



ASIAN UNIVERSITY  
FOR WOMEN

**Request for Proposal of LiDAR Topographic Survey for Asian University for Women**

**RFP Summary Sheet**

<b>Name of the company</b>	Asian University for Women
<b>Procurement Reference Number</b>	AUW/24-25_AUW_LiDAR TOPOGRAPHIC SURVEY
<b>Date of issue of the RFP</b>	24 <sup>th</sup> June, 2024
<b>Date and Closing Time for RFP submission</b>	2 <sup>nd</sup> July, 2024 (12:01 pm) (GMT +6)
<b>Quotation submission mail address</b>	<a href="mailto:tender101@auw.edu.bd">tender101@auw.edu.bd</a>
<b>Address for Communication</b>	Asian University for Women 20/A, M. M. Ali Road Chattogram 4000, Bangladesh Tel: +880-31-285-4980 Fax: +880-31-285-4988

Bidders are invited to submit their proposal in accordance with the enclosed Request for Proposal (RFP) terms. AUW reserves the right to reject any or all offers without assigning any reason.

Complete confidentiality should be maintained. Information provided here should be used for its intended scope and purpose. Retention of this RFP signifies your agreement to treat the information as confidential.

All communication with regard to this request for proposal needs to be directed to AUW directly while in copy of all these communications at the email addresses mentioned in the RFP mail.

For any further queries can contact in below mail: Primary point of contact for RFP process and technical queries Mohammed Ishrat Bin Mahbub; Head of Procurement; Email: mohammed.mahbub@auw.edu.bd; Contact Number: +8801926673027; Whatsapp: +8801671470348

**Proposal should be submitted only in the email: [tender101@auw.edu.bd](mailto:tender101@auw.edu.bd)**

No other AUW email should be in TO/CC/BCC. Any proposal violate this instruction may face the cancellation of their proposal.

## **1. BACKGROUND**

**Asian University for Women (AUW)** is the first of its kind: an independent, regional institution dedicated to excellence, women's education and leadership development. Located in Chattogram, Bangladesh, AUW exists solely to educate and empower a rising network of women leaders through the transformative power of American-style liberal arts and sciences education. AUW intends to establish its new campus in 140 acres of land in the city's Arefin Nagar, Bayezid area. The Asian University for Women (AUW) strives to be an international center of excellence, focused on women's education and empowerment. Asian University for Women is now looking to LiDAR Topographic Survey for its project.

## **2. SITE DESCRIPTION**

### **2.1 LOCATION**

The site is located in Bayezid Hills, 8km to the northwest of Chittagong (Chattogram) city centre, at Latitude 22°23'00N, Longitude 91°47'30"E . The site is located to the south side of Bayezid Link Road.

### **2.2 LOCAL TOPOGRAPHY**

The site comprises rugged topography with a mixture of landforms of an incised hill range (Bayezid Hills) including ridges, slopes and valleys. Elevations vary between approximately +20m and +65m AMSL, with 45m local relief. Appendix A includes contour and slope map of site.

Land cover is of mixed land use, predominantly wooded, together with cleared areas, areas of scrub vegetation, agricultural field plots, tracks, roads, housing and the construction site for the proposed University for Women, Chittagong campus.

### **2.3 EXISTING SURVEY DATA**

Existing survey data includes:

- Grihayan (2007) - Appendix A includes contour map based on Grihayan 2007 survey data. Note, that the 2007 survey pre-dates construction of Bayezid Link Road.

## **3. PROPOSED SCOPE OF SURVEY**

### **3.1 SURVEY OBJECTIVES**

The LiDAR Topographic Survey is being undertaken to support masterplanning and further design stages of the project.

The primary objectives of the survey are to provide:

- LiDAR point cloud data for the project site
- LiDAR data processed into DSM, DTM, mesh, contours, coloured-point cloud
- Orthoimagery (vertical/nadir) for the project site
- Oblique aerial images for the project site

### 3.2 AREA OF INTEREST (AOI)

The area of interest (AOI) for the survey is approximately 1.27km<sup>2</sup> (127 ha) as detailed on UAW\_UAV\_Survey\_AOI.kml, shown in white on Figure 1.



Figure 1 Proposed Survey AOI shown in white [UAW\_UAV\_Survey\_AOI-1.kml]. AWU Site boundary shown in green.

### 3.3 KEY SPECIFICATIONS REQUIREMENTS

Survey should be in accordance to the Royal Institution of Chartered Surveyors (RICS) ‘Earth observation and aerial surveys – RICS professional standard, global 6th edition, RICS, 2021’ (free to access/download).

<https://www.rics.org/profession-standards/rics-standards-and-guidance/sector-standards/land-standards/earth-observation-and-aerial-surveys>

Table X summarises the key LiDAR specification requirements.

Survey type	LiDAR
Accuracy	±0.05m RMSE for plan (X, Y) ±0.05m RMSE for height (Z)
Coverage	As per supplied file AUW_UAV_Survey_AOI-1.kml detailing Area of Interest (AOI) Minimum requirement is AOI.
Field of View (FOV)	Minimum 50°
Data Acceptable Quality Limits (AQLs)	The LiDAR should only be flown in good conditions, in the absence of rain, cloud, atmospheric haze, snow and flooding.
Solar angle	No restriction
Point density	To be confirmed by Contractor based on LiDAR system used and site terrain conditions. Point density in the order of 50ppm <sup>2</sup> is expected.
Project start date	To be agreed with Client
Deliverables	Point cloud (Raw and processed), derived DTM and DSM, topographic mapping

## 4. PROJECT PLANNING

### 4.1 Professional Experience, Capability and Permits

The Contractor shall be a licenced/authorised surveyor with the appropriate current licence for commercial UAV operations as per the Country Civil Aviation Authority (CAA) and carry the statutory minimum Aviation/Public Liability Insurance as per the CAA. The operator will have no less than 2 years commercial UAV experience specific to the Works.

In Bangladesh, the regulation and control of Remotely Piloted Aircraft Systems (RPAS), Unmanned Aerial Vehicles (UAV), including drone use, falls under the Civil Aviation Authority of Bangladesh (CAAB) <https://caab.portal.gov.bd/>

The Contractor shall be responsible for compliance with current CAAB requirements, including, as appropriate:

- CAAB (2019) – Civil Aviation Circular on operating Remotely Piloted Aircraft Systems (RPAS), Issue 1, January 2019 [rpas.pdf \(caab.gov.bd\)](#)
- Application for Special Flight Operations Certificate (SFOC) for the purpose of operating Remotely Piloted Aircraft System (RPAS) [rpasapp.pdf \(caab.gov.bd\)](#)

Project planning shall include consideration of safety and be in accordance with CAAB requirements.

The location(s) for launching and operating the drone and surveys shall be considered with safety considerations. To minimise potential disruption and safety risk, UAV/ drone equipment shall be selected according to the following principles:

- reliability, additional safety features and redundancy are sufficient to ensure safe operation; and,
- size and weight to be minimised to limit distraction to others and potential impact should a collision occur.

The Contractor shall be responsible for obtaining any third-party agreements and permissions such as any access agreements with landowners or stakeholders, including that may be required according to CAAB.

## **4.2 INSURANCE**

The Contractor shall have public liability insurance to minimum of US\$1,000,000 (or equivalent currency).

## **4.3 PROGRAMME**

The Contractor shall agree the date(s) of survey with the Client, each party cognisant that some flexibility on survey date(s) may be required due to a range of factors including permitting, approvals, weather, flying conditions and site access.

Reporting and deliverables shall be no longer than 3 weeks after completion of site survey works (Refer Section 7).

## **4.4 SURVEY CONTROL**

The Contractor shall plan and establish adequate Ground Control Points (GCP) to achieve the desired accuracy.

Independent Ground Control Points (GCPs) are required to support the data processing and verify accuracy of the final product and to correlate to site, national and global coordinates. It is recommended that the GCPs are surveyed with Real Time Kinematic (RTK) survey equipment. Should the site have any existing permanent local ground control it is recommended that these locations should also be surveyed. As per 'RICS (2021), Section 3.42 Control Points for Lidar surveys': GCPs should be captured on points of detail – on hard surfaces within the project area, away from overhead obstructions – that can be located within the survey AOI.

GCP control points and accuracy verification markers must be placed on the ground in advance of survey. The locations chosen should be by the professional judgment of the surveyor, to be in areas of open ground visible during time of the UAV / aerial survey and with appropriate spatial spread around the whole survey area. Photographic record (taken from the ground) shall be taken for each GCP, to be included within appendices to the survey report. A minimum of 15 GCP's are required. Appendix C provides examples of GCP that may be used during surveys as accuracy verification marks.

The Survey of Bangladesh (SOB) <https://sob.gov.bd/> manages and operates the Geodetic control network (geodetic control points) and Global Navigation Satellite System (GNSS) control network in Bangladesh.

Coordinate Reference System (CRS) shall be to: WGS 84 / UTM zone 46N (EPSG:32646). Vertical elevation shall be to National Vertical Datum 1992 (EPSG\_1303).

The Contractor shall advise Client in advance of survey if an alternative CRS or vertical elevation is recommended.

## **5. LiDAR SURVEY**

### **5.1 Selecting equipment**

The survey requires an airborne LiDAR survey to be undertaken. The Contractor shall propose the equipment to be used, according to meeting the required minimum quality requirements of the deliverables. LiDAR survey using UAV / drone platform shall be used, given the dense tree canopy. The project requirements include obtaining both LiDAR data and aerial imagery.

### **5.2 Lidar Date**

The Contractor shall provide the following outputs:

- LiDAR point cloud data (.las; .laz) – tiled data. Tiling of the point cloud shall be considered, based on file size and dimensions of the point cloud to reduce processing power requirements. RGB colouring shall be added to the point cloud
- Processing of lidar data shall be undertaken to provide deliverables conforming to the efficiency of data files, with filtering and classification as appropriate
- 3D mesh
- Digital Surface Model (DSM) - DSM with 0.5m spacing, provided as GeoTIFF
- Digital Terrain Model (DTM) – DTM with 0.5m spacing, provided as GeoTIFF

## **6. Aerial imagery**

### **6.1 Orthoimagery (Vertical/Nadir)**

Colour aerial survey is required, complementary to LiDAR survey, to provide orthoimagery of the AOI. Ground Sampling Distance (GSD) to be minimum 0.05m (5cm).

Processing of the aerial imagery is required to produce the following outputs:

- Orthorectified colour imagery (tiles and mosaic), either (RGB) or (RGBN i.e. RGB+NIR) depending on equipment used. The orthophoto shall be colour balanced, with tone and contrast balanced so as to appear as a continuous photographic image over the AOI.
- Data to be supplied as GeoTIFF and .ecw format.

The final orthophoto file shall be supplied as single mosaic and, if appropriate considering file size, as tiled data.

### **6.2 Aerial Imagery (oblique)**

Supplementary to the principal survey objectives (LiDAR and aerial orthoimagery) collection of colour oblique aerial imagery shall also be undertaken, using camera of minimum 20 megapixels. A minimum of 16 oblique photographs shall be taken, including photographs taken from outside perimeter of site looking inwards towards the site, with principal points of compass (e.g. approximately N, NE, E, SE, S, SW, W and NW), to provide record of site setting.

The following deliverables for the oblique aerial imagery:

- GeoTIFF or .jpg with geolocation data

## **7. Reporting and Deliverables**

The Contractor shall provide the following set of deliverables.

Results, post-processing and deliverables shall be undertaken and submitted no longer than 3 weeks after completion of the survey unless otherwise agree with the Client.

### **7.1 UAV Survey Report**

UAV Survey report to be supplied in .pdf format.

Contents of UAV Survey Report shall include, as minimum, the following information:

- Project title
- Client name
- Report Date
- Mission planning & permissions (SFOC to be included within Appendices)
- Date(s) of survey
- Equipment used for the survey, type, specification, date of last calibration
- Methodologies for performing the survey
- Coordinate details – coordinate reference system and Ground Control Points (GCP) – with photographs of each GCP location to be included in appendix
- Map of survey area, including flight lines
- Index map of data deliverable tiles
- Schedule of deliverables, including file names, formats and description
- Verification of the accuracy (accuracy report)
- Calibration certificates

### **7.2 Data Deliverables**

The Contractor shall supply raw data and derived data to conform to the specification, that shall include, as minimum:

- LiDAR point cloud data:
  - Raw data, post-processed data, colour-point cloud data
  - 3D Mesh data
  - Gridded data
    - DSM
    - DTM
- Orthoimagery (vertical/nadir)
- Oblique aerial photographs
- Topographic mapping

### **7.3 Mapping**

Topographical mapping shall be required to 1:500 scale, produced by feature extraction using LiDAR and orthoimagery.

Data to be delivered in .dwg and .pdf format.

Topographical features to be mapped shall include:

- Road edge
- Building footprint
- Other structures: bridges, retaining walls,
- Face of walls and fences
- Edge of fields
- Visible service covers
- Location of manholes and inspection covers will be surveyed with cover levels only
- Overhead cables lines, posts and pylons
- Footpaths, tracks and changes of surface
- Natural and man-made drainage features, including ponds, streams, valley talweg, ditches

Contours and Spot Heights:

- 0.5m, 1.0m, 5.0m and 10m contour data layers
- Spot Heights (to 2 decimal places i.e. 0.01m) at selected areas of open ground and ridge or hill tops

### **8. Privacy**

UAV / drone activities shall be planned and conducted in a manner ensuring privacy for third parties.

Unintended and unnecessary data collection that may affect the privacy of third parties should be avoided, particularly during the launch and landing elements of a drone flight.

Data post-processing should, where feasible, exclude any sensitive private detail e.g. editing out of people, vehicle number plates or other identification features (where detail is visible).

### **9. Data Ownership and copyright**

The data and products become the property of the Client on completion and final payment of the contract.

### **10. FINANCIAL PROPOSAL**

1. The Financial Proposal should include details such as VAT and tax information.
2. Please mention your payment terms in the bid.



**11. Basic Documents that needs to be submitted by the offeror:**

<b>The bidder should submit</b>	
1	Trade License.
2	TIN/BIN.
3	Company profile.
4	Similar survey experience details (Years, Project, amount of work).
5	Large survey experience details.
6	Client List (client certificate will be an advantage).
7	Bank solvency certificate.
8	TIMELINE: Overall timeline to accomplish the survey.
9	Health, Safety & Environmental (HSE): All HSE requirements should be ensured by the offeror that they discharge their responsibility effectively.
10	Permissions: Any permission related to the survey work must be taken by offeror. It is solely offeror responsibility to take such permissions. (E.g: Drone permission or any other permission from the related authority).
11	Completion Handing and Taking Over: The survey company have to handover the survey details to the AUW Authority with the expert details and the handover will accomplish once AUW team confirms the completion of the handover.

**12. Please note that this offer is subject to the following terms and conditions:**

1. AUW reserves the right to cancel the bidding before or after the receipt of bids or also after the opening of bids and call for fresh bids. AUW also has the right to reject any bid without assigning any reason.
2. Bids incomplete in any respect will not be considered.
3. Any query for clarification on the bid can be had from the undersigned latest by 2<sup>nd</sup> July, 2024 11:00 am. Please note that any inquiry received from any bidder will be sent to all bidders without disc losing the source of the inquiry.
4. The basic rates quoted should be effective until 15<sup>th</sup> December, 2024

### 13. Glossary

Glossary of key terms.

AOI	Area of Interest
AQL	Acceptable Quality Limits
CAA	Civil Aviation Authority
CAAB	Civil Aviation Authority of Bangladesh
CRS	Coordinate Reference System
DSM	Digital Surface Model
DTM	Digital Terrain Model
FOV	Field of View
GCP	Ground Control Point
GNSS	Global Navigation Satellite System
GSD	Ground Sampling Distance
LiDAR	Light Detection and Ranging
RMSE	Root Mean Square Error
RPAS	Remotely Piloted Aircraft System
RTK	Real Time Kinematic
SFOC	Special Flight Operations Certificate (issued by CAAB)
SOB	Survey of Bangladesh
UAV	Unmanned Aerial Vehicle

# Appendix A Existing Topographical Survey

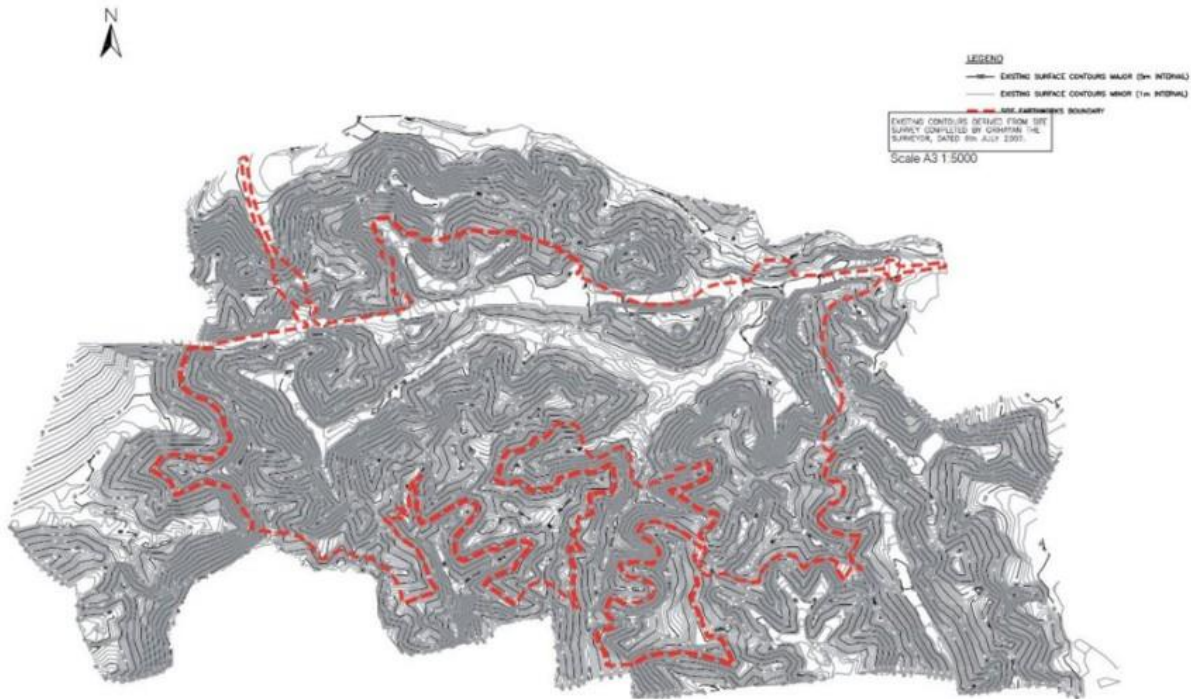


Figure 2.1 Existing surface contour

Existing Surface Contour Map (based on Grihayan 2007 Survey data), showing extent of existing Topographic data. Red line = Site Earthworks boundary.

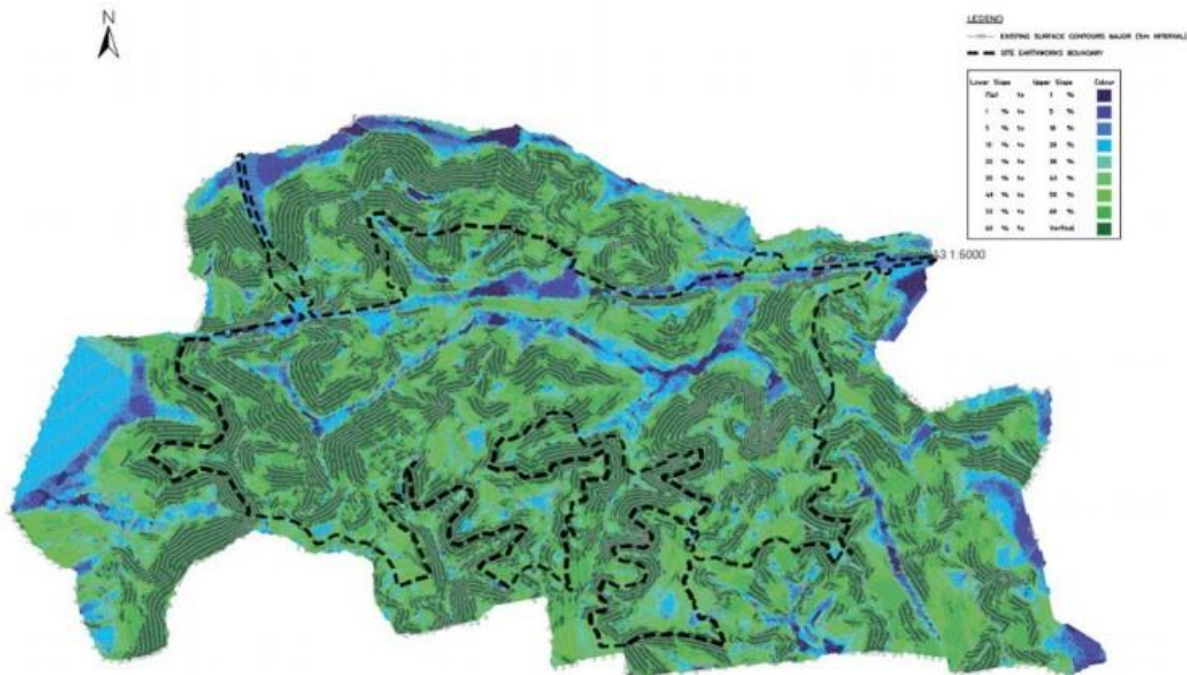
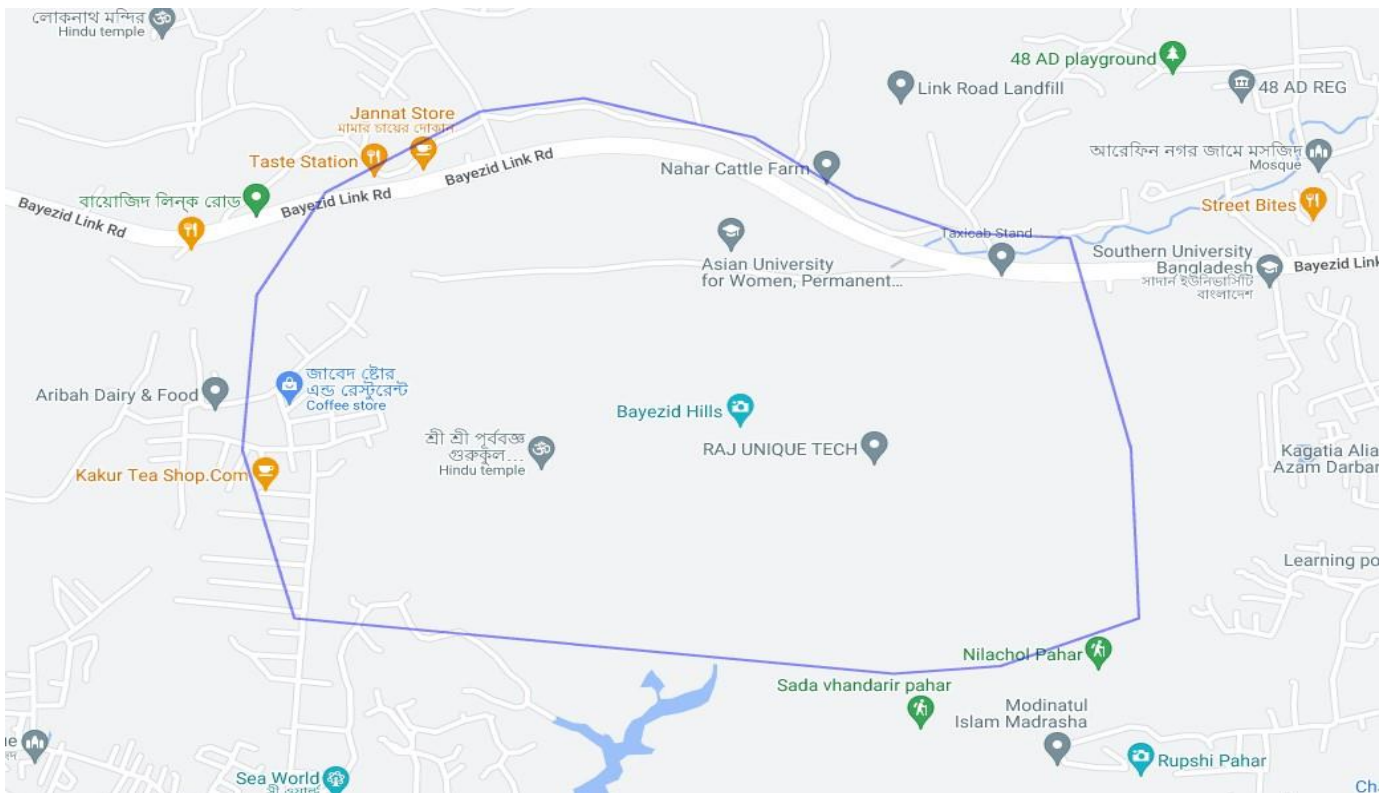


Figure 2.2 Existing surface slopes

Existing Surface Slopes



Contour map overlain on 2024 Google Earth image with proposed survey area shown in white [UAW\_UAV\_Survey\_AOI-1.kml]. AUW site boundary shown in green.



**Appendix B**  
**Example GCP Targets**



UAV Ground Control Target (Source: routescene.com)



GCP Target (Source: TheDroneLife)



GCP Target (Source: Hoodman)