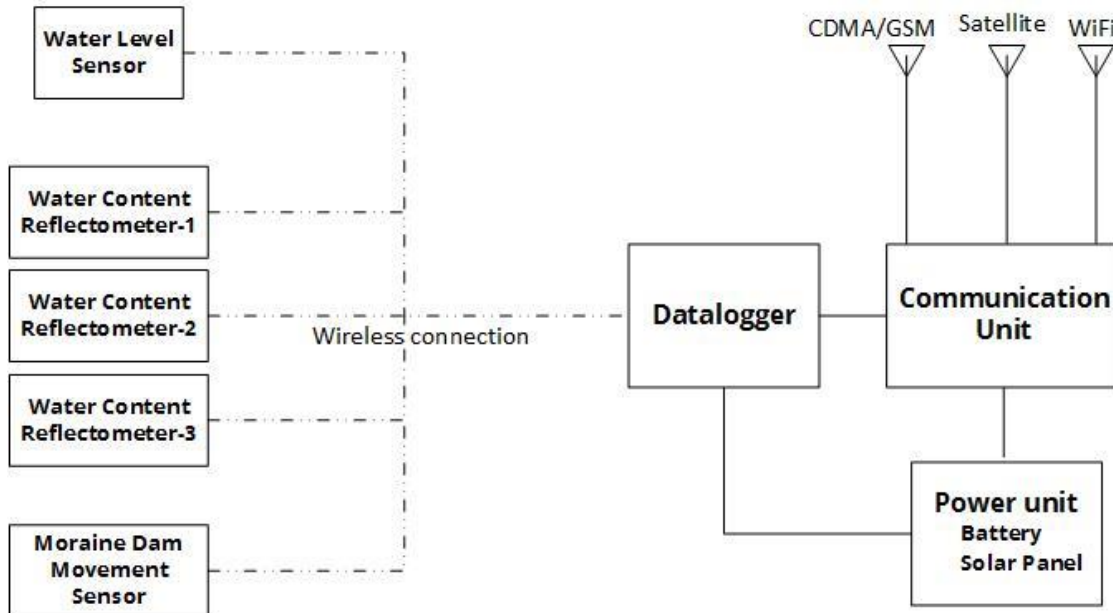


Queries / Questions and Comments / Answers:

1. Explain a little more about overall block diagram and its performance system.



Block diagram (the sensors should be as indicated in the document).

The overall performance of the system should be:

- The early warning system on Imja Lake is to be installed at remote and accessible through trekking at 5010 masl. So, the reliability of the system has to be very high. The system should also withstand harsh environmental condition and the solar power backup system should last at least a month without solar charging.
- The data transmission should automatically select economical and reliable system according to signal strength and Encrypted data transmission through HTTP and FTP. The CDMA / GSM/ IRIDIUM/ WIFI networks should function simultaneously in a redundant way.
- The audio GLOF Sirens should be Common Alerting Protocol (CAP) compliant.

2. Explain line of sight distance between 1.0 Water level Sensor and Automatic Weather Station, 2.0 Upstream GLOF detection systems and 3.0 Downstream GLOF detection systems.

The water level radar and automatic weather station are integrated to single system and will be installed at lake-outlet area. The distance between the water level sensor and automatic weather station is less than a kilometer.

The Upstream and downstream GLOF detection systems are proposed on wide downstream valley where line of sight would not be a problem. The distance between Upstream GLOF detection system and downstream GLOF detection system is less than 4 Km., but they should have independent communication systems for redundancy.

3. Is there a free line of sight between all stations (installation sites)?

Line of sight for Automatic Weather Station and GLOF sensors at Lake area and downstream respectively are not a problem.

4. What are the locations of each station (installation site) and what are the distances between them?

The water level radar and automatic weather station will be installed at lake-outlet area. The distance between them is less than a kilometer.

The Upstream and downstream GLOF detection systems are proposed on wide downstream valley. The distance between them is less than 4 Km., but they should have independent communication systems for redundancy.

5. Sketch and distance of Speakers, Sirens with central DCP in order to calculate power and link.

The distance between speakers, sirens with respect to the DCP is variable and not in line of sight. The communication between the DCP and the Speakers, Sirens is via the internet using various communication channels. The distance between the Audio Sirens and slave sirens is less than 10 Km.

6. Is there LOS (Line-of-Sight) between audio sirens and slave sirens?

There is line of sight between audio sirens and slave sirens to generate GLOF warnings to CBEWS.

7. What are the locations of siren stations? Can you please provide GPS co-ordinates for the siren stations?

The highly vulnerable areas are identified within 50 km from the Imja Lake but due to limited number of sirens (five in number), appropriate locations would be recommended but may need field testing before actual installation takes place.

The tentative coordinates of some of the potential sites are:

Dingboche: 27°53'32.46"N_ 86°49'53.22"E;
Pangboche: 27°51'17.04"N_ 86°47'19.54"E;

Jorsal: 27° 8'56.14"N_ 87°44'50.72E;
Bengkar: 27°45'42.76"N_ 86°42'53.69"E;
Phakding: 27°46'26.86"N_ 86°43'19.73"E;
Manjo: 27°46'16.42"N_ 86°43'24.25"E

8. Explain more about software of this project, the information is incomplete. What are the main application and features to be integrated in this software?

The software will be developed according to local requirements in close collaboration with DHM. The software should have the following components:

- Data acquisition module
- Data Processing module
- Data Presentation module
- Remote device configuration module
- Automatic and human assisted decision support system
- Emergency alert dissemination module

Data Acquisition Module should have software to receives data streams from various data collection platforms automatically and encrypt it for security reasons.

Data Processing Module should have quality control to validate data, capable of data aggregation (tables, charts etc.) and raise flags and alerts at thresholds.

Data Presentation Module should display data in tabular and graphical format; real time, hourly, daily and monthly. The module should be capable to display data on GIS platform.

Remote Device Configuration Module should be able to configure field devices and notification system remotely through web based interfaces via the server. Should support administration rights to remotely configure devices and notification systems.

Automatic Decision Support System should be designed for upstream villages (Chhukung, Dingboche, Pangboche etc.) to disseminated alerts promptly due to close proximity and less lead time. But **Human Assisted Decision Support System** should be designed for the downstream villages due to enough lead time and possibility of data verification by the government officials. Hence the decision support system should support both automatic and human assisted system.

During alert conditions the authorized experts are notified using SMS and emails. The experts then verify the data from field devices, camera pictures and sound. The alert can be cancelled in case of false alarm.

Emergency Alert Dissemination Module should support various medium of alert dissemination such as SMS, email, audio emergency notification system, etc. Support Web interface for

disseminating alerts and warnings to registered mobile numbers and email address, GIS based application to send alerts to impact areas through mobile based applications using GPRS. Alerts and warnings should use Common Alerting Protocol (CAP).

9. **There are 2 sensors for dam movement. Provide simple sketch of the dam showing the measuring points and their distances from each other and to the data Centre.**

The two dam movement sensors along with other sensors should be judiciously located to sense GLOF. The data collection platform needs to be located in an altitude high enough for it to be safe even when the GLOF occurs.

10. **Explain more about Digital Sound Metering Sensor (When the sound decibel exceeds certain threshold, sensor should also be capable of logging and transmitting sound clips to the server for analysis). Is above mentioned server means DHM server or any other? Is the transmission to server by GPRS/CDMA Modem or any other?**

The camera and sound metering sensors are proposed for physically verify GLOF events during day and night respectively. All the software needs to be installed in a server that DHM owns. The transmission to the server should be via GPRS / CDMA / Wifi / Iridium in a redundant way.

11. **Explain more about Camera for Harsh Environment (Communication protocols: FTP, email and web page interface, Memory Card Interface: SD card, FAT32, JPEG (image)). What is the purpose of SD Card in this Camera?**

The camera will log the pictures in certain time interval, but should be able to transmit the data to the server when the DCP senses any GLOF activity. If the GLOF sensor senses some activity, the camera should push the data to the server so that the officials can decide looking at the pictures.

How often are we to take readings of each of the sensors?

The water level, automatic weather station data, time lapse images and sound should be recorded at regular interval. The GLOF sensors would be activated whenever the threshold values are exceeded and the GLOF event is verified through multiple sensors. The sirens in the head reaches are activated automatically while those in the downstream are verified and warnings generated by the authority.

12. **Camera for Harsh Environment**
o **How often is this camera supposed to take a picture?**

Time lapse pictures would be taken at regular interval and stored data for uploading whenever GLOF events is suspected to visually verify it.

o What should these cameras take pictures of?

The river channel pictures are taken to visibly monitor GLOF floods from Imja Lake.

o Is this a real time requirement

During suspected GLOF events the recording should be real time.

**13. Why do you differentiate between Horn Speakers Array and Slave Siren Nodes?
Must the Slave Siren Nodes be omnidirectional?**

The CBEWS is triggered by horn speaker array through slave siren nodes.

Yes.

Is there a specific SPL or power requirement for the Slave Siren Nodes?

No.

Where will the Slave Siren Nodes be placed?

At Audio GLOF Sirens (Emergency Notification) System.

Is a mast for the Slave Siren Nodes required?

No.

14. The horn speakers array is a very low 60w max.

o Why so quiet? Is a louder, more powerful array allowed?

Sound should be audible from at least 700 meters both directions at 50 db, more powerful array is allowed for GLOF disaster warnings but not recommended at Sagarmatha National Park (SNP) area as it is protected area, but beyond this area more powerful horn speakers is allowed.

o Have the locations for the siren speakers already been chosen?

The highly vulnerable areas are identified within 50 km from the Imja Lake but due to limited number of sirens (five in number), appropriate locations would be recommended but may need field testing before actual installation takes place.

o What's the ambient noise of the area(s) where the speaker arrays are?

The Imja GLOF impact areas are close to river banks that are flowing through narrow and steep mountain terrain. So the ambient noises are around 40 db.

- o **How far away should someone be able to hear the sirens?**

Should be audible at least 700m both directions.

- 15. Under the item specifications you write "output signal: RS 485 / SDI 12 ", do you mean that the sensor needs to have both options or just one of them?**

Any one.

- 16. For the water level sensor, is SDI-12 absolutely necessary or is any other digital interface acceptable?**

SDI-12 or RS485, Analogue is not acceptable.

- a. Is a water level sensor with a horn antenna acceptable?**

No. The flat antenna is preferable than horn antenna and should be covered.

- 17. For the Digital Sound Metering Sensor, there are no operating temperature specifications. Can you clarify?**

The operating temperature: -40° C to +60° C

- 18. For the Mast (item 24, page 37), is the total height 6 meters?**

The **mast** for Imja Lake and surroundings (Automatic Weather Station and GLOF sensors) are 3m in height but mast for audio sirens (emergency notification) system can be 3m or higher.

- 19. Legacy equipment**

- o Is there an expectation to integrate the existing community warning system with the new one?

The automatic siren system will activate 15 community based early warning system (CBEWS) through slave and siren nodes, mobile phones, FM warning broadcast etc.

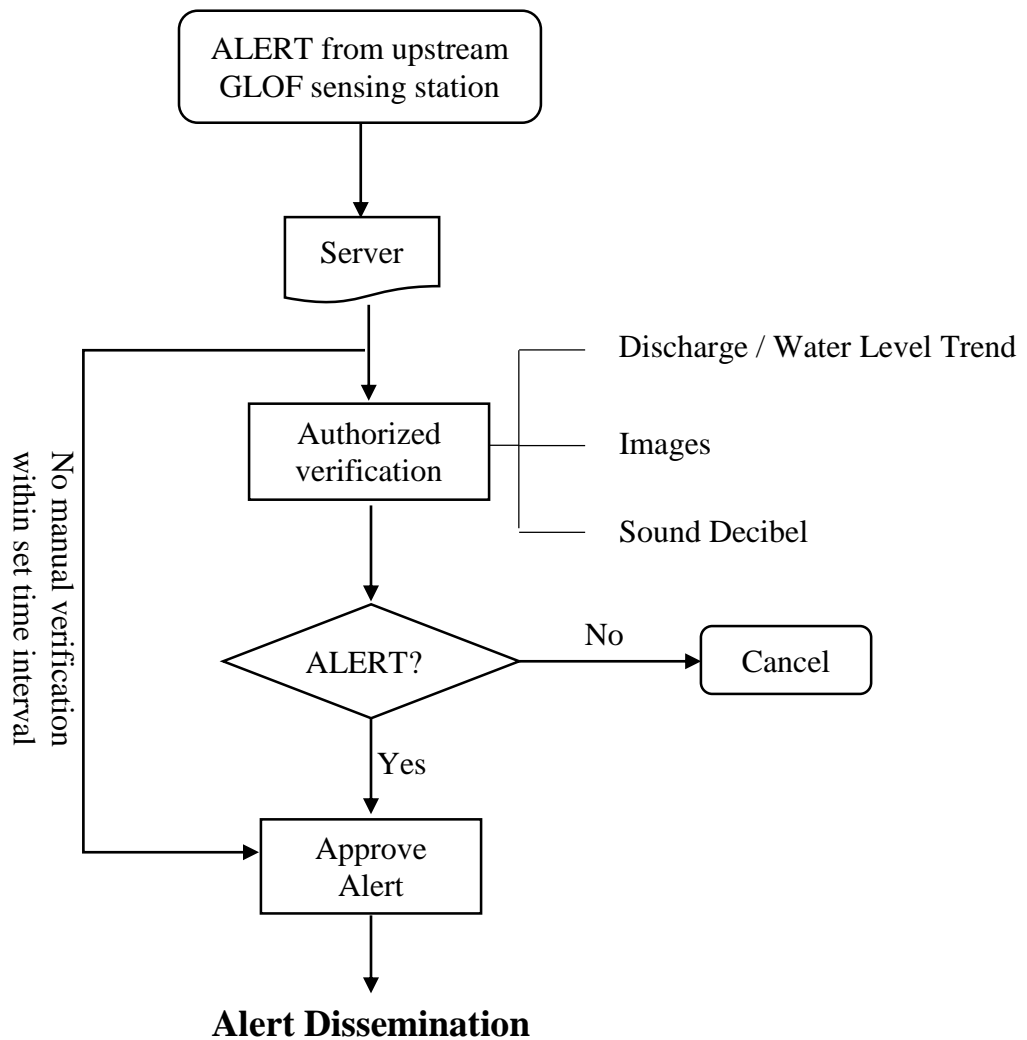
- o If so please provide information on the existing system. Make/ model of sirens, number of sites, siren output, linking format, etc.

The hand operated sirens, mega phones, mobile phones and manual water level gauge are provided to 12 Taskforces that operate the CBEWS.

- 20. Explain more about Wireless Remote Terminal Unit with Audio Codec (Remote triggering by**

CDMA, GSM, Wifi and Iridium- Live Public Address and /or pre-recorded voice messages).
Remotely from where it is triggered? Is it possible to provide block diagram?

The Wireless remote terminal unit (WRTU) with audio codec needs to be triggered remotely by the server. The WRTUs are triggered automatically for upstream villages and manually for downstream villages.



21. Explain more about Wireless Remote Terminal Unit for GLOF sensing (Built in rechargeable battery for power source, Built in charge controller to charge the battery, Should use solar panels to charge the internal battery, The battery should last at least a month without solar charging). Is this power supply system, enclosure separate than BOM mentioned?

The power supply system can be separate or integrated into the WRTU.

- 22. Page 28 say "sensors used to detect the GLOF will communicate with the DCP using low power wireless communication". What are the sensors to be connected with low power wireless communication (Laser Snow Depth Sensor, Moraine Dam Movement Sensor, etc. or any other sensors)? Do GPRS, Radio (VHF) is possible in the locations of the systems, what are the distances and whether there is free line of sight?**

The water level sensor for the lake will communicate with the DCP used for weather station using wireless communication. All the GLOF sensors will communicate with the DCPs using wireless communication, as the DCP will be placed in a higher altitude.

- 23. Page 35 says "data transmission through CDMA / GSM/ IRIDIUM/ WIFI networks simultaneously". As for the above, are CDMA/GSM network really available in the location of the systems? In BOM, Iridium is not mentioned. What is the quantity of Iridium required? Is it compulsory to Iridium SBD charges for 1 year?**

At the moment mobile operators are not present in this area. But we have already requested NTC to have the region covered, and they have already made plans to install a BTS at Dingboche. Iridium is required for all the DCPs and the emergency notification systems. Yes it is compulsory to include the iridium SBD charges for a year.

- 24. CDMA/GSM Cellular Communications**
o Is there a reliable infrastructure already in place?

Mobile towers are installed at Namche, Tengboche and Everest base camp as of now but not very reliable.

- ☑ Are there cell towers already in range at Imja Lake? What about the small villages?**
o Have you considered other types of communications such as satellite?

The Nepal Telecommunication Centre (NTC) is planning to install a BTS at Dingboche that is expected to cover Imja Lake. Iridium is required for all emergency notification systems and the data collection platforms.

- 25. Page 30 says" 500kbps or other appropriate bandwidth from a local ISP". From where Local ISP is available? Who will pay for Local ISP?**

There is a local ISP in Khumbu region. The bidder will pay for the local ISP for a year.

- 26. Page 35 says "The data logger should be remotely configurable to change any settings in the**

system. (Note that mobile communication providers in Nepal do not allow fixed IP address nor public IP address to its nodes)". Is local ISP available on Imja Lake site? If available, remotely configuration is possible. It shall be possible only if Local ISP can provide internet access and can be linked to Data logger and Local ISP with Wifi or Wireless Radio Modem. Please comment on it.

A local ISP is present in Khumbu region. But the remote configuration should work by all the communication mediums including iridium, GSM and CDMA. The bandwidth from the local ISP cannot be expected to be fully reliable.

27. A server and a database are mentioned throughout the text (item 10, page 33; item 14, page 34; item 17, page 35; item 21, page 37). However, the Tender does not call for related hardware. Is there a server and /or a database available? Can you give us specifications?

The server is existing server at DHM

28. Do the solar irradiance in this lake region have enough solar radiation in order to have enough power with a single 24V-100W Power supply system(100 Watt solar panel, VRLA battery, 2 x 12V 42Ah, 5A charging current Capacity for 24 V systems). The system needs enough energy to feed a system that has a consumption of >1A?

The daily mean radiation is 125 -250 W/m² recorded at Dingboche station between 1988- 2004. The bidder can offer bigger solar panels and batteries if so required.

29. Regarding the power supply systems, we recommend that the power available for each station is increased. We would recommend to either add more solar panels and larger batteries or at best to combine the solar panels with wind turbines made for such conditions. Please commend.

The bidder can offer more solar panels and larger batteries if so required.
Technical questions:

30. Control center: Where would it be located?

It is located at Department of Hydrology and Meteorology (DHM), Kathmandu.

o Would you like more than one?

No.

☐ If so, would they be in a hierarchical structure?

o Who will be activating these sirens?

o Can you describe these control centers?

31. Commercial Questions:

❓ C.17 C.17.2

- o **Is the exchange rate of 101.96 fixed or as stated in 17.1?**

Yes.

❓ C.21.1

- o **Deadline of Bid Submission – We request an extension of two (2) weeks**

Extension of deadline is not possible.

❓ C.15.2

- o **Is the expected date for the commencement of the contract mean expected beginning of deployment?**

Procurement process is initiated.

- o **Please provide an explanation of how the expected duration of the contract is believed to take only 3 months?**

Once the procurement process is initiated, the delivery of equipment is expected by 6 weeks, testing of equipment by 2 weeks, Installation, training and customized software development by 4 weeks.

32. It is stated that "Training of PMU /DHM staff for data acquisition and uploading to DHM website: www.hydrology.gov.np " must be delivered. Please clarify whether PMU /DHM staff have IT (information technology) experience, whether members of the IT staff will be present, whether the persons in charge of the website (web-master) will be available for support during the training and whether it will be possible to gain enough information on the structure of the website.

The PMU /DHM staff do not have IT experience but web-master would support for the training. The information on the structure of the website can be discussed with web-master.

33. How and when will we get information regarding the interface, structure and formats of the database and the website?

During the bid proposal submission phase the website: www.hydrology.gov.np has to be referred. During design phase, the details on interface, structure and formats of the database and the website can be discussed with web-master.

