

**Ministry of Population and Environment (MoPE)**  
**Department of Hydrology and Meteorology (DHM)**  
**Community Based Flood and Glacial Lake Outburst Risk Reduction Project (CFGORRP)**  
**Field Trip Report (FTR) :(19 June – 14 July)**

**1.0 Team Members:**

*Pravin Raj Maskey, Senior Technical Advisor.*

**2.0 Overall objective of the field visit/ mission:**

- *To get Imja construction permit from SNP and royalty payment letter.*
- *Appraise Imja construction progress to SNP and BZMC.*
- *To supervise the ongoing construction work, construction work mangement, camp and workforce management, waste management at work site.*
- *To monitor progress of milestone activities.*
- *To supervise installation of hydro-met, GLOF detection sensors and VSAT at Imja Lake.*

**3.0 Key activities carried out based on the travel itinerary :**

<b>Date / Day</b>	<b>Travel destinations.</b>	<b>Persons/ Groups interacted with</b>	<b>Description of Field visit Program/Activities</b>
Day 1: 19 June 2016	Kathmandu – Okhaldhunga by vehicle.	On the way to Imja.	
Day 2: 20 June 2016	Okhaldhunga – Phaplu by vehicle.		
Day 3: 21 June 2016	• Trekking Phaplu – Nunthala.	On the way to Imja.	
Day 4 - 5: 22- 23 June 2016	• Trekking Nunthala to Lukla.	On the way to Imja.	
Day 6: 24 June 2016	• Trekking to Monjo.	On the way to Imja.	
Day 7: 25 June 21 June 2016	• Trekking to Namche.	Visited SNP office and met acting warden. Visited SPCC office and discussed with Kapindra Rai on waste and solid waste management.	<ul style="list-style-type: none"> <li>• <i>Shared information on ongoing activities at Imja Lake.</i></li> <li>• <i>Submitted CFGORRP letter seeking permit for Imja construction work to SNP.</i></li> <li>• <i>Received letter from SNP on Royalty payments for sand and aggregates.</i></li> <li>• <i>Received letter from SNP on permits for Imja related construction work.</i></li> <li>• <i>Consulted with SPCC official on waste and solid waste management at Imja lake site.</i></li> </ul>
Day 8: 26 June 21 June 2016	• Trekking to Debuche.	Met with SNP game-scout Bharat Karki and Lakpa Lama.	<ul style="list-style-type: none"> <li>• <i>Arranging of Puja at Imja Lake by Lamas of Tengboche Gumba on 30 June 2016.</i></li> </ul>
Day 9: 27 June 2016.	• Trekking to Dingboche.		
Day 10: 28 June 21	• Trekking to Imja.		

Day 11 - 21: 29 June – 9 July 2016.	• Supervision of work in Imja.	Site engineers, workforce, Nepal Army personals, RTS & NTC technicians, Lamas of Tengboche Gumba.	<p>Field visit of construction site at Imja, physical verification of ongoing construction work milestone 2 (excavation of open channel, finalization of formation levels of open channel, placements of gabion mattresses, geotextile, geomembrane, installation of gate structure, concreting of gate column, preparation of cabling in downstream and upstream transitions, strengthening of cofferdam etc.).</p> <p>Physical verification of ongoing construction work milestone 3 (office building, warehouse, green colouring of roof, planking of interior walls, roofs and floor for insulations.</p> <p>Quarrying of sand, stone and transportation to worksite by workforce.</p> <p>Excavation by excavator and preparation of formation levels, removal of big boulders at worksite by excavator and breaking of boulders by chisel and hammer (indigenous knowledge) without using explosives or silent crackers.</p> <p>Transportation of construction materials (cement, kerosene, diesel etc.) from Phaplu / Syangboche by helicopter, Jupke and porter to Imja worksite.</p> <p>Pumping of seepage water, gabion work upstream and downstream portion of open channel and concreting of gate columns etc.</p> <p>Supervision of installed hydro-met, GLOF detection sensors and VSAT.</p>
	30 June 2016.	Tengboche Gumba Lama and game-scouts of SNP.	Traditional Puja from Lamas of Tengboche Gumba that had participation from local communities and workforce (Engineers, Nepal Army, workers etc.).
Day 22: 10 July 2016	Trekking to Debuche.		
Day 23: 11 July 2016	Trekking to Namche.		
Day 24- 25: 12 - 13 July 2016:	Trekking to Lukla.		Flight cancellation on 13 July due to bad weather.
Day 26: 14 July 2016	Flight to Kathmandu.		Arrived at Kathmandu.

#### **4.0 Major observations/findings made from the field visit/ mission:**

(Listing in order of Priorities, point out the key findings from the field visit in bullet form.)

The status of milestones as per the Letter of Agreement (LoA) are as follows:

4.1 Imja construction LoA **Milestone 1 targets is achieved** and reported (earlier FTR report).

4.2 Imja construction LoA **Milestone 2 targets are:**

- Construction of open channel and regulatory structures.
- Widening of existing river sections.

#### **4.3 Hydro-met, GLOF sensor and VSAT installations activities are:**

- *Hydro-met and GLOF detection sensors installation.*
- *VSAT installation for real time communication of data.*

#### **4.4 Progress of Milestones 2:**

- *Imja construction LoA **Milestone 1 targets achieved** and reported (14 June 2016).*
- *Status of LoA **Milestone 2 targets:***
  - *The royalty for sand and aggregates paid to SNP and SNP has issued permit for Imja construction work.*
  - *Puja from five Lamas of Tengboche Monastery conducted according to local traditions on 30 June 2016 with the participation from local community, SNP staff and Imja construction workforce.*
  - *Excavation of transition, upstream and downstream section until the existing river sections completed.*
  - *Excavation of foundation of regulatory structure, placement of sheet piles and concrete work completed at bed level, steel gate installed and concreting of column partially completed, construction of gabion sidewalls of gate structure also completed.*
  - *Construction of downstream gabion section and plump concrete work completed and preparatory work for cabling until the natural river section is being undertaken and expected to be complete within a week.*
  - *Construction of upstream gabion section initiated and expected to be completed by next week along with preparation of transition section and boulder linings.*
  - *Reinforcement of cofferdam by filling and compaction of earth due to rising lake water level (milestone 1 work) has been undertaken to release water later in September / October.*
  - *The regular rainfall at worksite has hampered the construction work at site, but due to proper gears provided to workforce, the construction schedule has not been interrupted so far and the progress of work is as per the schedule.*
  - *So far no mountain sickness related incidents has been reported and the medical team are mostly engaged in treatment for common cold and gastroenteritis related problems.*
  - *The record keeping of visitors has been initiated on regular basis.*
  - *The record keeping of workforce daily engagement record has been maintained.*
  - *Transportation of last consignment of construction material (cement) to Imja site has been completed by airlifting from Phaplu to Syangboche and then by Jyopke and porter to Imja worksite.*

#### **4.5 Conditions of seepage flow from Imja Lake:**

- *During October 2014 design study phase, two seepage locations at the bottom of the lake*

were identified. The discharge from these seepage area has increased during the peak Monsoon period. Except for the seepages, no physical changes around the moraine dam are witnessed during the field visit.

#### **4.6 Traditional Puja by Lamas at Imja construction site:**

- *The traditional puja was performed by five Lamas of Tengboche Monastery on 30 June at Imja Lake. Local people participated and assisted in performing the Puja. SNP game-scout Bharat Kumar Karki and other staff was present in the Puja. The workforce, Nepal Army and technical staff were also present in the Puja ceremony.*

#### **4.7 Progress on Hydro-met and GLOF sensor installations:**

- *Hydro-met, GLOF detection sensors and VSAT equipment installed successfully and the data are uploaded at DHM website through VSAT. The operation of VSAT is weather dependent and communication linkages are frequently disrupted but the data are being uploaded. The preliminary test results has shown that the VSAT is not reliable for GLOF disasters warnings due to frequent breakages of internet links. For GLOF disaster, the Iridium communications through satellite communication has to be relied upon as a single source. Once the planned installation of NTC towers in the area, particularly tower in Dingboche and extended services to Imja Lake that has been requested to NTC will provide additional GLOF warning communications in case of emergencies. The BZMC has procured 28 VHF radio sets distributed to BZ users committees, who are also the members of the taskforces of the project needs to be integrated to communicate GLOF disasters during emergencies.*
- *There are two telephone lines apart from the internet communication at 256 kbps. One telephone has been used for telephone communications but the lines are frequently disrupted in bad weather conditions.*

#### **4.8 Status of Display boards erected at trekking routes:**

- *While trekking to Imja Lake, six display boards were seen at Cheplung, Ghat, Phakding, Tok Tok, Pangboche and Dingboche. Out of these six display boards, display materials at Cheplung, Phakding and Tok Tok were found torn and remaining display materials at Ghat, Pangboche and Dingboche are in good conditions.*

#### **4.9 Environment Management at Imja worksite and campsite:**

- *The garbage and waste is properly collected at worksite and campsite and properly disposed by carrying by Nepal Army MI-17 helicopter while returning and disposed at Nepal Army camp at Phaplu whenever there was helicopter flights at Imja Lake.*
- *Recently, these garages and waste are separated into biodegradable and non-*

degradable, the biodegradable are managed by digging pit and covering with soil away from the water bodies and non-degradable are transported.

- The solid waste are disposed by digging pit away from the water bodies and covered by soil. The informal discussion with SPCC officials at Namche has informed that the inspector working on their behalf has inspected Imja campsite and reported that the solid waste has been managed properly and garages has been well managed.
- The workforce engaged at Imja Lake are from local communities from Dingboche and Pangboche and the vicinity as well as from other villages in Solukhumbu District. These workforces has undertaken job according to the local traditional practices. Interaction with local communities have not reported any issues that are contrary to their local cultural practices.
- The Nepal Army personnel are monitoring the activities at campsite and worksite and no illegal poaching activities have been reported so far.
- The quarrying site is at two location for sand, which is small confined area. These quarrying sites have been closely monitored and limited quarrying activities will not create any instabilities in the area. These sites will be maintained to its original condition after the completion of quarrying activities. The stones are mostly collected from the areas close to worksite. Due to spread of large boulders on the surface of the construction sites, digging for the quarrying of stones has not taken place so far.

#### **4.10 Status of DHM building at Dingboche:**

- The DHM building at Dingboche has been constructed long time back but this building has been unused for quite long period of time and remain closed most of the time.
- The local community has informed that the DHM building has no access road or open area and the building has encroached land of the neighbouring plot. Therefore, DHM has to acquire additional land for accessing the building.

#### **4.11 Outcome of discussions with SPCC:**

- *The SPCC is aware of the ongoing Imja construction work and they had informal meetings with Nepal Army on waste and garbage management.*
- *The SPCC has no objection for the garages managed by the Nepal Army. The Nepal Army solid waste management by digging pit away from water bodies and glaciers and covering with soil has been supervised by field staff of the SPCC and so far has no objections to this practice.*

#### **4.12 Outcome of Informal meeting with SNP warden and BZMC chairperson at SNP:**

The Informal meeting with SNP warden and BZMC chairperson took place at SNP on 11 July 2016 and the followings are discussed:

- *The 21-23 May visit to SNP by NPD, NPM and team had been minuted and it had to be finally signed by chairperson of BZMC after consultation with Khumjung and Chaurikharka BZ chairperson. This was put up in the BZMC meeting as an agenda and it was decided that the minutes not be signed by BZMC chairpersons on the recommendation of Khumjung and Chaurikharka BZ chairpersons.*
- *The SNP and BZMC observed that there is less possibility of re-alignment of the taskforces formed by the CFGORRP with 28 BZ user groups as the work of CFGORRP has progressed significantly and DHM / CFGORRP has no significant activities planned for 2016 and 2017 except for impending mock-drill for communities.*
- *The SNP has indicated that it is not in a position to provide permit for mock-drill exercise and the DHM / CFGORRP can undertake activities for TF that are loose bodies.*
- *The SNP and BZMC has suggested that DHM has to be responsible for all the work undertaken in Imja and accordingly manage all the infrastructures developed for the post project period.*
- *The SNP and BZMC indicated that it is not in a position to take responsibility or allocate budget for operation and maintenance of the system including recurrent operation cost of the taskforces for the post project period.*
- *The SNP and BZMC raised the legal status of the taskforces (TF) formed by the DHM /CFGORRP. It was made clear that SNP is in no position to provide permit for mock-drill exercise that has been verbally requested by DHM /CFGORRP in the past. Since TF are loose bodies, there is no need to get permission for conducting mock-drill.*
- *The NA has indicated that for any mock-drill exercise and other activities they should be integrated as part of the disaster management team as they are mandated with search and rescue operation.*

## **5.0 Key Recommendations and conclusions:**

*(What strategic recommendations would you propose to the Project Management regarding implementation and future course of action?)*

### **5.1 Recommendation for Imja construction work:**

*The progress of work of milestone 2 (excavation of open channel and widening of the existing river section) and milestone 3 (office building, store, warehouse etc.) has significant progress and expected to be completed by next two weeks. Significant work has been done under milestone 4 (moraine dam levelling, compaction and strengthening; removal of wastes / solid wastes and beautification of construction site) has been initiated and significant work is expected by end of July. Except for dismantling of cofferdam, release of water through the open channel and widening of necking areas, significant work under milestone 1, 2 3 and 4 is expected to be completed by end of July.*

*Due to peak, monsoon season and more than average rainfall predicted this monsoon; the release of water through the open channel structure should not take place before the lake level starts to decrease. The precipitation records of 1987-2004 at Dingboche shows that the July precipitation is 80 mm and this rises to 120 mm in August, so release of water through the open channel should be strictly be discouraged in July and August.*

*The radar water level sensor has been installed at Imja Lake to monitor changes in water level. This data needs to be closely be monitored to identify appropriate time period of falling lake level to release water through open channels. The release of water through the open channel should be gradual and controlled to avoid any unnecessary erosion as well as ensure safety of structures that are constructed.*

*The widening of necking portion upstream of the open channel section should take place after gradual lake lowering task is completed. The neck portion between the main lake and the westward lake should function as natural control during lake lowering for the safety during lake lowering operations.*

*The report of International Consultant (IC) is being prepared and used for quality assurances of the construction work.*

*For quality assurances, regular monitoring of construction work is required.*

## **5.2 Recommendations for Hydro-met and GLOF sensor:**

- *VSAT real time communication is being disrupted frequently due to harsh climatic conditions. So real-time uploading of photo during disaster may not work, as per the continuous photos are not being uploaded due to frequent breakdown of internet linkages of the VSAT. Similarly, using VSAT for communication of GLOF disaster will not be a reliable option as of now. The VSAT operated by World Link is being procured by RTS and will be tested at Imja Lake. Depending on the test results, VSAT use for the GLOF warnings would be finalized.*
- *There is need for fencing of GLOF sensors with barbed wires and hydro-met and VSAT station properly be fenced to protect against flow of traffic of yak, animals, porters and visitors.*
- *The real-time hydro-met data has been uploaded via VSAT internet communication and the threshold values are being set, instrument results calibrated and tested by RTS. Once the testing phase is over the hydro-met data would be uploaded at DHM website. The necessary trainings to DHM staff on data acquisition, management and*

*uploading would be imparted in Kathmandu by RTS. The dates of such trainings would be mutually agreed with DHM and RTS later.*

### **5.3 Recommendation for re-alignment of taskforces:**

- The taskforces have been formed with assistance of the SNP who had issued letter and assisted in consultation with local communities. The local communities at vulnerable locations had selected member of the taskforce and according to the broad framework TF agreed that the officiating VDC level BZ chairperson shall officiate as chairpersons of the taskforce, even though the VDC BZ were not physically present during TF formation period.*
- The BZMC has reservation of formation of taskforces outside of the existing 28 BZ User Groups that exist in Khumbhu. The taskforce formation with people that are impacted by GLOF and Flood and who are the member of BZ. These TF are chaired by VDC level BZ chairperson, this arrangement has been envisioned to integrate DHM /CFGORRP TF with existing BZMC institutions, but BZMC has been objecting the existence of TF.*
- The DHM /CFGORRP has tried to realign TF with Village Disaster Risk Management Committee (VDRMC) and consultative meeting was undertake at DHM /CFGORRP office. It was suggested that the TF should be realigned with BZMC and realignment with VDRMC is not a big issue.*
- As an outcome of meeting led by NPD with the SNP and BZMC at Namche on 21-23 May 2016 for realignment of TF and conducting DHM /CFGORRP in consultation with SNP/ BZMC was minuted but failed even though this was signed by other member except chairperson of BZMC. No, concrete suggestion has been provided by SNP /BZMC for realignment of TF so that SNP /BZMC has ownership for future activities of TF.*
- The DHM /CFGORRP should formally request to get the copy of the minutes that is signed by NPD as well as get minutes of BZ council meeting concluded in July 2016 for recording DHM /CFGORRP initiatives of partnership with BZMC.*

### **5.4 Exit strategy to sustain TF:**

- These taskforces are expected to safeguard GLOF sensors at Imja Lake and automatic sirens and operate community-based sirens during GLOF, Flood and other disasters. These TF require regular operation cost as well as repair and maintenance cost for sirens. The SNP /BZMC is unwilling to provide any operation and maintenance cost for the TFs.*
- The DHM /CFGORRP should explore hydropower projects such as Dudh Koshi Storage (300 MW) to be undertaken by Nepal Electricity Authority to bear the operation cost of TF that are responsible for providing early warnings to the hydropower.*
- The Imja Lake lowering work is at final stage of completion and it is being executed by Nepal Army which has physical presence at Lukla, Namche and Fungithanka. At the time of disaster, NA are directly and indirectly involved for search and rescue operation.*



*Therefore, the NA should also be integrated with TF so that they have some role in safeguarding the GLOF detecting sensors and automatic sirens in future.*

#### **6.0 Outputs from the Field Visit/ Mission:**

*(List the main achievements and outputs that were accomplished during the mission in bullet form.)*

- 1. Letter from SNP on royalty payment for sand and aggregates.*
- 2. Issuance of Construction Permit for Imja construction work.*
- 3. Traditional Puja at Imja Lake by Lamas of Tengboche Monastery.*
- 4. Realignment of GLOF sensors and uploading of hydro-met data to DHM server from Imja Lake.*
- 5. Overall Milestone 1 work supervision and certification of completion of work.*
- 6. Monitoring and supervision of Milestone 2 and 3 related work at site and recommend remedial actions if any in construction related work.*

#### **7.0 Likely Follow-ups that might be necessary after the visit (What Next?):**

*(Pinpoint the probability of follow-ups that might likely be necessary to validate and contribute towards information and knowledge that you collected during the field visit).*

*Regular monitoring of Imja Lake level is required and threshold value set to trigger alarm in case of significant rise or fall in water level over short time span. RTS should set threshold value in consultation with DHM / CFGORRP and other stakeholders.*

*Release of water through open channel should take place only when lake level starts to fall-down, which is expected after September.*

*Even when significant progress of milestones 2, 3 and 4 has taken place, minimum staff at site needs to be managed by Nepal Army for emergency works if any. The excavator and the operator needs to be stationed stand-by until lake-lowering operation is completed.*

*Similarly, hydro-met and GLOF sensors data needs to be regularly be monitored and warning disseminated for extreme events and safeguarding of equipment and sensors needs to be undertaken by Nepal Army until the defect liability period.*

#### **8.0 Major changes observed, if any, since the last field visit made:**

*The significant progress has been made in milestone 2 and 3 activities and it is expected that all the works of milestones 2, 3 and 4 is expected to be completed by end of July.*

*Annexes:*

*A 1. Letter of SNP on a. Royalty Payment for sand and stone, b. Permit for Imja Construction work.*

*A 2. Traditional Puja at Imja Lake.*

*A 3. Hydro-met data set retrieved from data logger at Imja.*

*A 4. Construction related photos.*

*A 5. Hydro-met and GLOF detection related sensor photos at Imja.*

*A 6. Display board related photos.*

*A 7. DHM's building at Dingboche.*