

# AERODROME ASSESSMENT

## MOSUL AIRPORT

### *IRAQ*

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## EXECUTIVE SUMMARY

SkyLink Team 3, conducted an assessment of Mosul Airport between 6<sup>th</sup> and 9<sup>th</sup> June 2003. The assessment was conducted in accordance with ICAO adopted standards and the requirements of CLIN 001.

Mosul Airport is by Western standards a medium sized regional airport, capable of handling approximately 550,000 passengers per annum but with limited cargo capabilities. It operates with a single North/South Runway (15/33 and 2400m in length), and a single level terminal building, which is situated at the southern end of the runway, on the western side. To the north, there is a dedicated cargo hardstand with a destroyed cargo hangar. Currently the entire airport is controlled by, and the centre for operations of the US Army, 101<sup>st</sup> Airborne Division.

Prior to 1991, the airport was primarily operated by the military with an unknown number of civil movements. The current passenger terminal was built in 1992 but was not commissioned until Iraqi Airways began a Baghdad – Mosul service (twice per day) in 2001, utilising mostly Boeing 727 aircraft.

Within the boundaries of the airfield, the US Army conducts helicopter operations. They also operate a large communications centre (within the terminal building) and provide accommodation and administrative facilities in support of over 6,000 military personnel. They also provide a limited air traffic service from a control tower located on the eastern side of the airfield. A helicopter maintenance unit is housed within the old cargo hangar complex (structure only), which sustained substantial damage during the recent conflict. Looting during the post conflict period resulted in the removal of large quantities of sheet metal cladding. Once repaired, the hangar would offer ideal cargo handling facilities as it is serviced by a large apron area at the northeastern end of the airfield adjoining the threshold of Runway 15.

The runways, taxiways, and terminal building did not sustain any damage during the recent conflict. USAID operations (passenger and cargo) could commence relatively quickly provided the US Army relocated some of their operational and support assets to alternate locations away from Mosul Airport. The size and scope of civilian operations would then be dependent upon US Army policy on the use of the airport. The commencement of passenger services, however, would be delayed due to the number and complexity of various issues that will require resolution prior to the airport receiving ICAO accreditation. The nature of the recommendations made in this assessment assumes the airport would not operate as an international point-of-entry. This assumption is made based on the requirement for customs and immigration facilities at all approved international points-of-entry, and added ICAO and ATC compliance requirements.

Air Traffic Control services and facilities are basic and limited. All civil operations in the short to medium term would need to be conducted in Visual Meteorological Conditions

(VMC) by day only. Any classification of the airspace surrounding Mosul Airport should be considered as part of the national ATC strategy and not looked at in isolation. The team concluded that any runway extension would be difficult due to the close proximity of residential housing at the northern end of the runway, with river and terrain severely restricting any extension to the south. It is important to note that fog forms in the river valley to the south of the airfield and regularly effects operations in the mornings during the period November to February each year and occurs for approximately 60 days of that period.

Electricity appears reliable, with water and sewerage functioning at the terminal building. The assessment team could not ascertain the water quality, however, the Army utilises bottled drinking water for their personnel.

Person's unknown removed Ground Service Equipment (GSE) owned by Iraqi Airways that had been situated at the airport prior to the recent conflict. Despite arrangements being made, the GSE was not sighted by the assessment team (refer detailed report), although anecdotal evidence suggests that the equipment is in reasonable condition. The US Army has indicated that they may obtain this equipment and relocate it to support operations at Baghdad International Airport. Should this occur replacement equipment would be required as GSE currently operated by the US Army is very limited in its capability to service commercial aircraft.

The largest impediment to Mosul Airport being utilised for the flow of USAID relief materials, supplies, and personnel is the occupation by the US Army. The US Army is undertaking extensive development of their camp and appears to be preparing for a medium to long-term deployment in the area. Brigadier General Sinclair, the Commanding General of the 101<sup>st</sup> Airborne Division stated to the assessment team that he will not allow any aircraft larger than a Boeing 737 or C-130 Cargo aircraft to land in Mosul. He believes that due to the close proximity of the airport to the centre of Mosul, and US assets that are located close to the runway, heavy lift operations pose risks to both civil and military personnel.

It should also be noted, that as the team could not identify the airfield Pavement Concession Number (PCN); all operations should be restricted to those aircraft with low ACN's until the issue is clarified. Failure to do so could lead to medium to long-term pavement damage. The team was advised that the US Army Engineers were in the process of engaging an external contractor to carry out the required investigation to determine the PCN's. The team could not obtain survey data of the airfield and runways during the inspection, however, we have been advised by Sgt Cliff Adaire, US Army Engineer, that the survey is currently being carried out by the US Army and should be complete before the end of the month.

The US Army plans to divert all cargo operations to Qayyarah West (pron. Key~ara), a large military airfield located 60km to the southwest of Mosul. General Sinclair's concept calls for all military, UN and commercial cargo flights to use the airfield and that cargo to

be distributed via road to final destinations. The airfield is currently under repair after extensive bombing and could be operational within weeks.

The assessment team recommends USAID liaise with the US Army to confirm their intentions, reference the extent of future aircraft operations at Mosul. This plan will confirm Mosul's short to medium term role, i.e. domestic passenger only or a multi use passenger/cargo facility. Notwithstanding the above comments, it is the assessment team's opinion that due to the close proximity of the civilian population, limited Fire Fighting & Rescue Services, and the current congestion on the airport, any cargo aircraft should be limited to C130 specifications. Passenger aircraft should be limited to Class 4C aircraft such as Boeing 737 or smaller. It should be noted that the bituminous taxiways are only able to accept light to medium turbo prop aircraft, due to the potential FOD from the deteriorating bituminous pavement.

## INTRODUCTION

### **General**

Since the construction of the aerodrome, (hereon referred to as Mosul Airport) the war and UN sanctions have caused a continual degradation of infrastructure and system. Up until 1992, the airfield was utilised predominately by the Iraqi Air force with a small civilian presence supporting Iraqi Airways domestic services. In 1992, a new civilian passenger terminal was constructed but not opened until 2001. The Iraqi Air force provided all services to the airfield except the operation of the passenger terminal and the handling of Iraqi Airways flights. These functions were undertaken by the Iraqi Civil Aviation Authority (ICAA) and Iraqi Airways, which provided all passenger and aircraft handling services. What was once a functional airport is now non-compliant with standards required of a modern airport.

Currently the airport is operated by the US Army, predominately for helicopter operations. The US Army has over 6 000 men on the airport and is in the process of developing the site for a medium to long-term stay. The US Army has set the current airfield operating procedures, including allowable aircraft types. Consequently, the airports ability to handle the flow of rehabilitation cargoes including food and medical assistance and materials for reconstruction is limited

### **Statement of Work**

The Statement of Work issued by USAID comprises the following three tasks for Mosul Airport:

- CLIN 001: Initial Aerodrome Management Assessments.
- CLIN 002: Planning Implementation of Aerodrome Improvements.
- CLIN 003: Direct Operation of Aerodromes

### **Initial Assessment**

An initial management assessment of Mosul Airport in accordance with CLIN 001, as well as a thorough assessment of air traffic management was conducted during the period June 2003. The assessment was carried out by the following personnel:

- Leon Smith – Team Leader.
- Mal Sandford – Airport Logistics/Operations Specialist.
- Rod Clarke – Air Traffic Control Specialist.
- Brendan Dinnar – Civil Engineer.

## **Aim**

The aim of this report is to present the outcomes of the assessment of airfield resources, systems, utilities and facilities in place for the control, safety, service and security of civil aircraft at Mosul Airport.

## **Scope**

The scope of the assessment includes all elements associated with the approach, arrival, turn-around, and departure of aircraft from Mosul Airport. The following airport elements are addressed herein:

- Air Operations.
- Emergency.
- Ground handling.
- Aerodrome infrastructure.
- Cargo handling.
- Passenger handling.
- General infrastructure.
- Utilities.
- Military operations and reconstruction activities.
- Environmental considerations.
- Airport requirements, ordinances, leases, agreements, laws and regulations.

Recommendations for improvements based upon the following timescales are made:

- Short term (up to 6 months).
- Medium term (6-18 months).
- Long term (beyond 18 months).

## **Assumptions**

The following assumptions were made:

Information gathered during interviews with Iraqi nationals responsible for the above airfield elements was accurate.

- Where it was impossible to examine items of infrastructure and equipment, it was assumed that these items were in a similar state of serviceability to like items inspected.



- The air traffic management problem must be approached on a national rather than individual airport requirement.
- Iraqi Subject Matter Experts (SME) will play a crucial role in achieving the recommendations detailed herein.

### **Limitations**

The limitations of the assessment were as follow:

- Access to records, plans and diagrams.
- Access to legislation, leases, agreements, laws, regulations and extant contracts, and MOUs.
- Ready access to Iraqi SMEs.
- Access to off-field facilities.
- Inability to examine or investigate structure concealed behind fixtures and fittings or in sensitive military areas where access was restricted.
- Access to the marketplace for costing analysis.

### **Authorities Consulted**

A list of authorities consulted throughout the assessment is at Annex A. US Army Engineer Survey Teams are currently undertaking a survey of the airfield for obstacles and reference points. As at the time of writing this assessment, this survey was not complete. The team could not locate any assessment reports conducted by coalition military units or any Iraqi Air force/ICAA airfield technical data. In May 03, a UN Joint Logistics Centre Airport Brief was undertaken, which found the airport suitable for aircraft up to AN- 124. Team 3 does not support this recommendation.

## **BACKGROUND**

### **Development of Mosul Airport**

Prior to 1991, Mosul Airport comprised a military airfield with a small commercial operation with Iraqi Airways operating regional flights to and from Baghdad. In 1992, a new Passenger Terminal was completed but due to the Gulf War it was not commissioned until 2001. From 2001 to early 2003, the airfield was utilised by the Iraqi Air force and Iraqi Airways, which flew two Boeing 727 aircraft daily to and from Baghdad

The Iraqi Air force managed all airport functions except the passenger terminal operations. These functions were undertaken by the ICAA and Iraqi Airways, who were responsible for their own requirements, including ramp, passenger handling and security services. Anecdotal evidence suggests that ICAA in Baghdad had significant oversight in the airfields operations.

Since Coalition Forces arrived in Mosul, the US Army has based the 101<sup>st</sup> Airborne Division at the airport. Currently all airport operations and support is provided by this unit. The majority of flights are helicopter operations with occasional C130 cargo and UN Boeing 737 (WFP) passenger flights.

The airport equipment has not been supported by through-life integrated support including configuration control, training, maintenance management, and spare parts. The serviceability and reliability of key airfield elements suffered due to the inactivity between 1991 and 2000, and minimal operations between 2001 and 2003.

### **Description of Mosul Airport**

Mosul Airport is located approximately four km to the south of Mosul. It covers an area of approximately 3 square kilometres, and is 225.5 metres above sea level. The airport is ringed by housing and public land, which limits any future expansion. A two lane sealed main access highway connects the city with the airport from the south. The road surface appears in sound condition with debris and refuse scattered along its length. To the north of the airport, a narrow road threads its way through residential housing to a main through road.

The airport consists of:

- Runway: 15/33 – 2400 meter concrete paved runway.
- Taxiways: one.
- Aprons: two.
- Passenger Terminals: one.
- Cargo terminal: destroyed, hard standing could be used.
- Catering building: nil.

- ATC facilities: one tower and office, both in disrepair.
- Hangar and maintenance building: to the north of the airfield but both completely destroyed.
- Fuel farm: nil.
- Fire station: two garages and hardstand but no office.
- Medical centre: nil.
- Weather station: nil.
- Administrative buildings: small old facility beside new terminal.
- Car parks: small site beside terminal.

Data taken from a United Nations Joint Logistics Centre Airport Brief dated 26-05-2003 is at Annex B.

Known airfield obstacles located at:

- Major obstacle at 1065ft (324.6m) AGL bearing 070 at 5nm
- Other obstacle at 320ft (97.5m) AGL bearing 070 at 3nm

## **AIR OPERATIONS**

### **References**

ICAO Annex 3 – Meteorological Service for International Air Navigation  
ICAO Annex 4 – Aeronautical Charts  
ICAO Annex 10 – Aeronautical Communications  
ICAO Annex 11 – Air Traffic Services  
ICAO Annex 14 – Aerodrome Design and Operations.  
ICAO Annex 15 - Aeronautical Information Services  
ICAO Doc 4444 – Air Traffic Management  
WMO Volume 1 – General Meteorological Standards and Recommended Practices  
WMO Volume 2 – Meteorological Services for International Air Navigation  
WMO Weather Reporting Volumes A, B and C  
United Nations Joint Logistics Centre Airport Brief dated 26-05-2003

### **Overview**

Air operations are defined as the delivery of Air Traffic Management (ATM) services to arriving and departing aircraft. A number of supporting elements, all of which are essential and inter-dependent for the delivery of this service, have been considered when making an assessment of Mosul Airport's Air Traffic Control (ATC) capability.

The type of ATC service provided to users of Mosul Airport will be determined by airspace design. Each level of airspace classification requires an appropriate level of technical and personnel support and should be determined by various factors including current and anticipated traffic density levels.

Coalition forces are currently providing all ATM services, including air space architecture and control for the Iraqi Flight Information Region (FIR). The United States Army is providing Class F Airspace control services (or similar) at Mosul.

### **Control Tower, Approach & Area Control Centre – Mosul ATC**

There is no evidence to indicate the presence of any form of civil ATC service being provided at Mosul Airport during recent times. Some documentation located at Baghdad suggests that Baghdad ATC provided a control service but this could not be confirmed. The Mosul Airport Manager indicated that the Iraqi military provided a local ATC service, probably aerodrome control only.

There is no comprehensive Manual of Air Traffic Services (ATS), local operating instructions or any evidence of an ATS safety oversight program. No ATC personnel, if any existed, were available for interview.

ATC infrastructure consisted of a building with four levels. It was located on the eastern side of the airfield, abeam the midpoint of the runway. Levels one to three appeared

to have been used for domestic and crew rest purposes, level four is an ATC tower cabin. Access to each level is via an internal staircase, with an external stair access between level 3 & 4. There is evidence of water penetration within the building. A crude console (work bench) was attached to the front wall of the tower cabin and had at some time housed various ATC instruments. All cabin windows were in place and a door at the rear of the cabin allowed access to an outside area, which in turn provided ladder access to the roof of the cabin. The entire complex was void of any operational ATC equipment.

Adjacent the tower complex is an administration building consisting of general office space.

**Assessment** Mosul Airport's lack of ATC infrastructure, including adequate operating facilities and suitable equipment, renders it incapable of supporting any level of ICAO compliant ATC service. Services currently provided by the US military allow for IFR and VFR operations by day only in Visual Metrological Conditions (VMC) for all aircraft categories. Due to the absence of runway lighting and civil navigation aids, special provisions are made for military operations at night or in Instrument Metrological Conditions (IMC). No provision is made for civil operations at night or in IMC.

**Recommendations:**

AIROPS –1 Following the withdrawal of military ATC services, the airspace immediately surrounding Mosul Airport should be classified as either Class E or Class F (traffic dependent) with associated services provided by the nearest ATC Centre, yet to be determined.

AIROPS –2 Introduce policy and procedures for the day-to-day management of operations, record keeping and a safety oversight as required by the needs of the emerging ATM system in the medium to long term.

**Weather**

The tower console houses an unserviceable wind speed indicator. There are no other weather sensing instruments in the tower complex. Located in an area adjacent the civil terminal is an anemometer. It is unclear where the instrument readouts for this anemometer were located.

**Assessment** There is no known capability to forecast or observe weather at Mosul Airport.

**Recommendation:**

AIROPS –3 Establish an Automatic Weather Information Station at Mosul Airport.

## **Aeronautical Information Service (AIS)**

AIS is a national service providing airspace architecture and aerodrome instrument approach procedures for airfields in Iraq. The AIS section was located in the ATC building at Baghdad International Airport.

Airfield data and instrument approach and departure procedures for civil operations at Mosul Airport have not been sighted. The US Army has developed an instrument approach based on a portable Tactical Air Navigation Beacon (TACAN) and GPS coordinates. This approach is not available to civil aircraft. Obstructions were observed in the proximity of the airfield and will require surveying prior to the construction, flight-testing, approval, and subsequent publishing of instrument approach procedures.

**Assessment** There is no meaningful AIS capability in Iraq. Accordingly, no reliable information is available regarding Mosul Airport.

### **Recommendations:**

- AIROPS - 4 Survey the aerodrome environment for obstructions in the short term.
- AIROPS -5 Establish GPS approach procedures in the short term.
- AIROPS - 6 Dependent upon navigational aid installation/availability, re-establish instrument approach and departure procedures (ILS/VOR), determine Lowest Safe Altitude sectors (LSA), Track Lowest Safe altitudes and airfield circling minima's in the medium term.

## **ATC Communications Overview (Voice Communications & Nav Aids)**

There are no civil communications facilities installed at Mosul Airport. The US Army has installed temporary VHF/UHF ATC and secure communications in support of current operations.

**Assessment** Existing ATC communication equipment will be removed when military operations cease. At that time, Mosul will be without ATC communications.

### **Recommendations:**

- AIROPS - 7 Provide VHF/HF ATC communications in support of Class E or Class F airspace.
- AIROPS - 8 Provide for maintenance of all ATC communication equipment installed.

## **Voice Recorders**

There is currently no voice recording equipment at Mosul Airport.

**Assessment** A voice recording system is a vital tool in the assessing of incidents associated with the unsafe operation of aircraft.

### **Recommendations:**

AIROPS - 9 Install voice recording equipment to record current and future voice communications at Mosul. This should integrate into the national ATC plan.

AIROPS - 10 Provide for maintenance of all ATC voice communication equipment installed.

## **ATC Surveillance Radar**

The US Army has located an ATC surveillance radar system at Mosul Airport. It is currently unserviceable and is expected to remain unserviceable indefinitely. It will be removed with the departure of Army assets.

**Assessment** There is no civil ATC surveillance radar system to assess. Military non-radar procedures currently being employed are sufficient to meet existing operations and traffic levels. The Classes of airspace recommended, if adopted, do not require radar services. The nearest ATC Centre using procedural control procedures can provide the required service.

### **Recommendations:**

AIROPS -11 Not to install an ATC surveillance radar system.

## **Power Supply**

Refer to 'Utilities' section.

## **Uninterrupted Power Supply**

Refer to 'Utilities' section.

## **Navigation Aids**

A VOR navigation aid is located on the eastern side of the airfield approximately 100 metres from the control tower. It is currently not in operation as it has been disconnected from both mains and standby generator power supplies. The serviceability of a co-located Uninterrupted Power Supply (UPS) is unknown. A closer inspection of the facility revealed that the equipment was relatively modern and largely

intact. The US Army has installed a Tactical Air Navigation Beacon (TACAN) for use by military aircraft. Some international civil aircraft may be capable of interrogating the Distance Measuring Equipment (DME) component of the TACAN.

### **Instrument Landing System (ILS)**

Two of the three components of an ILS are present at Mosul Airport. Localiser and glide path equipment is aligned for runway 33. Both components are without power. The localiser appears to be complete; however, it is badly weathered and has not been maintained. The glide path antenna has been severely damaged. The assessment team was unable to determine whether locator beacons normally used for inner, middle or outer markers, exist. There is no airfield lighting to support the use of an ILS to ICAO standards.

**Assessment** The ILS equipment at Mosul is unserviceable and irreparable. The VOR is unserviceable and requires repairs and connection to a mains and backup power supply.

### **Recommendations:**

- AIROPS -14 Not to repair/install ILS if operations are to be restricted to VFR/IFR in VMC by day only.
- AIROPS -15 If an ILS is required, a complete new system together with appropriate runway lights, approach lights and visual approach slope indicator lights should be installed.
- AIROPS - 16 The VOR navigation aid should be assessed by qualified technical personnel, repaired, calibrated and returned to service.
- AIROPS -17 Restore mains, emergency generator and UPS power to the VOR.

### **Safety Oversight**

World's best practice requires that a safety management system be in place for the oversight of ATM to ensure safe operation of aircraft and maintenance of records for incident and accident investigation. There appears to be no such system in place at Mosul Airport.

**Assessment** There is no safety management system in place at Mosul Airport.

### **Recommendation:**

- AIROPS -18 Develop a safety management system for the oversight of air traffic control services in the short term.



## EMERGENCY

### **References:**

ICAO Annex 14 - Aerodromes  
ICAO Doc 9137 - Airport Services Manual  
IATA Dangerous Goods Regulations

### **Medical Facility**

There are no civilian medical facilities at Mosul Airport. Prior to Operation Iraqi Freedom, ambulances were provided by the Mosul Health Services on an as required basis to cover commercial operations. All patients would be transported to the local hospital. The current status and capabilities of the local medical services is unknown. Medical support provided to the Iraqi Air force operations could not be ascertained, Currently the US Army provides medical facilities and support, including casevac and hospital services to the airport.

**Assessment** There is no medical emergency response capability or infra structure at Mosul Airport. There is no Airfield Emergency Plan.

### **Recommendations:**

- EMER -1 Establish a medical emergency response capability in the medium term.
- EMER - 2 Develop and implement an Airfield Emergency Plan in the medium term.

### **Rescue and Fire Fighting (RFF)**

There is no fire station at Mosul Airport, although there appears to be two concrete garages for vehicle parking. They are located beside the passenger terminal on the apron. Prior to the war there were three tenders but they have now been either destroyed or stolen. The team spoke to the ICAA Manager and asked to inspect the vehicles but after repeated requests were not able to do so. There are no fire mains fitted throughout the airport. Currently the US Army provides a limited RFF capability, although there are no fire tenders fitted with monitors, which reduces their ability to respond to an incident. The airfield would be classified as Category 1 or 2 for RFF.

**Assessment** Currently there is no:

- Commercial aircraft fire fighting or rescue capability at Mosul Airport
- Suitable Military RFF Services to meet the requirements for commercial aircraft – as per ICAO.

- Serviceable crash alarm and direct communications line with the local emergency services.
- Fire fighting foam.
- Personal protective clothing for fire fighters.
- Emergency plan for the aerodrome.

**Recommendations:**

- EMER - 3 Establish a civil fire fighting and rescue capability (to Cat 6) in the short term.
- EMER - 4 Develop and implement an Aerodrome Emergency Plan in the medium term.
- EMER - 5 Re-establish effective communications between the control tower and fire station in the medium term.
- EMER - 6 Re- establish communications between the control tower and the local emergency services.

## GROUND HANDLING

### References:

ICAO Annex 2 – Rules of the Air  
IATA Airport Handling Manual

### Overview

Mosul Airport ground handling operations are similar to those of a Domestic or Regional airport terminal. Baggage is moved by a simple, single conveyor system to and from basic external make-up/break-down areas, and is then transported to/from the aircraft on standard GSE. The Manager of the Iraqi Civil Aviation Authority (ICAA) advised that prior to Operation Iraqi Freedom, there was sufficient serviceable GSE to handle a single passenger aircraft, of approximately 100-150 passengers. Post hostilities, most GSE has been removed to an off site location by ex Civil Aviation Authority personnel. The lack of ground handling capability, post-hostilities, has the potential to halt the flow of cargo and passengers through Mosul Airport, and should be addressed as a matter of priority.

No turn-around servicing equipment was sighted that would allow the provision of passenger boarding and disembarkation, refuelling, ground power, catering, potable water or toilet servicing. Commercially operated fuel tankers aided by a mobile dispenser provided refuelling services, however these were stolen during the conflict. The previous ICAA Manager stated that the two tankers were now back in the possession of the local oil company, following occupation by coalition forces, however this was not confirmed, or the equipment sighted. The dispenser was neither located, nor sighted. During an interview, the manager stated that GSE belonging to Iraqi Airways was moved prior to the conflict and was located approximately 2 km from the airport. A meeting was arranged to view this equipment, however, the manager and an unknown former Iraqi Airways manager, failed to be present at the allotted time and despite extensive efforts the equipment was not sighted, or the type or number of items confirmed.

Mosul Airport has no maintenance facility for GSE and other aerodrome vehicles; however, a concrete shed 100m South of the terminal was assessed as suitable for parking GSE. Adjacent to the shed was an Iraqi Airways mobile baggage belt loader. The vehicle was in a state of disrepair with two wheels missing and appeared to require substantial mechanical repair.

### Recommendations:

GRNDH - 1 All GSE required for the turn-around of operating aircraft into MOSUL will need to be purchased new or second hand, or further attempts will be needed to locate former Iraqi Airways equipment and inspect accordingly.

- GRNDH - 2 Refueling by local tankers can commence once the vehicles and fuel supply have been appropriately inspected and tested. Oil company personnel will also require training.
- GRNDH - 3 Implement planned maintenance for all GSE, fuel tankers and aerodrome vehicles once in place.
- GRNDH - 4 Institute an airside training and licensing program on equipment as it is placed into service.

## AIRFIELD INFRASTRUCTURE

### References:

ICAO Annex 14 – Aerodromes  
ICAO Doc 9157 – Aerodrome Design Manual  
ICAO Doc 9137 – Airport Services Manual  
ORBS Military NOTAMS Issued by the RAAF (See Annex C)

The team carried out the inspection of the airfield infrastructure on Saturday 6<sup>th</sup> – Monday 9<sup>th</sup> of June 2003. The inspections were carried out as a walk through and over using only the naked eye. No attempts made to expose details concealed by fixtures, fittings or in areas considered sensitive by the US military, nor did we attempt to gain access to or investigate areas considered unsafe.

### Runway 33R/15L

Runway 33R/15L consists of concrete pavement, 2400 metres long, 45 metres wide and 7.5 metre wide asphaltic concrete shoulders. The concrete pavement appears to consist of tied concrete slabs, approximately 6m x 6m, with primary expansion joints orientated perpendicular to the runway at approximately 30m centres. The secondary joints between the tied slabs are sealed with a bituminous product and the primary expansion joints are sealed with either Polyurethane or a Polysulphide sealant. At the time of the inspection, the thickness of the concrete slabs and sub-grade were not available.

The age of the runway is unknown, however in all probability it was constructed prior to 1980, possibly as early as the 1960's. It has been and has been used as a joint military/civil runway. The runway markings are limited to a centre line, piano keys, runway identifier, and runway exit lines. There are no designated flight strip markings. There are no lights, signage, or windsocks.

While the runway has suitable cross falls to provide effective drainage from the pavement, there is no visible evidence of suitable drainage within the airfield. Water that sheds from the runway and taxiways appears to be trapped, and reliant upon the ground absorbing free water. If a heavy rainstorm were to occur, where the rainfall exceeded the rate of water absorption, the runoff water will dam between the various pavements and potentially flood onto the runway and over the taxiways.

**Assessment** The pavement was generally found to be in fair condition, however localised damage was observed to the edges of the concrete slabs adjacent to the primary expansion joints. In one case, the damage consists of a “pot hole,” 500mm diameter wide and approximately 80mm deep. In most cases, repairs have been attempted using an expanding epoxy grout. Some of these repairs have resulted in the patched portion of the pavement lifting several millimetres above the original finished slab surface. While this damage exists over the entire length of the runway, it is generally more concentrated at the thresholds. This damage should be rectified in the

short term to allow jets to operate on the airfield, however, if operation is limited to medium weight turbo prop aircraft, these repairs could be delayed into the medium term.

The bituminous joint sealant is in reasonable condition, however the joint sealant to the primary expansion joints is beginning to fail at a number of locations due to lack of bond to the concrete slabs. To prolong the life of the existing pavement, the sealant to the expansion joints should be removed and replaced in the medium to long term.

We have been advised that the US Military Army Corps will be engaging external contractors to obtain Pavement Concession Number (PCN), as they have no suitable testing equipment on site. Hence, we are unable to advise the PCN for the runway.

The 7.5 metre asphalt shoulders are considered to be in reasonable condition and should be fit for purpose. Runway markings are evident, however they were noted to have faded and worn and do not meet the requirements of the ICAO standards. The runway markings should be installed in the medium term.

There is only a windsock frame remaining, with no effective windsock. Primary and secondary windsocks will be required to meet the ICAO requirements. There are no runway strip markings (gable markers - white cones). There is a significant amount of debris scattered within the flight strip causing a safety hazard to aircraft operations and hence the debris must be removed in the short term.

If a suitable drainage system is not installed and maintained, adverse rain conditions could potentially inhibit or halt the operation of the airfield during rainy periods.

We have not been able to determine the PCN for the runway. Based on our observations and reported load history of the runway, the runway will in all probability accept aircraft classified as 4D in ICAO Annex 14. However, this is to be confirmed after the PCN and survey data have been received and reviewed.

### **Civil Taxiways**

We have been unable to determine the original nomenclature for the taxiways; hence, we have adopted the following taxiway designation system. The taxiway parallel to the run is "Alpha", taxiway "Bravo" is located at the south-eastern end of the runway connecting to Alpha, then sequentially through "Charlie", "Delta" & "Echo" at the north-eastern end of the runway connecting to Alpha taxiway. The taxiway from the southern end of the runway has been designated "X-ray" and the taxiway at the northern end of the runway to the proposed cargo facility has been designated as "Zulu".

Taxiways Alpha through Echo are constructed with bituminous seal coat / asphaltic concrete with a relatively rough textured surface of exposed aggregates. The thickness of the asphaltic concrete and base course is unknown. The taxiways vary in width from 20.0m to 21.5m. Generally, the asphaltic concrete pavement was noted to have a reasonably significant quantity of random cracking, with crack widths in the order of 5-10mm. There is evidence of previous repairs to the pavements that related to specific damage, however there was no evidence of normal maintenance repairs. The north shoulder of Delta, adjoining Alpha, has broken up completely over an area of

approximately 6m x 6m, and will require reconstruction of the sub-grade, base-course and asphaltic concrete surface.

The taxiway centre line markings and beam threshold markings are faded. A large number of fuel and hydraulic fluid spills were observed on the Alpha taxiway.

The clearance between the access road and Alpha taxiway is only 9.2m.

The concrete paved taxiways X-ray and Zulu were generally found to be in reasonable condition, however the sealant within the expansion joints is deteriorating.

**Assessment** The asphaltic concrete pavements are considered to be in poor to fair condition with significant evidence of deterioration requiring rectification and maintenance. However, if access to these taxiways is limited to medium weight turbo prop aircraft only, (i.e. all jets and heavy aircraft land, turn on the thresholds and utilise taxiways X-ray and Zulu only), the asphaltic concrete taxiways should prove serviceable for the next few years without significant maintenance. The damaged section of pavement at the junction between to taxiway Alpha and Delta will require reconstruction in the short term. The condition of the pavement represents a significant FOD risk.

We have been advised that the US Military Army Corps will be engaging external contractors to obtain Pavement Concession Number (PCN), as they have no suitable testing equipment on site. Hence, we are unable to advise the PCN's for both the flexible (asphaltic concrete) and rigid (concrete) taxiway pavements.

There is no taxiway signage and the taxiway markings are faded and worn and does not comply with ICAO standards and standard practice. Suitable signage and markings must be installed in the short term.

There is no taxiway lighting and it has been assumed that Mosul Airport will only operate during daylight. However if night operations are envisaged it will be necessary to provide suitable lighting in accordance with ICAO standards.

The debris scattered around the taxiways is a safety hazard to aircraft operation and hence must be removed in the short term.

As the bituminous pavement is in relatively poor condition, we are unable to identify a probable PCN range, however based on the taxiway widths the following limitations are imposed by ICAO Annex 14, upon aircraft that able to be accepted on the taxi ways.

X-ray & Zulu can accept aircraft classified as 4D, while Alpha to Echo can only accept aircraft classified as 3C. These classifications may need to be further modified once the PCN's have been identified.

## **PAX Terminal Apron**

The PAX Terminal Apron services the civilian passenger terminal and is accessed via taxiway X-ray. The apron covers approximately 34 400 m<sup>2</sup>, it is of concrete construction and is considered to be in reasonable condition. The markings to the apron are limited to a single lead in line, with a non-plane specific stop bar. There are no lead out or keyhole

markings, nor is there any signage. There is no flood lighting to the apron nor are there any guide lights to taxiway X-ray. There are no docking aids.

There are no civil maintenance hangars or facilities.

**Assessment** The rigid pavement of the PAX terminal apron was considered to be in reasonable condition. The apron markings are considered to be inadequate and the signage does not comply with ICAO standards and established practices.

We have been advised that the US Military Army Corps will be engaging external contractors to obtain Pavement Concession Number (PCN), as they have no suitable testing equipment on site. Hence, we are unable to advise the PCN for rigid apron pavement.

### **Proposed Cargo Apron**

The proposed cargo apron is accessed from the north end of the runway via taxiway Zulu. The apron covers approximately 60,000m<sup>2</sup>, it is of concrete construction and is considered to be in reasonable condition. The markings to the apron are limited to a single lead in line. There are no lead out, stop bars or keyhole markings, nor is there any signage. There is no flood lighting to the apron nor are there any guide lights to taxiway Zulu.

**Assessment** The rigid pavement of the proposed cargo terminal apron was considered to be in reasonable condition, and in all probability fit for purpose. The sealant in the expansion joints will require replacement in the long term. The apron will require the application of suitable markings in accordance with the requirements of the ICAO standards and established practices.

We have been advised that the US Military Army Corps will be engaging external contractors to obtain Pavement Concession Number (PCN), as they have no suitable testing equipment on site. Hence, we are unable to advise the PCN for rigid apron pavement.

### **Hangar**

A hangar exists to the southeast of the proposed cargo apron. Access was not available to the hangar at the time of the inspections, however it is clearly evident that the hangar structure has suffered significant damage, reportedly during the Gulf war. The damage includes the external metal cladding, a number of the metal purlins and girts and the doorframes at either end. Some of the structural bracing has also been damaged or removed. The gantry crane appears to have suffered extensive damage and is probably unserviceable. The main structural steel to the hangar appears to have suffered relatively minimal damage, and in all probability could be reused if required as part of the redevelopment of the aerodrome's cargo facility. (It should be noted that the structural steel, slab, and the footings to the hangar have not been closely inspected.)



**Assessment** If the hangar is to be refurbished it will be necessary to remove and replace the damaged purlins, girts and bridging. Install new structural bracing, new hangar doorframes and validate the condition of the existing structural steel frame, slab and foundations. Install and fix new profiled metal cladding suitable for the spans between the existing purlins and girts. It may also be appropriate to provide suitable ventilation to the hangar, either passive or mechanical, along with insulation.

### **Air Traffic Control Tower.**

The existing air traffic control tower is a four-storey building, constructed of reinforced concrete columns, beams and slabs. The walls are infill masonry. Generally, the building was found to be in fair condition, with no visible evidence significant structural distress. There is some cracking of the walls however, it is considered relatively minor and not of significant concern. The water proofing membranes to the roof and balcony could not be inspected or assessed due to the concrete overlying the membranes.

The lightning strike protection system to the building has been disconnected at roof level and is not operational.

The stairs and balustrades to the external balconies do not meet current Occupational Health and Safety requirements and are considered unsafe.

While the waterproofing membranes could not be assessed, there was some evidence of water damage to the walls within the ATC tower.

**Assessment** The existing building is considered adequate. However if it is to be used it will be essential to connect the lightning strike protection system to a suitable earth in the short term, and the installation of suitable waterproofing membranes to the roof and balconies. Similarly the balustrades and stairs will require modification / reconstruction to make them safe in the short term.

### **VOR Building.**

The VOR building is a demountable structure. It appears to be relatively new and in reasonable condition, however there are no hold down bolts or fixings between the building and the concrete foundations. In addition, the size of the existing concrete foundations is unknown.

There was no lightning strike protection system to the building.

**Assessment** The building appears adequate, however existing foundations must be investigated and confirmed as suitable to prevent overturning under design wind conditions, and the building must be fixed down to the foundations. A suitable lightning

strike protection system should be installed. These works should be carried out in the short term, if the building is to be utilised as the ATC tower.

### **PAX Terminal.**

The existing PAX terminal was reportedly constructed in 1992 and first used in 2001. The building is one and two stories in height and consists of reinforced concrete slabs, columns, and roof beams. The walls and balustrades have been constructed with a mixture of concrete and clay based masonry units. The façade of the building has been clad with slabs of stone. The glazing consists of glass panels in extruded aluminium frames. The roof membranes could not be assessed due to the concrete topping overlying the water proofing membrane. Generally the building was found to be in reasonable condition with no visible signs of significant structural distress, except as noted herein below.

The stone clad façade has suffered minor sniper damage, however there is some concern over the suitability of the wall ties used to fix the stone to the structure. The exposed wall ties on the northwestern façade are rusting and it may be appropriate to investigate the condition of the concealed ties within the next 10 years.

At the airside of the terminal on the second level, the lintels over the glazing have suffered significant corrosion and spalling, with large sections of render de-bonding from the lintel and falling off the building. This has exposed a portion of the lintel supporting the stone cladding, and it was found to be corroding. A brief engineering assessment of the detail suggests that it was originally inadequate and all lintels over openings in excess of 1.5m should be closely examined and reconstructed as required using a more suitable lintel.

The lightning strike protection system to the building appears to be intact and connected from the roofs to below ground level.

The glazing system utilised to the front entry appears to be very flexible and under ultimate design wind speeds is unlikely to have sufficient capacity to safely resist the ultimate design loading.

The hand rail or balustrade to the main internal stair is structurally inadequate and must be either strengthened or replaced as it has inadequate capacity to resist the required design loads and hence represents an Occupational Health & Safety risk to the users of the stairs. Similarly, the handrail or balustrade to the fire stair in the centre of the building that accesses the roof is also inadequate and must be replaced.

The roof membrane and expansion joint details within the building are concealed and could not be inspected, however there is evidence of damage at the expansion joints and water penetration both into the building and through the expansion joints. While these are not structural issues, they will probably need to be addressed by the owner of the building to ensure it remains suitable for purpose and habitation.

**Assessment** The existing building is considered structurally adequate. The support of the stone cladding above large openings must be further investigated and rectified in the short term. The glazing to the landside entry must be either strengthened or replaced in the short term. The handrails or balustrades to both staircases must be removed and replaced in the short term. The ties to the stone cladding should be further investigated in the long term, and rectified as required. The roof membranes and expansion joint details should be investigated in the long term and rectified as required.

**Recommendations:**

- INFSTR -1 Repair the larger sections of pavement damage to the runway and thresholds in the short term.
- INFSTR -2 Repaint markings to the runway 33R/15L, all taxiways and both aprons in accordance with ICAO Doc 9157 – Aerodrome Design Manual in the medium term.
- INFSTR - 3 Repair pavement to taxiway Delta in the short term.
- INFSTR - 4 Install all runway, taxiway and apron signage in accordance with ICAO Doc 9157 – Aerodrome Design Manual in the medium term.
- INFSTR - 5 Install primary and secondary windsocks at the runway in the short term.
- INFSTR - 6 Replace expansion joint sealant to the concrete runway, taxiway and apron pavements in the long term.
- INFSTR - 7 Review records of thunderstorm activity and install an airfield drainage system in the medium term if required.
- INFSTR - 8 Install runway strip markings in accordance with ICAO Doc 9157 – Aerodrome Design Manual in the long term.
- INFSTR - 9 Refurbish and re-clad the existing hangar and gantry crane, suitable for a cargo handling facility.
- INFSTR - 10 Install flood lighting to the Civil Passenger Terminal in the long term.
- INFSTR - 11 Replace and rectify stairs and balustrades to the air traffic control tower building in the short term.
- INFSTR - 12 Reinstate lightning strike protection systems to the air traffic control tower in the short term.
- INFSTR - 13 Rectify lintels to stone clad façade of the PAX terminal building in the short term.
- INFSTR - 14 Strengthen or replace glazed façade on the northwest façade of the PAX terminal at ground level in the short term.

INFSTR - 15 Strengthen or replace the handrails to the stairs within the PAX terminal in the short term. It may also be appropriate to provide suitable guardrails to the airside balcony on the second level.

INFSTR -16 Investigate condition of stone cladding ties, and rectify as required, long term.

### **Perimeter**

The perimeter fence was severely damaged and breached at numerous locations. The fence consists primarily of reinforced concrete posts with chain mesh and topped with barbed wire. US Army engineers advised us that the fence would be reinstated and the perimeter enlarged along the eastern side of the airport. While it is apparently envisaged that the new fencing will be a permanent fixture, the actual condition of the fencing will need to be reassessed on completion of the Army's construction activities.

There is a perimeter road and several internal roads within the airfield site. The roads have been constructed with asphaltic concrete, and are generally considered to be serviceable requiring only normal ongoing maintenance.

### **Recommendations:**

INFSTR - 17 Repair perimeter fences in the short term.

INFSTR - 18 Repair and maintain perimeter roads in the long term.

## CARGO HANDLING

### **References:**

ICAO Annex 17 – Security  
ICAO Annex 18 – Safe Transportation of Dangerous Goods by Air  
IATA Dangerous Goods Regulations  
IATA Airport Handling Manual

**Assessment** There is no specific commercial or military cargo handling facilities or infrastructure at Mosul. Discussions with local authorities led us to the conclusion that limited small items of commercial cargo were carried on passenger services and handled by terminal staff within the terminal building. The assessment team was unable to determine how the cargo was distributed or collected.

Pre the 1991 conflict, Military cargo was handled on a large apron and hangar area situated at the Northern end of the airfield. This hangar is currently in disrepair but could be refurbished and utilised for cargo handling. It is currently occupied by the military for helicopter maintenance.

The General commanding the Mosul camp stated in conversation that he would not allow anything larger than an aircraft, in similar size and weight to a C-130, to operate into the airport whilst it was occupied by the military. However, this was not backed up by any reference to any set ICAO performance criteria of the airfield.

No specific storage or handling area was set aside for the provision of Dangerous Goods or Hazmat. The only Military cargo handling equipment sighted was a medium size forklift suitable for handling military pallets

### **Recommendations:**

- CARGH - 1 Seek approval to relocate current military activity from within the proposed cargo area, or consider options of working alongside the military within the same area.
- CARGH - 2 Determine an appropriate level of cargo requirements for the region and build/repair appropriate facilities that will enable facilitation of Aid and future commercial activities.
- CARGH - 3 In the longer term determine the Commercial Cargo market for the region and provide appropriate cargo infrastructure as required.
- CARGH - 4 Establish DG and HAZMAT storage areas and develop handling procedures in accordance with both IATA DG Regulations in the medium term.
- CARGH - 5 Purchase, repair and/or install the following in the short to medium term:

- i. Repair or rebuild existing hangar facilities
- ii. Power, water and sewerage.
- iii. Office, collection and distribution areas.
- iv. Cold storage areas.
- v. Close circuit security camera system.
- vi. Five ton scales.
- vii. Air conditioning.
- viii. Fixed fire fighting system.
- ix. An appropriate level of GSE equipment including (but not limited to); Scissor lifts, forklifts, tugs, barrows, ground power units, tail stands and containers appropriate to the size and type of aircraft used.

In the interim period awaiting the delivery of cargo handling equipment, all cargo aircraft should be self discharging, or at least with a tail ramp.

### **Proposed Cargo Apron**

The proposed apron covers an area of approximately 60,000m<sup>2</sup> and can accommodate aircraft with the dimensions and performance of a Boeing 767 or similar. Refuelling capabilities mirror those of the passenger terminal.

**Assessment** The pavement is in reasonable condition but markings and signage are indistinct. Although apron lights were evident, they could not be tested because of unreliable power supply. A five-meter asphalt shoulder surrounds the concrete pavement. There are no eyewashes, deluge showers, or fuel spill functionality built into the cargo terminal infrastructure. There is considerable debris scattered around the edges of the apron.

### **Recommendations:**

CARGH - 6 Re-establish apron area in the short term to comply with ICAO Annex 14 - Aerodromes.

CARGH - 7 Install a deluge shower and eyewash in the short term.

## **PASSENGER HANDLING**

### **References:**

ICAO Annex 17 – Security  
ICAO Annex 18 – Safe Transportation of Dangerous Goods by Air  
IATA Dangerous Goods Regulations  
IATA Airport Handling Manual  
ICAO Doc 9249 – Dynamic Flight-related Public Information Displays

### **Passenger Terminals – General Condition**

Passenger handling is conducted out of one single terminal building, capable of handling approximately 550,000 passengers per annum.

The terminal is arranged on a single level (excluding a bar and coffee shop situated on a small mezzanine deck above the terminal entry exit point). The arrivals and departure areas are situated at each end of the building between a passenger meet and greet area and glassed framed walls. Each of these three areas has adequate office space for both airline/s and airport facilitators. The building has a total floor space of approximately 2,735m<sup>2</sup> made up of the following areas:

- Passenger Meet/Greet Area (Includes office space at rear): Approx. 1125 m<sup>2</sup>
- Departures Hall & Offices: Approx. 625m<sup>2</sup>
- Arrivals Hall & Offices: Approx. 625m
- Mezzanine Lounge, Bar & external Balcony: Approx 360m<sup>2</sup>.

At the time of the assessment, the US Army had complete use of the entire terminal area and facilities for military use. Access to some of these areas for the purposes of this assessment was time critical and difficult as some areas were required to be sterilised whilst the assessment was conducted.

Utilities connected were a reliable City of Mosul power supply, with a manually operated back up generator in serviceable condition. Functioning City water and sewerage services were connected. The structure appears sound, with functioning individual commercial 3 phase air conditioning systems, excluding the mezzanine floor, however it, is not fitted with any automatic or manual fire protection or extinguishing system. Any recent maintenance has been conducted since US military occupation. There was no significant damage to the building as a result of the conflict.

There are no customs or immigration facilities as this airport has never held international status.

**Recommendations:**

- PAXH - 1 Once the US Army was relocated, and their areas cleaned the building could be made operational very quickly.
- PAXH - 2 Install Communications (phones and IT cables).
- PAXH –3 Install fire protection systems.

**Flight Information Display System (FIDS)** There is no FIDS system installed or operating at the terminal.

**Recommendations:**

- PAXH - 4 Purchase a small FIDS system commensurate with the operating capability of the terminal.

**Passenger Check-in** The passenger departure suite consists of two check-in counters, (moved for military access), serviced by one German made Siemag conveyor system. The conveyor system could not be tested due to access by the military, but the Iraqi CAA stated that it was serviceable three months prior. A single Berkel electronic scale is attached to one of the counters but was deemed unserviceable and out of calibration. Seat allocation and baggage control are manual processes.

**Recommendations:**

- PAXH - 5 Service the baggage handling conveyor system& scales in the short term.
- PAXH - 6 Upgrade the number of counters to four and install a seat allocation system in the long term.

**Passenger Arrivals** The arrivals hall is fitted with one German made Siemag baggage conveyor belt. The conveyor system could not be tested as the military had work stations situated on the carousel. The Iraqi CAA claimed that all belts were serviceable 3 months prior.

**Recommendations:**

- PAXH - 7 Service the baggage handling conveyor system in the short term.

**Escalators** There are no escalators installed or required in the terminal.

**Elevators** There are no elevators installed or required in the terminal.

**Aerobridges** There are no aerobridges installed or required in the terminal.



**Public Announcement (PA) System** There is no PA system operating within the terminal.

**Recommendations:**

PAXH - 8 Install a suitable PA system in the terminal in the short term.

**Airside Roller Doors to Baggage Make-up Areas.** Small access outlets service the baggage conveyors in both the arrivals and departures areas. Military access did not allow us to inspect type or condition.

**Recommendations:**

PAXH - 9 Repair and/or service access outlets in the Terminal in the short term.

**Automatic Doors for Passenger Access to Terminal** There are no automatic doors in the terminal building.

**Fire Fighting System.** There was no fire fighting or fire protection system in the building.

**Recommendations:**

PAXH - 10 Install a suitable fire suppression / protection system in and around the Terminal.

**Security Screening Machines** A Heimann Hi-Scann 6040TS screening system was fitted in the departures area. It could not be tested because of military access. There was no walk-thru metal detecting equipment, which in accordance with ICAO compliance represents a security risk.

**Recommendations:**

PAXH - 11 Carry out hand searches in the short term.

PAXH - 12 Service security screening equipment in the short term

PAXH - 13 Install new walk-thru metal detecting equipment in the short term.

**Car Parking** There is a 45-vehicle car park supporting the passenger terminals. It is currently housing military tents and equipment.

**Recommendation:**

PAXH - 14 Clean the car park in the short term.

## UTILITIES

### **Potable Water**

The City of Mosul water system provides water for drinking, as well as to amenities in the terminal building and surrounding facilities at the airport. The potable water is gravity fed throughout the airfield. However, as with most of the country, city based facilities are not yet providing safe drinking water.

### **Recommendations**

UTIL - 1 Ensure airport staff and customers/passengers have adequate bottled water for use and purchase in the short term until water purity can be guaranteed.

### **Sewerage**

The City of Mosul sewerage system provides drainage of sewerage and oily water from the airport facilities. There is no sewerage treatment facility within the airport grounds.

### **Power**

Power supply to the terminal, ATC and some airport facilities is supplied directly by mains power. Mains power is reportedly reliable and the terminal is currently backed up by a suitable and serviceable manual generator.

On the ATC side of the airfield, there are two back-up generators. One of these units' dates back to the 1960's and indications are that it has not been used for a significant period of time. The ATC complex, VOR and ILS facilities were connected to the other back-up generator located in a transportable container adjacent to the ATC tower complex. US military personnel advised that this generator was serviceable when they occupied the ATC complex, however it was quoted as being "1/2 burnt out", and despite registering only 3,000 hours operation time requires a major overhaul. This unit has since been disconnected from use in favour of supportable US Army back-up equipment.

The VOR was connected to mains power; the above back up generators and also had its own UPS. The power supply cables had been disconnected/cut to the VOR. The condition of the UPS is unknown as it was located in a locked facility adjacent to the VOR enclosure. It is likely that the ILS was also connected to the UPS, but not confirmed.

### **Recommendations:**

UTIL - 2 The transportable back-up generator adjacent to the tower complex be refurbished and confirmed as a reliable source of back-up power.

## **Air Conditioning**

There are three air conditioning units located in the ATC complex. Two of these have been stripped by looters and are inoperable and beyond repair. The third unit is located on the fourth floor and is reportedly operational however there is no coolant within the system. The US Army is supplying its own air conditioning units.

The VOR-Omni building contains a domestic air conditioning unit. It appears relatively new, however it could not be tested due to lack of power supply to the building.

Within the passenger terminal, there are approximately eight commercial air conditioning units, of which five are functioning. The units are approximately ten years old, however it is assumed that they have operated for only two years and it is expected that parts for these units will be difficult to obtain, given their age.

## **Recommendations**

UTIL - 3 Service and repair existing units in the short term including supply of compliant refrigerant to all units. Locate a supplier for the medium term supply of spare parts.

UTIL - 4 Replace all air conditioning units in the long term.

## **Fire Fighting Water**

There was no available dedicated fire fighting water available at the airfield. The assessment team sighted no hydrants.

## **Cleaning**

No cleaning service was provided at the airport other than that undertaken by the Army.

## **Storm Water**

Storm water is absorbed naturally as no piped drainage exists on the airfield.

## ENVIRONMENTAL CONSIDERATIONS

**Sewerage** The sewerage system collects human waste, fuel spills, and oily water. The current sewerage system (refer to 'Utilities' section) pumps this waste outside the airport limits where it is treated. The assessment team did not identify any oil-water separation equipment or fuel spill kits for apron incidents.

### **Recommendations:**

ENVIR - 1 Verify sewerage collection system in the short term.

ENVIR - 2 Procure fuel spill kits for apron use in the short term.

**Weather** During a meeting with the previous ICAA manager, he stated that due to the close proximity of a river at the southern end of the airfield, fog was a common morning occurrence (60 days) between November and February. This can hamper and restrict airport movements and place local air traffic in IMC conditions.

### **Recommendations**

ENVIR - 3 Schedule aircraft to arrive late morning during the fog 'season' or install instrument approach equipment (ILS). Installing this equipment will also impact runway lighting, approach lighting, and VASI equipment requirements.

**Aircraft Systems Fluids** There are no civil maintenance facilities on the airport.

**Noise** Aircraft noise from airfield operations has a great impact on the population because the airfield is 4km from the City of Mosul, and there are significant residential areas in the vicinity of the airport.

### **Recommendations**

ENVIR - 4 Noise abatement procedures be developed for departures from Runway 33 and arrivals for Runway 15.

**Waste.** Waste was collected by a contractor. Currently it is burnt and buried by the US Army on site.

**Unexploded Ordinance (UXO)** UXO within the airport environment is currently being cleared by the US Military.

**Recommendations:**

ENVIR - 5 Deny access to areas where UXO searches have not been conducted.

**Dust.** The aerodrome is located in a dusty environment and is exposed to regular dust storms. Dust restricts visibility, and may damage sensitive equipment. This reduced visibility also affects air traffic with one instance of IMC conditions recorded between March and June 03.

**Recommendations:**

ENVIR - 6 Reduce vehicle movements on unsealed surfaces in the short term.

ENVIR - 7 Seal buildings to restrict ingress of dust in the medium term.

ENVIR - 8 Establish positive pressure in rooms housing sensitive equipment in the medium term.

ENVIR - 9 Regenerate vegetation or seal areas between runways, taxiways and adjacent areas in the long term.

ENVIR - 10 Refer to above paragraph in regard to low visibility operations

**Heat** The reliability and calibration of sensitive equipment is compromised by extreme heat, which in turn, affects aircraft safety. Mosul Airport employees and customers need relief from the extreme temperatures (up to 60°C). Heat can also reduce aircraft performance and therefore may restrict outbound passenger and cargo loads in extreme conditions.

**Recommendations:**

ENVIR - 11 Air-condition all compartments housing sensitive equipment in the medium term.

ENVIR - 12 Air condition domestic areas and provide adequate hydration facilities throughout the aerodrome in the medium term.

**Animals** The assessment team observed uncontrolled wildlife (dogs and cats) within the airfield perimeter.

**Recommendations:**

ENVIR - 13 Repair perimeter fences in the short term.

**Foreign Object Damage (FOD)** Aircraft movement areas are littered with debris capable of causing FOD.

**Recommendations:**

ENVIR - 14 Clear apron and aircraft movement areas of debris in the short term.

ENVIR - 15 Sweep apron areas on a regular basis.

**Foul Ground.** The use of field toilets during the hostilities will continue to present a potential environmental and medical hazard.

**Recommendations:**

ENVIR - 16 Identify foul grounds with signage and appropriate barriers in the short term.

ENVIR - 17 Treat foul grounds in the medium to long term.

## **AIRPORT REQUIREMENTS, ORDINANCES, LEASES, AGREEMENTS, LAWS, AND REGULATIONS**

### **Local and International Airport Requirements**

The assessments and recommendations contained throughout this report are based on compliance with ICAO requirements where relevant. Where ICAO standards are not relevant, the assessments and recommendations have been based upon professional judgment and experience in relation to best practice. The assessment team did not identify or locate any local airport requirements. Anecdotal feedback from all personnel interviewed throughout the assessment indicated the following:

- Prior to 1992, the aerodrome was controlled by the military for predominately their use. The aerodrome was not ICAO compliant
- 1992 -2001. The terminal was built but, did not handle any flights, and any relevant ICAO compliances, licenses and procedures lapsed.
- 2001 – Conflict. Although the aerodrome operated approximately two flights daily during this period, there was no evidence to indicate a proactive approach to safety or to regaining ICAO certification.

### **Leases and Agreements**

Despite the best efforts of the assessment team to locate any documented evidence of ordinances, leases, agreements, laws and regulations, none were identified. Local Iraqi CAA officials and the US Army advised us that all documentation had been burnt or purposely destroyed during the recent conflict. The authorities consulted at Annex A were quick to alert the team that there was a total lack of priority afforded to the control, safety, service and security of civil aircraft at the airport by the executive government. Although the assessment team could not verify their status, the following anecdotal evidence was gathered in relation to recent activities:

- Mr. Hasan Nofal Zeki (CAA Manager - Mosul Airport) indicated that there was no lease or agreement between either Mosul Airport and Iraqi CAA, or Iraqi Airways and Iraqi CAA, for aerodrome real estate. He stated that there were no payments made in lieu of any agreement.
- Mr. Hasan Nofal Zeki indicated that to his knowledge there were no valid contracts either directly or via third parties with any company in relation to any activities either, past present or future.

The assessment team located drawings at BIAP to completely upgrade Mosul Airport to International status. This work however never got past the initial planning stage.

**Recommendations:**

- CONTR - 1 Assist Iraqi personnel assigned to ICAA and Mosul Airport senior management positions to conduct a complete review of ordinances, leases, agreements, laws and regulations required for a civil domestic aerodrome in the medium term.
- CONTR - 2 Develop those ordinances, leases, agreements, laws and regulations required to operate a domestic aerodrome in the long term, including obtaining ICAO certification.



## **MILITARY OPERATIONS AND RECONSTRUCTION ACTIVITIES**

The runway and associated infrastructure was used exclusively by the Iraqi Air Force prior to 1991 when military flying operations ceased. Air operations recommenced on arrival of coalition aircraft post Operation Iraqi Freedom.

There are currently no reconstruction activities being undertaken by the US military for the improvement of the airfield for civil operations. It was apparent to the assessment team that the military were upgrading the camp facilities indicating an intention to remain at the airfield for the medium term to long term.

As discussed earlier, it appears that the US Army intends to transfer all cargo flights from Mosul to Qayyarah West Airfield, 60 km from Mosul. This airfield is currently under repair by the US army and will be capable of handling AN 124 aircraft. This will leave Mosul with regional passenger services.

## CONCLUSION

The assessment team, in accordance with CLIN 001, reviewed the current capability of Mosul Airport, noted current impediments affecting future operations and listed by priority, improvements needed to ensure future operations meet ICAO standards. A cost analysis for the improvements is also included.

As a consequence of successive wars, sanctions and general neglect by Saddam's regime, what was once a serviceable aerodrome has degenerated to the point where the resources, systems, utilities, and facilities of Mosul Airport are incapable of supporting civil air operations. Mosul has historically operated as a Military base with minor commercial activity, hence most services were provided by the Iraqi Air force.

The project of reconstituting Mosul Airport to achieve ICAO compliance and to adopt best practice is extensive. Tasks range from basic cleaning activities, through short-term repair of existing systems, to acquisition of capital equipment and infrastructure. The recommendations contained herein have been developed with due regard to facilitating the airports ability to handle the flow of rehabilitation aid in the short term, through to Mosul Airport achieving ICAO compliance in the long term.

In its present state, Mosul Airport is incapable of providing compliant civil air traffic services at any level. There is no functioning control tower, ATC equipment or functioning navigation aids. The airfield is limited to Visual Meteorological Conditions by day. The US Army is providing limited airfield control services using military equipment. This military equipment will be removed on departure so an Air Traffic Management system needs to be installed during reconstruction.

There are no civil aircraft fire fighting, rescue or medical emergency capabilities at Mosul Airport. The US Army is currently providing these services, primarily for military air movements, although it should be noted that the RFF coverage meets ICAO RFF Cat 1 or 2 at best, as there are no suitable fire tenders

Mosul Airport has no commercial aircraft ground handling capability, with serviceable GSE being stored off site. The US Army has limited capabilities to handle commercial aircraft. This is a severe restriction on Mosul Airport's capacity to handle passenger and cargo aircraft movements. There is no cargo handling capacity through the cargo terminal. Commercial aircraft fuelling is currently not possible and effort should be devoted to reintroducing a tanker refuelling capability.

The passenger terminal is structurally sound but the systems to support passenger handling are in a poor state of repair. The terminal has reliable power, water, sewerage, and air conditioning services.

The runway, taxiways and aprons associated with the civil airfield, are in reasonable condition but all markings, require extensive refurbishment. There are no airfield lights.

Despite the best efforts of the assessment team, no documentary evidence of agreements, leases, ordinances, and legislative requirements were identified. The

general response from ICAA personnel to the assessment team's enquiries was that these functions were not documented by the regime or destroyed during the war.

The largest impediment to Mosul Airport being utilised for the flow of USAID relief materials, supplies, and personnel is the occupation by the US Army. The US Army is undertaking extensive development of their camp and appears to be preparing for a medium to long-term deployment. Brigadier General Sinclair, the Commanding General of 101 Airborne Division, stated that he would not allow any aircraft larger than a Boeing 737 or C130 Cargo Aircraft to land in Mosul. He believes that due to the close proximity of the airport to the centre of Mosul, the risk to the local community and military personnel of larger aircraft operations is too great.

The General plans to divert all cargo operations to Qayyarah West (pron Key~ara), a large airfield 60 km to the west of Mosul. The plan is for all military, UN and commercial cargo flights to land at the airfield and the cargo to be distributed via road to final destinations. This airfield is currently under repair and could be operational within weeks. USAID will need to clarify the future operational role of Mosul Airport as a matter of priority.

## RECOMMENDATIONS

All recommendations detailed in this report together with indicative costing are contained in Annex E. The recommendations are presented in the following groups:

- a. Short term improvements – those required to facilitate a minimal safe operating capability and should be actioned within six months of the commencement of CLIN 003: Direct Operations of Aerodromes. Indicative cost - \$US 11,590,200
- b. Medium term improvements – those required to facilitate a transition from military to civil control of MOSUL AIRPORT, but short of ICAO certification, and should be completed between six and 18 months after the commencement of CLIN 003. Indicative cost - \$US 4,265,000
- c. Long term improvements – those required to take MOSUL AIRPORT to ICAO certification and handover full control to Iraqi authorities. These improvements should be initiated no later than 18 months from the commencement of CLIN 003. Indicative cost - \$US 3,455,000

Skylink Airfield Assessment Team 3  
Baghdad

12 June 2003

### **Annexes:**

- A. List of Authorities Consulted
- B. Aerodrome Data
- C. List of ORBS Military NOTAMS
- D. List of GSE
- E. Cost Analysis

**LIST OF AUTHORITIES CONSULTED**

<b>Name</b>	<b>Appointment</b>
<b>CIVIL AUTHORITIES</b>	
Gen Ahmed Abdukarin.M	Ex Commanding General Iraqi Air force Mosul
Mr Hasan Nofal Zeki	ICAA Terminal Manager - Designate
<b>MILITARY AUTHORITIES</b>	
Brigadier Gen Sinclair	101 Airborne Div
Col Glass	101 Aviation Bde
Maj Lyell	101 Airborne Div – Civil Affairs
Lt Mosley	101 Airborne Div – Engineer Liaison
SQLDR F Breckenridge	RAAF SATCO Baghdad

**AERODROME DATA**

(Source: United Nations Joint Logistics Centre)

**General Information**

Country	Iraq
ICAO ID	
Time	UTC + 3 (+4 DT)
Lat	36DEG18MIN 59N
Long	043DEG08MIN 97E
Elevation	740' (225.55metres)
Type	Paved
Mag Variation	3DEG E (01/03)
Bn	No
Operating Agency	Military (civil joint use)
International Clearance Status	
Daylight Saving Period	1 April – 30 September

**Communications**

TWR	120.6
Radar	Nil
RDO	Nil
Ground	Nil
ATIS	Nil

**Runways**

ID	Dimensions	Surface	ILS
15/33	7,875' x 148' 2400m x 45m	Paved / Concrete?	No

**Nav Aids**

Type	ID	Name	Channel	Freq	Dist fm Field	Bng fm Nav Aid
VOR/DME		Na	Na	Na	Na	Na

**LIST OF MOSUL AIRPORT (ORBS) MILITARY NOTAMS**

1. RWY 33L/15R
  - a. Approach procedures – visual approach with circling overhead both on approach and departure to avoid possible small arms fire, or as instructed by ATC
  
2. AIRFIELD LIGHTING  
Nil
  
5. AIRFIELD SERVICES
  - a. NO FUEL AVAILABLE
  - b. NO GROUND HANDLING SERVICES AVAILABLE.
  - c. FIRE PROTECTION RFF CAT 1
  - d. AIR TRAFFIC SERVICES AVAILABLE H24
  
6. NAV  
Nil
  
7. OBSTRUCTION DATA
  - b. Major obstacle of 1065 ft AGL at 5 NM R 070. Other obstacle of 320 ft at 3 NM R070.

**LIST OF GSE**

<b>Type</b>	<b>No. and Condition ID by Assessment Team</b>	<b>No. reported as serviceable prior to conflict</b>
Baggage Loader	1 –unserviceable	•Unknown

The team was advised that GSE was being stored in Mosul City. After repeated attempts to locate these items, the team was not able to do so. Advice from the ICAA Manager is that the equipment is to be moved back to Baghdad, at the request of the US Army.