatial Monitoring and Reporting Tool (SMART) for the Mandalika SEZ and its surrounding areas.

1. **Scope of Work**

This consultancy particularly aims to:

1. conduct preliminary research and data collection. Specific activities may include:
   * review of theoretical literature and empirical studies in the fields of coastal tourism development (both national and international examples), urban development, spatial planning/monitoring, and coastal environment.
   * collection of relevant and required datasets and documents – relevant policies, regulations, spatial/land use plans, socio-economic data, infrastructure provision, and all other compulsory and otherwise considered essential thematic maps including natural hazards maps.
   * review of the aerial operating regulations and assess potential safety issues of aerial operations.
   * Obtain necessary approvals for aerial surveys from competent authorities (comply with regulations, operational standards, quality standards, safety management, insurance etc.)
2. Design and build a permanent ground control surveying network monuments and reference these to *Badan Informasi Geospasial[[1]](#footnote-1)* (BIG) geodetic surveying ground control. This surveying network would support the following:

* The established reference stations will be used for the LiDAR “test point” acquisition. These test points would be used to QA/QC the LiDAR results after acquisition.
* the test point layout must be submitted for approval before mobilization takes place.
* support construction layout and effort
* support the original Lidar and Digital Area Photos (DAP) acquisition
* provide the primary ground control base for the unmanned airborne vehicles (UAV) LiDAR / DAP work. Additional temporary ground surveying benchmarks (BM) maybe required for the UAV work.
* And Premark specification

**GROUND LEVEL**

1. Collect airborne LiDAR and DAP of the AoI *and provide engineering accuracy 3D mapping and high-resolution orthophotography upon which Mandalika urban and coastal development will be based*. The expected mapping and imagery will include:
   * DAP georeferenced, rectified to the LiDAR and orthophoto mosaics produced at **10 cm/pixel** ground sample distance (GSD).[[2]](#footnote-2)
   * LiDAR point cloud at a **density of 4 to 5 points per meter square.**
   * Classify the LiDAR point cloud into ground; non-ground, water and high-low noise points and provide a Digital Surface Model (DSM); Digital Terrain Model (DTM) and Water Surfaces. All the above to be delivered in LAS & ASCII.
   * horizontal relative accuracy of **45 cm** at 90% confidence level – directly related to the permanent surveyed ground control established for Mandalika and BIG geodetic accuracy.
   * L-section or vertical profiles for 2nd and higher order drains (locations to be defined) will be extracted from the LiDAR data.
   * Geo-referenced to the LiDAR the digital revenue maps in vector form with all associated attributes
   * specific to change detection: provide the base data from which the change detection be determined and optimize a change-detection map (Mean SIFT segmentation; SIFT features and mean shift segmentation to optimize the initial result).
   * High resolution Digital Cameras combine with LiDAR sensor with suitable range of frequency, compatible with survey airborne and software processing and GPS with dual frequency.
   * The survey aircraft shall be either fixed wings or other suitable survey aircraft.
2. *Collect UAV platform LiDAR / aerial imagery (DAP) for the AoI and produce high-resolution orthophotos that will be used to monitor land use changes in Mandalika’s urban and coastal areas*. The expected LiDAR and DAP will support:
   * The unmanned airborne vehicles (UAV)-based **10 cm ground sample distance (GSD)** images will be georeferenced Orthophoto mosaics produced and QA/QC to pre-selected and targeted surveying ground control points (GCP). The orthophoto mosaics to be used to detect land use changes.
   * Equipment’s may include (but not limited to) digital cameras, airborne UAV and software processing.
3. *compare spatial data derived from the aerial survey with existing Bappeda land use plan (RTRW) as it relates to the AoI*; in preparation, the consultant shall:
   1. design survey module to pull all baseline data needed for change detection;
   2. prepare a model change case, obtaining prior approval from ITDC
4. *conduct required spatial analysis, using the imagery generated, to assess the current and forward-looking understanding of spatial growth and dynamics of AoI.* This will help sustainable land use and natural resources management and improve the planning process and management of the AoI, helping shift from a corrective risk management or retroactive planning type of situation. Specific activities may include:
   * mapping of built-up land cover, changes in land use and spatial expansion.
   * mapping to monitor and safeguard the surrounding environment of Mandalika SEZ as well as in the defined coastal zone;
   * To track zoning violations, by overlapping it with the existing local zoning plan.
   * produce thematic maps, highlighting deviations observed
5. design a plan and provide recommendations for long-term arrangements for spatial monitoring, including institutional and financial arrangements, required staffing, equipment, software and other potential applications of the aerial-based mapping technology.
   * Design a plan to provide technical guidance to adopt the technology for supervision of infrastructure contracts in the Mandalika SEZ as well as surrounding areas, e.g., tracking construction progress of the project.
   * Design and Provide comprehensive operation manual outlining management tools step-wise
6. Design a plan acceptable to the Client and assist to enhance the capacity of the project stakeholders, particularly local governments to effectively operate, monitor and manage the AoI for sustainable urban development and coastal environment, in related areas such as land use planning, urban resilience, and infrastructure planning and management.

These will reinforce the impact of the project to strengthen technical capacity of local governments and relevant agencies, improve sustainability and resilience of their infrastructure investment, enable more effective urban planning, implementation and enforcement, and enhance the accountability and transparency in overall municipal management and service delivery to citizens.

1. Conduct using Earth Observation (OE) technology as a standard tool in planning, implementation, monitoring, and assessment for sustainable development, establishing baselines, results monitoring, impacts assessment and auditing, identifying hot-spot locations, and supporting dialogue with local partners by putting development issues in a spatial context.
2. Provide high resolution Earth Observation imageries for purposes of monitoring development works that sets out to transform the physical environment and define in its broadest possible terms Earth Observation that would allow valuable, cost effective, quick, and incontrovertible assessments.
3. **Implementation Arrangements**

The Project Management Office (PMO) of ITDC would be responsible for ensuring development of the spatial monitoring tool and periodic monitoring (Sub-component 2.4 of MUTIP). ITDC would engage a consultant to undertake this assignment in accordance with this Request For Proposal (RFP). The project activities will be consistent with the policies, procedures, and requirements related to AIIB’s procurement, social and environmental safeguards, and financial management system as well as relevant Government national, provincial, and Kabupaten-level policies and regulations.

As the ITDC does not have the mandate for spatial and land use planning outside of the Mandalika SEZ, this will require to prepare a coordination plan as well as close coordination with the Ministry of Public Works and Housing (MPWH), West Nusa Tenggara (NTB provincial government), Central Lombok Regency, LAPAN (Indonesian National Remote Sensing Agency) and village representatives to conduct the assignments. This assignment would be undertaken in collaboration with local consultants and concerned local government organizations and integrated with ongoing government-financed and managed studies and designs. The Consultant shall be responsible for developing a detailed implementation arrangement with, and appropriate assurances from, MPWH, the government of Central Lombok Regency, and village representatives and with support from the Consultant.

In consultation with ITDC and the local responsible officials, the Consultant would perform the tasks or activities delineated in this RFP, collaborating integrally with other TA consultants working across the Mandalika project. In particular, the Consultant will liaise and cooperate with the TA consultant assigned to other TA activities under Sub-project 1.2, 2.3, and 2.4 (of MUTIP).

1. **Reporting Requirements**

The Consultant will report directly to the Project Director of PMO/ ITDC in Mandalika. The Consultant would also closely liaise at all times with the respective ITDC/PMU staff, and other senior staff of the Provincial and district level local governments and, would keep them fully informed as work proceeds.

1. **Time table, Reports and Outputs**

The proposed duration of the consultancy would be approximately 6 months until submission of the Final Report, followed by up to seven bi-annual survey updates until March 2024 (the indicative end date for MUTIP):

| **Report/ Outputs** | **Duration (in weeks)\*** |
| --- | --- |
| Monthly Progress Report | 1 Monthly Progress Report each months for total duration of 6 (six) months |
| Completion of Initial Reconnaissance Survey | 1 |
| Inception Report/ obtaining necessary approvals | 2 |
| Original Airborne LiDAR and DAP Aerial Survey | 1.5 |
| Final Report: Data processing, Submission of Survey Data/ Analysis/ Maps (data/ analysis/ maps) for entire AoI (including training local staff to use the SMART ‘tool’) | 12 |
| Maximum of four bi-annual LiDAR/DAP survey updates from March 2021 until March 2024\*\* | Man-hour requirement for one LIDAR/DAP update times 7 (max.) |

\*Excluding time taken by client for approvals

Reports would be prepared initially in draft and finalized within two weeks following receipt of ITDC comments; these would generally be provided within one week of receipt of the draft report. 10 copies of Draft Reports and 10 copies of Final Reports would be required in both Indonesian and English. Distribution would be of both paper (hard) and digital (soft) copies. The Consultant will also make available to the other agencies, donors, NGOs and others as needed, information and data as it is available to enable and facilitate them undertake their planning and engineering work in a coherent and consistent manner. Reports will be sent to the Asian Infrastructure Investment Bank – (AIIB) Beijing, in addition to ITDC.

1. **Payment Terms**

| **Report** | **Consultancy Fee (percent of total quoted price LS)** |
| --- | --- |
| Completion of Initial Reconnaissance Survey | 10% |
| Inception Report | 15% |
| Original Aerial Survey (LiDAR survey) and data processing | 30% |
| Assignment Completion Report: Submission of Survey Data/ Analysis/ Maps Final report (data/ analysis/ maps) for entire scope of work | 45% |
| Concurrent surveys and assessment | Bi-annual |

# Key Personnel Expertise

The Consultant would be required to recommend and provide sufficient qualified personnel to carry out the work. The followings are qualifications criteria of each required professional personnel that would be expected to be included in the Consultant’s team:

**Professional Staff (Key Experts)**

| **No.** | **Professional Staff Inputs:** | **Academic qualification/ experience (years)** | **Number of Person\*** | **MM** | **Professional qualification** |
| --- | --- | --- | --- | --- | --- |
|  | **Project Manager/ Team Leader** | Masters in Urban Planning / Geography / Geo-Informatics / Geodetic Engineering / Remote-Sensing (12) | 1 | 6 | * Experience in managing/ developing Aerial mapping of urban land use, assets, environmental features with experience of leading at least 2 GIS based Aerial Asset Mapping projects as Team Leader. * Having a photogrammetric expert or equivalent to Level 8 SKKNI (Indonesian National Work Competency Standard) Certificate will get more points. * Having experience in working international projects will get more points. * Having good English skills as reflected with TOEFL, if the team leader is Indonesian. |
|  | Key Technical Resource: **Urban Planner** | Bachelor/ PG Diploma in Urban Planning/ Geodetic Engineering (5) | 1 | 1 | GIS expertise - Preparation of Base Maps, Master Plans, Area Plans, Urban Town Planning schemes |
|  | Key Technical Resource: **LiDAR Operator** | Bachelor / PG Diploma in Urban Planning/ Geodetic Engineering (5) | 1 | 1 | * GIS expertise - Preparation of Base Maps, Master Plans, Area Plans, Urban Town Planning schemes. * Having a photogrammetric technical or equivalent to Level 7 SKKNI Certificate will get more points. |
|  | Key Technical Resource:  **LiDAR Data Processor(s)** | Bachelor in Geodetic Engineering /  Geography (3) | 2 | 4 | * Experience in LiDAR and aerial photogrammetric data processing work. * Having a photogrammetric operator or equivalent to Level 4 SKKNI Certificate will get more points. |
|  | Key Technical  Resource:  **Surveyor (s)** | Bachelor/ PG Diploma  In Geodetic Engineering (3) | 3 | 1 | * Experience in performing Control point survey measurements and accuracy test. * Accuracy Test terrestrial survey operator or equivalent to Level 4 SKKNI Certificate will get more points. |
|  | Key Technical  Resource:  Security Officer from Indonesian Military | Pilot License (3) | 1 | 1 | * Having license for the proposed aircraft * Minimum License Validity is 6 months |

**Sub Professional Staff**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Sub-Professional Staff Inputs:** | **Academic qualification/ experience (years)** | **Number of Person\*** | **MM** | **Professional qualification** |
| 1. | **Technical Assistance** | Bachelor Degree in related field (3) | 1 | 3 | * Having at least 3 years of similar experience |
| 2. | **CAD Operator** | Senior High School, preferably Bachelor Degree in related field (5) | 3 | 3 | * Having at least 5 years of similar experience |

**Supporting Staff**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Supporting Staff** | **Academic qualification/ experience (years)** | **Number of Person\*** | **MM** | **Professional qualification** |
| 1. | **Office Manager/ Bi-language Secretary** | Bachelor Degree in related field (2) | 1 | 6 | * Having at least 3 years of similar experience * Having excellent English speaking and writing |
| 2. | **Computer Operator** | Senior High School | 1 | 4 | * Having at least 3 years of similar experience |
| 3 | **Office Boy** | Junior High School | 1 | 6 | * Having at least 2 years of similar experience * Having motor-cycle and “C” License |

It is expected that the Consultant shall carry out most of the work in Mandalika.

It is expected that the Consultant will either recruit directly local staff or will sub-contract local consulting firms in order to carry out the project effectively. The Consultant would be expected to adapt the assignment Work Plan to meet the requirements of ITDC, which may from time to time be adjusted to suite new requirements.

# Qualification Requirements

1. **Administration**
2. Participant who forms Joint Operation (JO) / *Kerja Sama Operasi (KSO)*, shall provide a signed qualification form and integrity pact by all members of JO.
3. Having Survey Business License or equivalent to *Surat Ijin Usaha Jasa Survey (SIUJS)*.
4. Having Certificate of Business Entity or equivalent to *Sertifikat Badan Usaha (SBU)*, with qualifications:
   1. Qualification: Specialist Consulting Services or equivalent to *Jasa Konsultan Spesialis*
   2. Sub Qualification:
      1. Land Surface Survey Services or equivalent to *Jasa Survey Permukaan Tanah* (SP303)
      2. Map Making Services or equivalent to *Jasa Pembuatan Peta* (SP304)
5. **Technical**

Experience doing relevant projects, at least three similar projects as provider and sub-contractor in the past seven years, both for government and private sectors.

1. **Financial Capability**

Having minimum average turnover in the past 5 years of IDR 5,800,000,000.00.

1. **Budget Ceiling**

The project will be carried out for 6 (six) months calendar upon signing of contract by all parties. The budget for SMART is allocated for the following items:

* + 1. Personnel remuneration i.e. Professional Staff (Key Experts), Sub Professional Staff and Supporting Staff.
    2. Non-Personnel i.e. Transportation & Duty Travel, Survey, Maintenance, Office Operation and Accommodation, Maintenance and Reporting.

1. National Mapping Agency of Indonesia [↑](#footnote-ref-1)
2. Distance measured on the ground between pixel centers in an image. [↑](#footnote-ref-2)