

**55<sup>th</sup> CONFERENCE OF  
DIRECTORS GENERAL OF CIVIL AVIATION  
ASIA AND PACIFIC REGIONS**

*Denarau Island, Nadi, Fiji  
22 — 26 October 2018*

**AGENDA ITEM 3: AVIATION SAFETY**

**MANAGEMENT OF DEVASTATING FLOOD SITUATION AT  
COCHIN INTERNATIONAL AIRPORT**

Presented by India

**INFORMATION PAPER**

**SUMMARY**

The Southern state of Kerala in India faced one of the most devastating floods during the current monsoon period. The Cochin International Airport located in central part of Kerala was one of the worst affected airport from these floods in Kerala.

This information paper articulates the flood situation at the airport in detail and elaborates on the actions taken by various agencies for managing one of the most grievous flood situation ever faced by the airport.

## **MANAGEMENT OF DEVASTATING FLOOD SITUATION AT COCHIN INTERNATIONAL AIRPORT**

### **1. INTRODUCTION**

1.1 Due to the heavy downpour and the rising water levels in the rivers and canals of Kerala and increased warning that the dams (Idamalayar dam – closer to the Cochin airport and cause of a flood in 2013 and Idukki dam – State's largest dam) were reaching their flood levels sent shock waves to all of Aluva, as the water from these dams were to be channelled through River Periyar which runs near the airport and Aluva and towns thereafter before reaching the sea. Moreover the Weather forecast for the days up to middle of August was also for heavy rain.

1.2 Accordingly, from the last week of July, Cochin International Airport Ltd. (CIAL) had been on the lookout for any eventuality that may arise due to the opening of the dams coupled with heavy monsoon. The flood waters started entering Cochin Airport and on 15 Aug 2018, the airport was fully flooded with water levels in airside being between 3 to 4 feet. The airport was flooded for 4 days.

1.3 The aircraft operations at Cochin Airport were suspended from 15 Aug 2018 till 29th Aug 2018 due to flooding and reconstruction activities post floods.

### **2. DISCUSSION**

#### **Pre Flood Warning Phase**

2.1 The period from July 27 onwards was a warning Phase accordingly, there was a constant alertness about the situation and constant communication with the concerned authorities and responsible agencies.

2.2 The following activities were undertaken during the Pre-Flood warning phase, so as to manage, minimize and mitigate the adverse factors that may affect the Airport Operations

#### **2.2.1 Information Gathering**

2.2.1.1. The most important step was to gather maximum and most authoritative and correct data from the respective agencies so as to make quick and effective decisions regarding airport operations in case of any eventualities including the following

- ✓ Maintaining Co-ordination with Dams
- ✓ Weather Report Monitoring
- ✓ Coordination with District Disaster Management Coordination Committee
- ✓ Recollection of past flood event & its minutes & action plan.

#### **2.2.2 Activity Identification & Implementation**

Learning from the previous flood situation and as decided in the Management meeting, following 3 pronged activities were undertaken:

- (a) Situation Monitoring (for information & for decision making);
  - ✓ Water Level Monitoring at Site – full time & dedicated manpower
  - ✓ Entire Airside & esp. periphery road inspection
- (b) Preventive / protective Action
  - ✓ Strengthen the focal area –
  - ✓ Water pumping

### **2.2.3 Stakeholder Co-Ordination**

On the August 14th evening, the flood warning situation in Kerala had aggravated and the opening of shutters flooded the rivers and canals beyond all limits. As the water level maintenance had become difficult and the incoming water exceeded the water drained out which resulted in the filling of drains and slower flooding of the airside.

Meetings were held with the stakeholders and they were informed of the situation and warning as above was issued to them. CIAL undertook activities for flood control. Meetings were conducted hourly basis with the airlines. Towards midnight decision was taken and the arrivals were suspended from 0200 hours and all flights on ground were directed to take off before 0400 hours. The Airport Operations were suspended from 0400 hours. Only Air India Express flight and aircraft of Kalyan was on ground due to crew unavailability, even though sufficient warning was given. All other flights were cancelled.

### **2.2.4 Emergency Passenger Information Control Room**

The most adversely affected persons in airport operation suspension are the travelling public and hence they need to be informed of the gravity of the situation, keep informed of their safety, diverted aircrafts and their destinations / rescheduling / cancellation information. The contact information of airline, call centres, remedies and alternate solutions available etc. are also highly sought after information from the travelling esp. departing passengers and friends and families of the arriving passengers. The Hajj Pilgrim flights also aggravated the situation. However, steps were taken to provide all required information by setting up an emergency passenger information control room with all facilities to inform all passengers. Following activities were undertaken with regard to the Emergency Pax. Information control room:

- ✓ Appoint Control Room Team Leader & Team Members
- ✓ Team Leader to establish the Emergency PI control room
- ✓ Ensure sufficient no. of telephones
- ✓ Computers, Printers, Internet, FIDS & Airline information,
- ✓ Flight schedule – sufficient copies esp. huge size for easy reading & their latest status, Agency / person to be contacted etc.
- ✓ Information Display Boards
- ✓ Contact Numbers of airline offices, Station Heads & call centres
- ✓ Collect information on diverted flights, Cancelled flights
- ✓ Phone numbers of airports to which diverted.
- ✓ Display all such information on the display board – (huge for easy notice)
- ✓ Provide correct / latest information available regarding the time of closure and estimated recommencing of the airport operations.
- ✓ Proper rostering to ensure their availability
- ✓ Facilities for the telecallers including refreshments, breaks,
- ✓ Updation of airport & airline information (to be provided by Airline)
- ✓ Co-ordination with airlines
- ✓ In this emergency the most fundamental tool in public information is Media and quick, correct and latest information were disseminated through following mass media:
- ✓ TV channels/ FM Radios/News papers
- ✓ Internet / News portals
- ✓ Airport & Airline Web sites
- ✓ Face book, Twitter & whatsapp
- ✓ For this purpose we sent out official, precise and latest information via

### **2.2.5 Safety of Installations & Shut Down of Equipment**

In tune with the main aim of providing safety to the equipment and facilities and resources following activities were carried out based on the below given priority:

- ✓ Critical Installations safety
- ✓ Equipment & vehicle safety
- ✓ “Protect your own equipment & facility and then lend a helping hand” was the call given to the airport and operational personnel. Accordingly all persons were assigned responsibility to protect equipment and resources.
- ✓ Shutting down of critical and later on all installations and facility was the most important step for the safety of the equipment.
- ✓ As soon as the Operations were called off, the Runway / Taxiway / Apron lightings, PAPI and NAV Aids were switched off.
- ✓ The ATC (CNS-ATM) Equipment were switched off as per the requirement.
- ✓ Generators, Sub stations which were not critical and not essential were shut down immediately.
- ✓ IT & Network system & DATA communication including CUTE system (critical) was shut down. The equipment were shifted & positioned at safer locations, which ensured their safety.
- ✓ At last the power system also was shut down so as not to cause any electrical shocks or damages.
- ✓ Removal of Furniture & fixtures and taking them to safer areas. Priority was given to criticality of the item, removability, high value items and those easily prone to damage
- ✓ Removal of electrical items, other equipment etc. to safety
- ✓ Use of protections, barriers, sand bags, closure of openings etc.
- ✓ Pumping out of water from water logged pits (baggage pit)

### **2.2.6 Co-Ordination for Alternate Airport**

One of the most appreciated factor (by the travelling fraternity) in the situation was arrangement for operation of domestic operations from the Naval Airport at Wellington Island in which Airlines co-operated and flights were well appreciated.

- ✓ Meet to seek alternate airport as solution
- ✓ Passenger traffic through Naval Airport
- ✓ Co-ordination with Navy
- ✓ Obtain approval of MoCA & DGCA for operations from Naval airport
- ✓ Ensure Operational personnel availability (fire personnel, Baggage loaders, GH operators, security screeners / personnel, key personnel)
- ✓ ATC & Fire Service ensured by Navy, IMD,
- ✓ Airline co-ordination for operations from naval airport.
- ✓ Provide all basic facilities including security installations, Housekeeping, refreshments,

## **2.3 Floods**

### **2.3.1 Timeline**

As the flood set on with all its fury,

- ✓ The airport operations were shut down in the morning of 15<sup>th</sup> August. By 0200 hrs the arrivals were called off and all departures were completed by 0400 hours and airport operations suspended.
- ✓ All GH equipment and other operational equipment were ordered to safety.
- ✓ All personnel were ordered to safety
- ✓ By 0800hrs the rushing flood waters broke the northern wall of the airport and flood water from outside gushed inside
- ✓ As the flood water entered the airside and was threatening to enter facilities, it was decided to break open the Southern wall of the airside and by the time, the flood took the wall in its torrents. The entire area was flooded.
- ✓ Accordingly decision was taken to shut down the facilities which were not shut down so far.
- ✓ The flood continued to rise.
- ✓ The flood entered into the lower part of the buildings, BMA, BBA and terminal.

- ✓ Equipment safety & removal was taken care of in this part.
- ✓ The entire car park and road were also flooded.
- ✓ Flood still rose and airport was flooded till 19<sup>th</sup> August.

## **2.4 Post Flood Activities**

### **2.4.1 Damage Estimation: Financial, Physical & Reconstruction view points**

The critical activity after the flood receded was Damage Estimation. The physical damage had to be calculated for understanding the impact of flood and for the purpose of re-construction planning. The Financial Estimation was for the loss sustained and for insurance claims. Activities carried out were:

- ✓ Evaluate the damage caused and document photo / video
- ✓ Contact Insurance agency in advance
- ✓ Arrange them to visit at the evaluation stage itself
- ✓ Document loss fully for insurance purpose.
- ✓ Evaluate facility for loss / damage sustained.
- ✓ Evaluate the extent of damage

### **2.4.2 Airport Reconstruction**

The resilience of CIAL was strongly demonstrated in the manner, speed and commitment with which the Airport was fully made functional and operations commenced with all required facilities operating in full swing on the date of recommencement of Airport Operations viz., 1400 hours of 29th August, a fortnight away from the date of closure and less than 10 days from the date of reconstruction commencement. An airport whose entire airside remained flooded for over 4 days and whose facilities like runway lighting, Nav-Aid facilities, baggage conveyors, etc. were flooded and damaged and in whose terminals the water gushed up to a feet or more, was fully made operational with all requirements and after getting approval of the competent authority, was put into operation to the surprise of all.

The entire airside of the Airport was affected as well as the terminals. The activities of reconstruction carried out in each of the areas is as indicated below:

#### **2.4.2.1 Compound Walls on three sides of the airside: (2.6 KM)**

- ✓ Debris removal, site clearance,
- ✓ Compound Wall & Barbed wire fencing materials procurement (pre coated GI-Galvalum Sheets, Barbed wire, concreting materials, fabricated pillars)
- ✓ Contractor positioning & ensuring their labour availability;
- ✓ Divided compound wall construction to 5 parts & Assigned to 5 contractors
- ✓ Target fixing for activities esp. in distance to be completed.
- ✓ Supplied Earth drilling machines and holes created
- ✓ Concrete ready mix supply
- ✓ Peripheral road clearance esp of wall debris, concertina etc.
- ✓ Periphery road made serviceable

#### **2.4.2.2 Runway**

- ✓ Examination of the Runway end to end.
- ✓ Cleaning of the entire runway of all slush, FOD & deep water cleaning,
- ✓ Runway sweeping after cleaning and drying
- ✓ Runway examination for damage, rectification wherever required,
- ✓ Re-painting & marking of the Runway,
- ✓ Rubber Removal & friction testing
- ✓ Pavement Strength Testing

### 2.4.2.3 Taxiway & links

Taxiways & links also required similar treatment as that of runway.

- ✓ Slush clearance & Cleaning of the entire taxiway & taxi links,
- ✓ Deep water cleaning,
- ✓ Taxiway / links examination for damage, rectification wherever required,
- ✓ Re-painting & marking

### 2.4.2.4 Apron

- ✓ Cleaning entire Apron area, equipment parking area,
- ✓ vehicular movement area
- ✓ Remove all slush, FOD and displaced items; water cleaning,
- ✓ Apron & related area Sweeping
- ✓ Examination for any possible damage, (urgent rectification if required)
- ✓ Re-painting & marking, all aircraft bays, lead-in lines, bay Numbers, Nose wheel points etc.
- ✓ Target dates and division of work; commence from both of Apron



### 2.4.2.5 VDGS

- ✓ Examine the cabling, structure examination
- ✓ System examination for its working & Rectification if required.
- ✓ Checking the Calibration

### 2.4.2.6 Aerobridges

- ✓ Site Clearance, Interior Cleaning
- ✓ Cleaning of Wheels, Fixed areas (attached to the ground)

### 2.4.2.7 Fuel Hydrant

The fuel supply pits in the bays in the apron were fully submerged in flood water and the top was filled with slush and dirt when water receded. As this was critical installation, the area was cleaned. The operational aspects were taken care of by BPCL who are the authorized hydrant service provider.

- ✓ Site Clearance,
- ✓ Facility Examination for operationability

### 2.4.2.8 Runway Lighting, Taxiway & Apron Lighting & Centre Line Lighting

- ✓ Site Clearance & Light installation cleaning
- ✓ Verify the circuits / cabling both normal (& redundant)
- ✓ Repair / replace & lay them new as required
- ✓ Place proper lights & verify its working,
- ✓ Remove & replace damaged lights & systems
- ✓ Commission the same; file compliance report
- ✓ No. of lights targets fixed & worked as per plan.
- ✓ Multiple groups were formed for simultaneous activities at different locations



**2.4.2.9 PAPI**

- ✓ Location clearance, installation Clearance
- ✓ Lights & systems deeper cleaning
- ✓ Verify the circuits both normal (& redundant) & lay them new as required
- ✓ Ensure working of the installation,
- ✓ Remove & replace damaged lights & systems
- ✓ Calibrate the Equipment
- ✓ Commission the Equipment; file compliance report

**2.4.2.10 Localiser & DME & DVOR.**

- ✓ Location clearance & installation Clearance
- ✓ Deeper examination & cleaning of the system / equipment
- ✓ Ensure working of the installation,
- ✓ Remove & replace damaged lights & systems
- ✓ Supporting power sources & systems to be examined and rectified
- ✓ Verify circuits both normal (& redundant) & lay them new as required
- ✓ Calibrate the Equipment / AAI
- ✓ Commission the Equipment; file compliance report

**2.4.2.11 Peripheral Lighting**

- ✓ Entire Lighting affected as circuits snapped as compound wall over
- ✓ 2.6 KM fell. Entire stretch to be cabled again.
- ✓ Ensure supply of the Lights
- ✓ Fabricate the light support on the temporary wall structure
- ✓ Cabling the entire length and ensure their safety thereafter
- ✓ Fixing lights & connection
- ✓ Commissioning.
- ✓ Had to wait till the construction of wall reached the required height to start the Light support Fabrication, which was fabricated in advance.

**2.4.2.12 Terminals**

- ✓ Removal of FOD & Slush
- ✓ Basic Clearing and cleaning
- ✓ Equipment and facility inspections esp. Electric points & IT & Commn. Data Cables & sockets & connections
- ✓ Check for water logging and clear them out.
- ✓ Equipment and facility cleaning
- ✓ Power Source & Cabling replace and relay as required.
- ✓ Equipment examination, deeper cleaning, replace as required, test & commission
- ✓ Deep and fine cleaning
- ✓ New purchases of furniture (chairs) / Equipment etc. as required
- ✓ Position Furniture & fittings & equipment & Commission them
- ✓ Verify & rectify all CUTE / Telephone & Commn. / Data cabling
- ✓ Power & electrical installation commissioning
- ✓ Painting wherever required
- ✓ Final examination for cleaning & damage rectification
- ✓ Trolley cleaning

**2.4.2.13 Fire Station**

- ✓ After flood evaluation of the fire station
- ✓ Examine & damage assessment (claim for insurance)
- ✓ Basic Site & location cleaning & building deeper cleaning
- ✓ Further Damage assessment

- ✓ Vehicle & CFT Assessment; cleaning, servicing & commissioning
- ✓ Equipment cleaning, servicing, repairs and commissioning
- ✓ Ensuring Personnel Availability
- ✓ Co-ordinate & Undertaking Runway & airside cleaning

#### **2.4.2.14 Substations & Re-Powering**

- ✓ Examine substation equipment, Gen sets &
- ✓ Damage assessment (claim for insurance)
- ✓ Site & location clearance, deeper cleaning
- ✓ Equipment cleaning, servicing, repairs and commissioning
- ✓ Power charging in various locations

#### **2.4.2.15 Cargo Complex**

- ✓ Cargo Complex Situation Monitoring,
- ✓ Damage assessment (claim for insurance)
- ✓ Ensure safety of cargo Consignments
- ✓ Deep cleaning of building & exteriors,
- ✓ Clean, service, repairs & commissioning Equipment / Vehicles
- ✓ Ensure Personnel Availability
- ✓ Co-ordinate with Customs & airline

#### **2.4.2.16 Baggage Conveyors**

- ✓ Examine Conveyors & damage assessment (claim for insurance)
- ✓ Safe cleaning to ensure no reptiles and creatures
- ✓ deeper external cleaning of the facility
- ✓ Equipment break down into parts and their examination, damage restriction, rectification (replacement), re-assembly & commissioning
- ✓ Ensuring spares & tolls
- ✓ Ensure OEM & AMC Support

#### **2.4.2.17 IT Installations & Telecommunications**

- ✓ Basic examination of facilities, servers, connections, cabling
- ✓ Damage assessment (claim for insurance)
- ✓ Deeper cleaning of the area & cable trenches
- ✓ Equipment cleaning, servicing, repairs and commissioning
- ✓ Broken cable replacements / re-joining, connecting & ensuring data / telephonic communication
- ✓ RT sets availability & upkeep

#### **2.4.2.18 Duty Free Shops & Warehouse**

- ✓ Evaluate the Shop & warehouse situation
- ✓ Shops & warehouse damage assessment (claim for insurance)
- ✓ Debris removal, damaged items (Co-ordinate with Customs / Bond)
- ✓ Slush removal, cleaning floor
- ✓ Gondola, stand, display boards & other facility cleaning (replace),
- ✓ Replenish stock,
- ✓ Computer System & Cashier systems – Ensure Operational
- ✓ Personnel Availability
- ✓ Warehouse cleaning, Stock verification,
- ✓ Disposal of damage items as per customs act



**2.4.2.19 Airside & Drainage**

- ✓ Safety Evaluation,
- ✓ FOD & Slush Clearance & Location Clearance
- ✓ Drainage Cleaning & Maintenance works as required.

**2.4.2.20 Car Park**

- ✓ Removal of Debris & Slush
- ✓ Full scale cleaning of the car park
- ✓ Ensure signs, lighting, car park management

**2.4.2.21 Solar Park**

- ✓ Examination of the facility & damage assessment (claim assessment for insurance)
- ✓ Site & location clearance as applicable
- ✓ Panel Cleaning & deeper cleaning
- ✓ Panels, inverters & Converters, substation: cleaning, servicing, repairs (replacing)
- ✓ Procurement of spares & ensuring supply
- ✓ Ensure OEM Support through experts & engineers
- ✓ Panel & Inverters repair and servicing, and individual commissioning
- ✓ Cabling examination / replacement (if required) and re-charging.
- ✓ Sub-station equipment repair and commissioning
- ✓ Commission the solar facility part by part
- ✓ Ensure Personnel Availability for individual panel examination.

**2.4.2.22 GH agencies**

- ✓ Office, restrooms, staff rooms, facilities & Workshop Examination
- ✓ Examine their equipment & damage assessment (claim for insurance)
- ✓ Site & location clearance, deeper cleaning and facility up keeping
- ✓ Equipment cleaning, servicing, repairs and commissioning & positioning
- ✓ Personnel Availability
- ✓ Co-ordinate with airline for operations

**2.4.2.23 Airlines**

- ✓ Offices & Facilities Examination
- ✓ Damage assessment (claim assessment for insurance if applicable)
- ✓ Site & location clearance, deeper cleaning and facility up keeping
- ✓ Personnel Availability
- ✓ Co-ordinate with Airport for operations
- ✓ Co-ordinate with Head Quarters for operations commencement.

**2.4.2.24 Immigration & Customs & APHO**

- ✓ Site & location clearance, and facility / System up keeping
- ✓ Personnel Availability
- ✓ Co-ordinate with Airport for operations Commencement

**2.4.2.25 Security**

- ✓ Take stock of their facilities & examine their equipment
- ✓ Damage assessment (claim assessment for insurance if applicable)
- ✓ Site & location clearance, deeper cleaning and facility up keeping
- ✓ Equipment cleaning, servicing, repairs and commissioning & positioning
- ✓ Personnel Availability & position in all locations
- ✓ Co-ordinate with Airport for operations
- ✓ Airport & airside security vetting.

- ✓ Compound wall & security installation vetting
- ✓ Security to co-ordinate all maintenance & resource material movement
- ✓ Security passes for working personnel entry/exit

**2.4.2.26 Concessionaires (F & B & other shops)**

- ✓ Take stock of their facilities & Examine their equipment
- ✓ damage assessment (claim assessment for insurance if applicable)
- ✓ Site & location clearance, deeper cleaning and facility up keeping
- ✓ Equipment cleaning, servicing, repairs & positioning
- ✓ Personnel Availability
- ✓ Co-ordinate with Airport for operations

**2.4.2.27 Dangers faced**

- ✓ Water not fully receded in some places
- ✓ Snakes, insects etc. inside the buildings, equipment, vehicles and airside
- ✓ Slippery surface & danger from falling
- ✓ Debris esp. concertina fence
- ✓ Sharp objects & FODs from outside the airport that got washed in.
- ✓ Contagious diseases – RAT fever
- ✓ Electrical shorting problems

**2.4.2.28 Difficulties faced**

- ✓ Slush over 2-3 feet high engulfing the runway, taxiway, Apron & runway lighting & Nav aid installations
- ✓ Debris esp. concertina making approach to working area difficult & dangerous
- ✓ lower levels of slush in terminals & Conveyors & such equipment,
- ✓ FODs from outside the airport that got washed in.
- ✓ Shortage of material (Fuel)
- ✓ Shortage of eqpt – motor pumps, genset supply (esp. as the region was flooded)
- ✓ Shortage of skilled Manpower
- ✓ Over 50% of airport personnel (local) flood affected & hence unavailable
- ✓ Vehicle Shortage (as most flood affected / in recovery mode)
- ✓ Water logging in cable trays, power sockets, connections, equipment, holes, trenches; lift / escalator / conveyor pits
- ✓ Water logging in critical equipment endangering their serviceability

**2.4.2.29 Support Received**

- ✓ Navy - permitting domestic operations from Naval Airport (alternate airport)
- ✓ MoCA, DGCA & BCAS for approvals & clearances
- ✓ AAI for equipment maintenance & calibration
- ✓ BIAL – Equipment Support
- ✓ Contractors & Labour Suppliers
- ✓ Material suppliers
- ✓ Airport Stakeholders: Airlines, GH Agencies, CISF, BoI, Customs, APHO and other agencies and concessionaires
- ✓ Airport Operator Personnel.
- ✓ KSEB & Kerala Water Authority

**3. ACTION BY THE CONFERENCE**

3.1 The Conference is invited to note the information contained in this Paper.

— END —