

Service requirements

LIFT pilot project for drone-based postal delivery and middle-mile connectivity in Bhutan

1 Introduction and background

1.1 Project overview

The UPU, as part of a project entitled “Last-mile innovation through flight technology” (LIFT), seeks to engage a qualified drone technology provider to plan, deploy and operate a postal drone delivery pilot project in Bhutan in partnership with Bhutan Post, Bhutan’s designated operator.

1.2 Objective

The purpose of the pilot project is to demonstrate the operational viability of drone-based middle- and last-mile delivery in the Thimphu region, connecting the Thimphu general post office with the Punakha post office (see figure 1) and three post offices in nearby *gewogs* (groups of villages) (see figure 2).

The pilot project will generate data and insights to inform the potential expansion of drone logistics throughout Bhutan’s postal network.

Figure 1 – Illustration of potential route between Thimphu general post office and Punakha post office

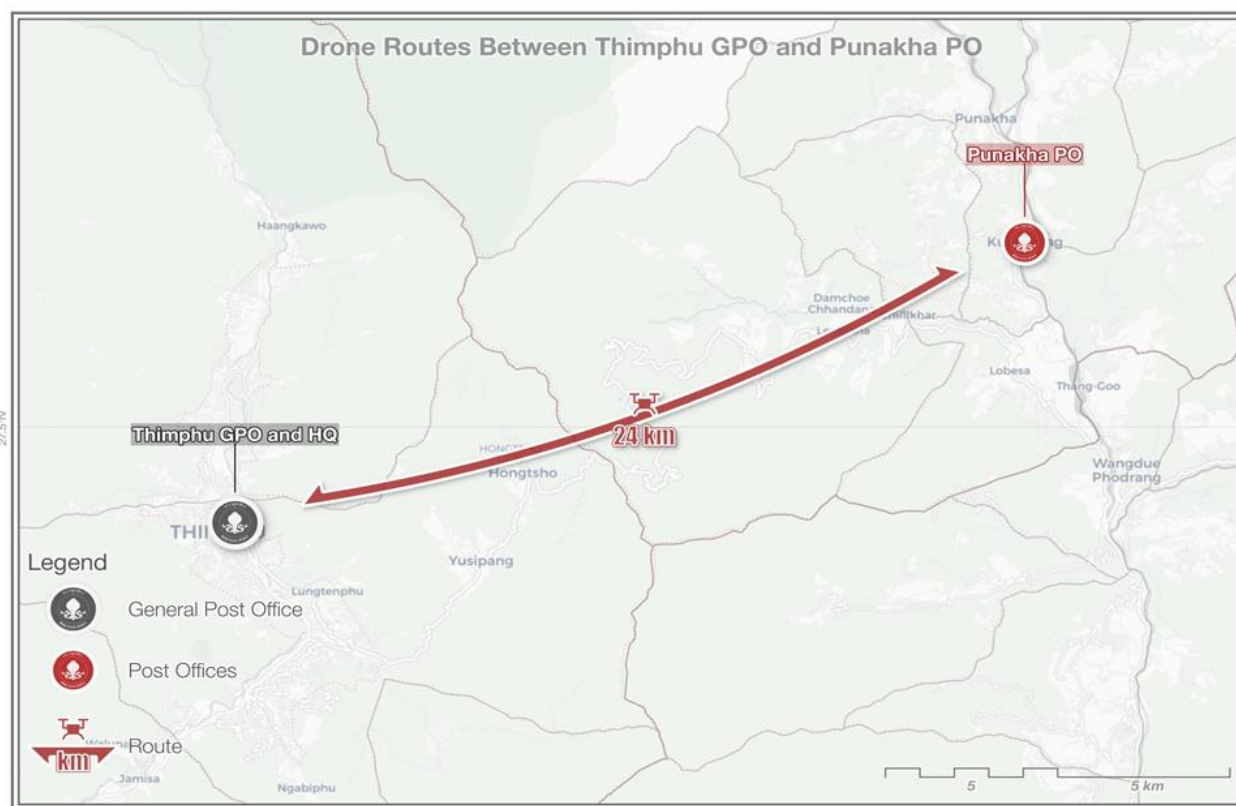
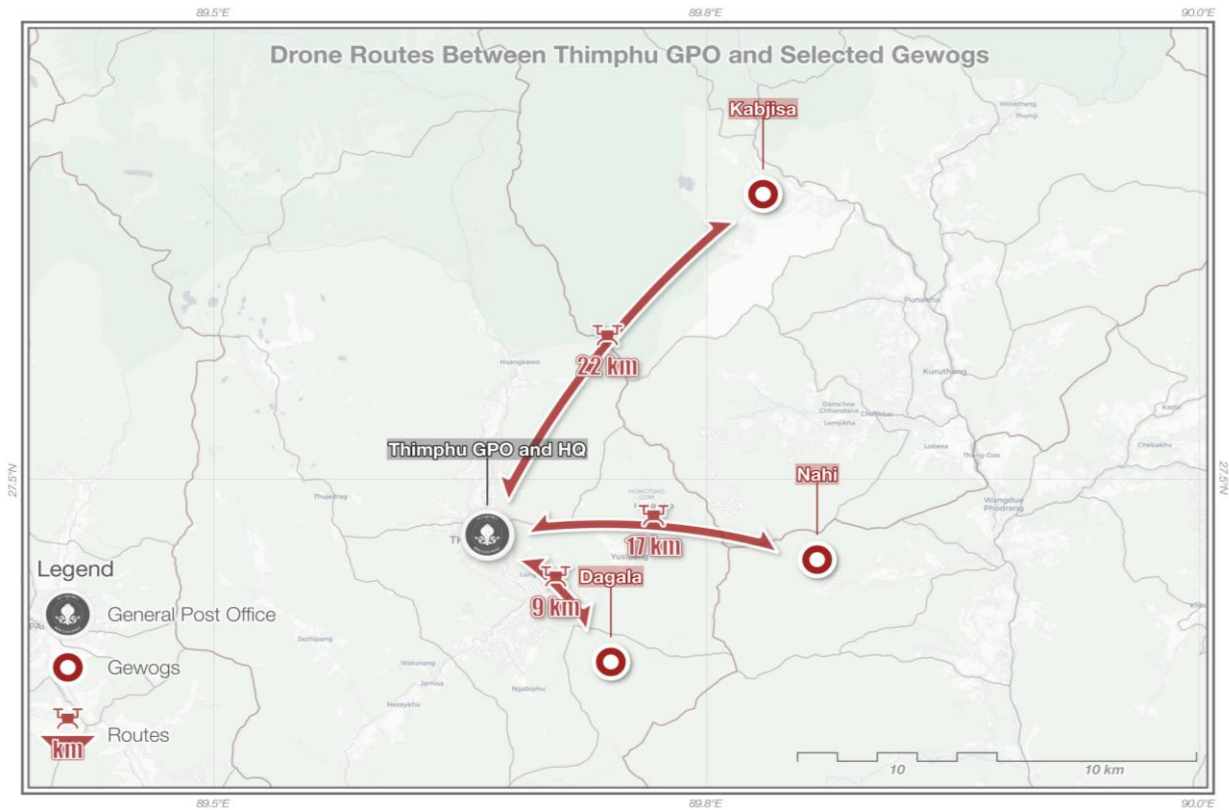


Figure 2 – Illustration of potential route between Thimphu general post office and post offices in gewogs



The routes depicted in figures 1 and 2 are for illustrative purposes only; the final routing will be determined by the Vendor and must include all designated points listed in table 1.

1.3 Contract model

The contract model shall be “drone as a service”. The Vendor will own, operate and maintain the entire drone fleet and associated systems. Bhutan Post will provide ground infrastructure, postal staff for cargo loading, unloading and battery change/drone refuelling, if necessary, and site access.

2 Operational area and route description

2.1 Area of operations

- Country: Bhutan
- Primary region: Thimphu
- Origin hub: Thimphu general postal office
- Route configuration: hub-and-spoke multi-destination deliveries

2.2 Route details

The route forms a hub-and-spoke delivery model originating in Thimphu, with the following stops:

Table 1 – Locations of all post offices to be included on the pilot project route

Post office	Latitude	Longitude
Thimphu general post office	27.473873	89.638714
Route 1		
Punakha post office	27.550339	89.870759

<i>Post office</i>	<i>Latitude</i>	<i>Longitude</i>
<i>Route 2</i>		
Dagala post office	27.413948	89.701417
Nahi post office	27.456463	89.853356
Kabjisa post office	27.633992	89.778678

If all relevant permissions for delivery to these locations cannot be obtained, the Vendor will be obliged to propose an alternative route corresponding as far as possible with the project objectives.

2.3 *Characteristics of the terrain*

The terrain consists of high mountains, with an altitude of 2500–4000 m above mean sea level and constant climbs and descents averaging around 1,500 m.

2.4 *Airspace considerations*

The Vendor must obtain all necessary airspace authorizations for the routes.

3 **Drone platform technical requirements**

3.1 *Drone technical specification*

The selected drone platform must meet or exceed the following minimum technical specifications:

<i>Parameter</i>	<i>Minimum requirements</i>
Aircraft type	VTOL ¹ or multirotor
Propulsion type	All types
Cargo release	On-ground cargo loading and unloading
Payload capacity	Minimum 5 kg
Cargo volume	Minimum 0.008 m ³
Maximum take-off weight	Up to 25 kg
Range	To be able to fly an effective distance ² of 30 km on a single battery (considering altitude changes)
Wind resistance	Preferably resistant to gusts of up to 6 m/s, depending on the month in which the pilot project will take place
Operating temperature	–10°C to +30°C, depending on the month in which the pilot project will take place
Landing pad requirement	Up to 8 x 8 m
Navigation	Minimum: – GPS/GNSS³ – RTK⁴, VIO⁵ or other positioning system

¹ Vertical take-off and landing.

² Effective distance considers not only horizontal distance between locations but also vertical distance, since the drone will need to continually climb and descend to navigate ridges and valleys.

³ Global Positioning System/Global Navigation Satellite System.

⁴ Real-time kinematic.

⁵ Visual-inertial odometry.

<i>Parameter</i>	<i>Minimum requirements</i>
Navigation (cont.)	– Cameras and vision processing – Downward LiDAR⁶/landing cameras/rangefinder
Communication	Minimum: – Radio – Cellular 4G/5G – Preferably also satellite link
Safety systems	Collision avoidance, parachute recovery system

4 Operational requirements

4.1 Assumptions

For this pilot project, it is assumed that the drone will operate point-to-point between post offices, carrying a mixed postal cargo, i.e. letters, documents, small parcels and packets, with payload quantities varying by post office according to actual mail volumes. The drone will be based at the Thimphu general post office and will fly to each designated local post office to deposit the payload, with battery changes or refuelling occurring at local post offices, where necessary.

All handling tasks (payload transfer, battery change or refuelling) will be performed by Bhutan Post staff at each post office. The entire operation will be coordinated closely with Bhutan Post, with designated landing and take-off zones cordoned off during the agreed launch and landing windows.

4.2 Flight schedule

- Number of UAS: minimum one drone.
- Frequency: four days per week.
- Actual flight frequency will be determined with Bhutan Post and the Bhutan Civil Aviation Authority (BCAA) during preparation of the pilot project. The determined frequency will be based on Bhutan Post's operational needs, airspace availability, weather conditions and equipment capacity.
- Operating period: The Vendor must be prepared to execute the project during the dry season, from October to March. The detailed schedule will be contingent upon regulatory, operational and weather-related factors and must be adapted to Bhutan's climatic conditions, in full consultation with and subject to the approval of the contracting authority, the UPU and Bhutan Post.

4.3 Responsibilities

- The Vendor shall operate the drone end-to-end throughout execution of the pilot project, performing all actions required for safe, efficient and successful operation.
- The Vendor is obliged to obtain the appropriate insurance to cover potential risks associated with the operation.
- Owing to challenging environmental clearance procedures, the Vendor should engage with the Department of Forests and Park Services of Bhutan early to ensure alignment on the pilot concept, proposed corridors and flight altitudes.
- The Vendor must plan the route to minimize impact on populated areas and avoid flying over religious structures with yellow roofs.
- Bhutan Post staff will handle the loading and unloading of cargo at each post office and will provide necessary support in remote locations.

⁶ Light detection and ranging.

4.4 Ground infrastructure assessment

The Thimphu general post office is equipped with the ground infrastructure listed below. The Vendor shall be responsible for thoroughly evaluating these existing conditions and, where necessary or appropriate, implementing enhancements (e.g. landing pads, wind barriers) to ensure optimal operational performance.

Overview of currently available infrastructure:

<i>Element</i>	<i>Thimphu general post office</i>
Landing zone area	Available safe space: approximately 10 x 10 m Parking area owned by Bhutan Post, with enough space for drone landing and take-off. The parking area can be cleared of any vehicles, creating a safe and dedicated operating zone for the drone. Unlike any other location around the building, the parking area is clear of overhead cables.
Overhead obstructions	Overhead obstacles (cables, utility poles, etc.) around the building
Surface	Asphalt
Shared use	Area owned by Bhutan Post, can be cleared of parked vehicles and pedestrians
Wind exposure	Partially sheltered (parking area between buildings)
Lighting	Lighting and electricity available directly from the warehouse (adjacent to the parking area)
Cargo handling space	The whole warehouse will be dedicated to drone operations during the pilot project (Bhutan Post is moving its warehouse operations to another location and plans to keep the warehouse empty). There is enough space to store and maintain the drone platform, sort, prepare and load the cargo, and so on.
Staffing	The site is part of the general post office. Staff are available with direct access to the warehouse and the parking area. Standard working hours are 8.00–16.00 (local time).
Electrical supply	Yes
Backup generator	Can be organized if needed – enough space to set it up (for work outside) and to store it inside the warehouse
Indoor space for battery charging	Wall-mounted power sockets inside the warehouse
Indoor workspace for drone maintenance	Maintenance would be possible inside, with overhead lighting. Electricity is available. The warehouse door can be closed for better working conditions.
Tools	There are storage shelves, but no dedicated workbench.
Maintenance area access	Accessible
Secure storage	Lockable garage/workhouse door. Full access control.
Security measures	The site is secured (part of the main office complex): locked building, security guard and fenced perimeter.
Connectivity	5G
Internet/Wi-Fi	Yes, local network with Wi-Fi available

Punakha and gewog post offices

Next to the Punakha post office, there is a large parking area with an asphalt surface that could be used for unloading cargo and changing batteries.

Next to the gewog post offices, there is a small open area with a soil or grass surface where drones could potentially land. These sites may require additional preparation, such as special landing pads.

The Vendor is expected to supply all necessary equipment to support the ground infrastructure essential for the successful operation of the drone delivery pilot project. This includes, but is not limited to, portable landing pads, portable wind barriers, backup generators, spare parts, toolkits for routine drone maintenance and repairs, and redundant communication architecture. This list is not exhaustive. Furthermore, during phase 1 of the pilot project, the Vendor shall coordinate with Bhutan Post to identify and confirm any upgrades – particularly with respect to security, electrical capacity and other relevant infrastructure – necessary to ensure the seamless implementation and execution of the pilot project.

5 Regulatory and legal requirements

The Vendor shall comply with all applicable regulations governing unmanned aircraft operations in Bhutan. In particular, the Vendor shall:

- obtain an import permit;
- register the drone;
- apply for an unmanned aircraft operation permit.

Throughout the preparation and execution of the pilot project, the Vendor shall coordinate closely with the BCAA, other regulators, local bodies and relevant authorities.

Bhutan Post and the UPU will lend their full support and cooperation to facilitate the timely acquisition of all necessary permits. Continuous engagement with regulators and proactive management of the permit process are mandatory to ensure uninterrupted and fully compliant operations.

6 Weather and environmental constraints

The Vendor shall take Bhutan's weather constraints fully into account in planning and executing the pilot project. All flight schedules, system specifications, maintenance routines and safety margins must be adapted to temperature extremes, high winds and seasonal precipitation patterns.

7 Training requirements

The Vendor must deliver training for the involved Bhutan Post staff to enable them to perform the necessary operations during the pilot project, including but not limited to:

- drone technology and operational basics;
- safe loading and dispatch of the drone;
- battery upkeep, charging and change procedures (or potentially refuelling);
- safe drone storage procedures;
- ground handling and cargo handover protocols.

Important: An initial training plan will be provided by the UPU; however, the final scope must be verified and, if necessary, adjusted by the Vendor.

In addition, the Vendor will obtain training from Bhutan Post to familiarize drone operators with the necessary postal operations.

8 Timeline

The Vendor shall deliver the following during and after the pilot:

#	Milestones	Deliverable	Phase	Duration ⁷
1	Obtain permits and flight authorization	Complete permit application pack (all BCAA forms and supporting documents)	Pre-pilot	12 months
2	Set-up of ground infrastructure	Ground infrastructure assessment report with potential purchase/installation plan	Pre-pilot	
3	Staff training	– Delivery of training curriculum and materials – Attendance record and competency sign-off certificate	Pre-pilot	
4	One month for test flights, necessary updates/upgrades and one month for scheduled operating flights	– Weekly operational logs – Monthly progress briefs	Pilot execution	2 months
5	Draft of summary of operations ⁸	– Performance report – Viability, practicality and business case scenario report	Post-pilot	2 months
6	Draft of recommendations for scale-up or route extension	Executive summary of scale-up options and implementation roadmap		
7	Final reporting	– Summary of operations – Recommendations for scale-up or route extension		

⁷ Given that the procedures for flight authorization and permit acquisition in Bhutan lack formal structure, the duration may fluctuate. This estimate is based on research and discussions with the BCAA.

⁸ The Vendor shall continuously monitor pilot performance and deliver detailed analytical reports encompassing comprehensive operational logs – including cargo volumes, flight metrics and incident records – alongside key performance indicators. These reports will provide the data-driven insights required to inform decisions on scaling up the drone cargo programme in Bhutan and assessing the cost-efficiency of operations.