



**AERODROME ASSESSMENT  
REPORT**

**BAGHDAD INTERNATIONAL  
AIRPORT**

VERSION: Aerodrome Assessment - Final Report  
27-May-03

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## INTRODUCTION

### **General**

1. Since the construction of the new aerodrome (hereon referred to as the civil airfield) in 1982, war and UN sanctions have caused a continual degradation of infrastructure and systems. What was once a state of the art aerodrome is now non-compliant with standards required of a modern international aerodrome. Consequently the aerodrome's ability to handle the flow of rehabilitation cargoes including food and medical assistance and materials for reconstruction is limited. Baghdad International Airport (BIAP) is a crucial conduit for the flow of international reconstruction aid post Operation Iraqi Freedom.

### **Statement of Work**

2. The Statement of Work issued by USAID comprises the following three tasks for BIAP:
- a. CLIN 001: Initial Aerodrome Management Assessments.
  - b. CLIN 002: Planning Implementation of Aerodrome Improvements.
  - c. CLIN 003: Direct Operation of Aerodromes

### **Initial Assessment**

3. Timing of Assessment. An initial management assessment of BIAP in accordance with CLIN 001, as well as a thorough assessment of air traffic management was conducted during the period 8 - 19 May 2003.

4. Team Composition, The assessment was carried out by the following personnel:

- a. Peter Day – Team Leader.
- b. Charlie Downes – Air Operations Specialist.
- c. Grant Buggy – Air Logistics Specialist.
- d. Chris Happé – Engineer.

### **Aim**

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

## **Scope**

6. The scope of the assessment includes all elements associated with the approach, arrival, turn-around, and departure of aircraft from BIAP. The following aerodrome elements are addressed herein:
- a. Air operations.
  - b. Emergency.
  - c. Ground handling.
  - d. Aerodrome infrastructure.
  - e. Cargo handling.
  - f. Passenger handling.
  - g. General infrastructure.
  - h. Utilities.
  - i. Military operations and reconstruction activities.
  - j. Environmental considerations.
  - k. Airport requirements, ordinances, leases, agreements, laws and regulations.
7. Time Scale of Recommendations. Recommendations for improvements based upon the following timescales are made:
- a. Short term (up to 6 months).
  - b. Medium term (6-18 months).
  - c. Long term (beyond 18 months).

## **Assumptions**

8. The following assumptions were made:
- a. Information gathered during interviews with Iraqi nationals responsible for the above aerodrome elements was accurate.
  - b. 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.
  - c. The air traffic management problem must be approached on a national rather than individual airport requirement.
  - d. Iraqi Subject Matter Experts (SME) will play a crucial role in achieving the recommendations detailed herein.

### **Limitations**

9. The limitations of the assessment were as follow:
  - a. Time constraints imposed.
  - b. Access to records, plans and diagrams.
  - c. Access to legislation, leases, agreements, laws, regulations and extant contracts, and MOUs.
  - d. Ready access to Iraqi SMEs.
  - e. Inability to test equipment due to unreliable utilities including power supply.
  - f. Access to classified military controlled areas including a hangar and the VVIP terminal
  - g. Underground service tunnels were not inspected.
  - h. Access to the marketplace for cost analysis.

### **Authorities Consulted**

10. A list of authorities consulted throughout the assessment is at Annex A. The team had access to unclassified initial assessment reports conducted by coalition military units, as well as various technical drawings of the aerodrome facilities. It must be stated that the assessment work would have been more difficult without the level of cooperation that was provided by Iraqi SMEs and selected coalition military authorities.

## BACKGROUND

### Development of Baghdad International Aerodrome

11. Prior to 1982, BIAP comprised of what is referred to herein as the old airfield. The civil airfield (comprising runway 33R15L, terminals and associated infrastructure), constructed by the French joint venture of Fougerolle and Spie-Batignolles, was completed in 1982. The new construction comprised terminals B, C, and D, each with a capacity to handle 2.5 million passengers each year. Terminal A, situated separately from terminals B, C and D, has not been used since 1982.
12. Civil aircraft have not use the old airfield since 1982.
13. An assessment of the facility known as the VVIP terminal was not possible because the US Military denied access. The Iraqi Civil Aviation Authority (CAA) could not assist with an assessment of this terminal because they did not have access throughout the period of Saddam's regime.
14. The civil airfield operated at a low level of capacity between 1982 and 1991, when all operations ceased due to various wars and UN sanctions. Operations recommenced in 2000 with a maximum of four domestic flights daily (to Mosul and Basrah), and the occasional international flight to/from Damascus. All civil operations ceased immediately prior to commencement of Operation Iraqi Freedom.
15. The air traffic management infrastructure was introduced as part of the 1982 construction project. Anecdotal evidence suggests that the air traffic management system was not fully commissioned into service, nor did it ever achieve optimal levels of capability because of poor through-life support. Documentation discovered during the assessment indicated that the Iraqi CAA had commenced a program to replace the air traffic management system (Proposals from AIRSYS ATM – Joint company Thomson CSF/AIRSYS and Siemens, Marconi Radar Projects, and MRSL Marconi in 1999). There was no evidence to suggest that this replacement program had commenced.
16. The majority of equipment assessed was not supported by through-life integrated support including configuration control, training, maintenance management, and spare parts. The serviceability and reliability of key aerodrome elements suffered due to the inactivity between 1991 and 2000, and minimal operations between 2001 and 2003. Only the efforts of a small, dedicated group of technicians kept some equipment functioning.

### Description of BIAP

17. BIAP is located approximately 20 kilometers to the southwest of Baghdad. It covers an area of approximately 30 square kilometers, and is 34 metres above sea level. Natural drainage appears to be adequate. A three lane sealed main access highway connects the city with BIAP. The highway surface appears in sound condition with debris scattered along its length.

18. The aerodrome consists of:
- a. Runway 33R/15L – 4000 metre civil runway.
  - b. Runway 33L/15R – 3300 metre old runway.
  - c. Taxiways S (including S1-S6), W and X, which are associated with the civil runway.
  - d. Taxiways associated with the old runway (including L, P, T, C, B, J, H, G and F).
  - e. Civil aprons.
  - f. Old aprons, which comprise a vast expanse of concrete pavement adjacent to the old runway.
  - g. Passenger Terminals B, C and D (known as Samara, Babylon and Nineveh respectively).
  - h. Cargo terminal.
  - i. Terminal A.
  - j. Catering building.
  - k. Control tower complete with approach room and administrative areas to the north and between runways.
  - l. Hangars and maintenance buildings.
  - m. Fuel farm.
  - n. Fire station.
  - o. Medical centre.
  - p. Weather station.
  - q. Administrative buildings.
  - r. Car parks.
19. An aerodrome data sheet taken from [www.worldaerodata.com](http://www.worldaerodata.com) is at Annex B.



## AIR OPERATIONS

### References:

- A. ICAO Annex 1 – Personnel Licensing
- B. ICAO Annex 3 – Meteorological Service for International Air Navigation
- C. ICAO Annex 4 – Aeronautical Charts
- D. ICAO Annex 10 – Aeronautical Communications
- E. ICAO Annex 11 – Air Traffic Services
- F. ICAO Annex 15 - Aeronautical Information Services
- G. ICAO Doc 4444 – Air Traffic Management
- H. WMO Volume 1 – General Meteorological Standards and Recommended Practices
- I. WMO Volume 2 – Meteorological Services for International Air Navigation
- J. WMO Weather Reporting Volumes A, B and C

### Overview

20. 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, must be considered when making an assessment of BIAP's Air Traffic Control (ATC) capability.

21. All elements supporting ATM, and the ATC section itself, were completely rebuilt and restructured during the development of the new BIAP in 1982. At the time it was a state of the art system.

22. Subsequent periods of conflict and inactivity resulted in poor support for ATM, and ultimately in the total degradation of the air operations capability.

23. **There is no longer a single serviceable element within the ATM capability.**

24. ATM Services. Coalition forces are providing all ATM services, including air space architecture and control for the Iraqi Flight Information Region (FIR).

25. Aerodrome Control Services. The Royal Australian Air Force (RAAF) is providing category D aerodrome control services, and the USAF is providing approach control at BIAP.

### Control Tower, Approach and Area Control Centre - Baghdad ATC

26. An effective ATM system was in place at the commencement of operations at the new airport. This included aerodrome, approach and area control elements as well as supporting elements such as Aeronautical Information Service (AIS), weather forecasting and flight planning. All records relating to ATC functions have been destroyed or lost.

27. There is no comprehensive Manual of Air Traffic Services (ATS), nor is there any evidence of an ATS safety oversight program. Anecdotal evidence indicates that there is a cadre of personnel who were proficient controllers.

28. **Assessment.** The continual run-down since the 1980s has resulted in the degeneration of the ATM system to that of an aerodrome information service. In its present state the ATC section is not capable of providing compliant air traffic services at any level. All controllers need retraining and re-licensing together with the development of a management structure for day-to-day operations, record keeping and safety oversight. The tower does not have a serviceable crash alarm system.

29. **Recommendations:**

- a. ATC 1 - Provide all Iraqi controllers with on-job training (under the guidance of RAAF controllers) in the short term.
- b. ATC 2 - Develop policy and procedures for the day-to-day management of operations, record keeping and a safety oversight in the short term.
- c. ATC 3 - Re-train all Iraqi controllers as required by the needs of the emerging ATM system in the medium to long term.
- d. ATC 4 - 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.
- e. ATC 5 - Refurnish ATC tower and building.

## **Weather**

30. BIAP's weather station was used only for observations. All observation equipment has been destroyed but the building itself is intact. The Iraqi Meteorological Organisation (IMO) in Baghdad provided aviation weather forecasting. This facility has also been destroyed along with all records.

31. The assessment team noticed that weather conditions at BIAP can deteriorate rapidly to instrument approach minima's eg. 600-800 metres visibility.

32. **Assessment.** There is no civil capability to forecast or observe weather at BIAP.

33. **Recommendations:**

- a. MET 1 - Establish a weather observation and reporting capability at BIAP in the short term.
- b. MET 2 - Procure aviation weather forecasts from a third party in the short term.
- c. MET 3 - Establish weather forecasting capability at BIAP in the long term.

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

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

35. Instrument approach and departure procedures for BIAP have not been reviewed for an indeterminate period of time. There are no GPS approach procedures for BIAP. Several communication masts (the highest approximately 380 metres) are located to north-east of the civil runway, apparently protruding through the transitional slopes; they will require surveying.

36. **Assessment.** There is no meaningful AIS capability in Iraq; however, there is inherent capacity to recover full AIS functionality using Iraqi SMEs. The instrument approach/departure procedures for BIAP must be re-certified. If the communication masts protrude into the transitional slopes, they must be included in the re-drafting of approach and departure procedures.

37. **Recommendations:**

- a. AIS 1 - Survey the aerodrome environment for obstructions in the short term.
- b. AIS 2 - Establish GPS approach procedures in the short term.
- c. AIS 3 - Dependent upon navigational aid serviceability, re-establish instrument approach and departure procedures (ILS/VOR) in the medium term.
- d. AIS 4 - Re-establish the national AIS service in the medium term.

### **ATC Communications Overview (Voice Communications and Navigation Aids)**

38. Communications systems have not been modified or upgraded since installation in 1982. The equipment has deteriorated to such a state that it is unlikely to be suitable for future operations. There are reportedly no usable spares held on site and it is highly unlikely that spares can be acquired.

39. Documents found in the control tower complex show the Iraqi CAA recognised the need to replace the existing systems and a tender process was initiated in 1998. A comprehensive proposal for the introduction of a replacement system was provided by AIRSYS ATM (a joint proposal by Thomson-CSF, AIRSYS and Seimens) in 1999.

40. The BIAP ATC Centre was also responsible for the upper airways airspace for the entire Iraqi FIR.

### ATC Consoles

41. Consoles in the tower, approach room and area control centre are in similar states of disrepair to the rest of the control system. The consoles house the following equipment:

- a. Landline communications to on-field, off-field and international locations.
- b. VHF radio communications.
- c. Accurate clocks with universal coordinated time (UTC).
- d. Anemometers.
- e. Accurate pressure indicators (airfield pressure).
- f. Telephones.
- g. Housings for radar displays.
- h. Facilities for ATC "strip" presentations.
- i. Display facilities for aeronautical charts.
- j. The tower console additionally houses the controls for airfield lighting.

42. **Assessment.** All consoles and associated equipment are unserviceable. The assessment team was unable to determine the reason for the unserviceability and the likelihood of short term repair. The Iraqi maintainers advised that no spares were available and that appropriate spares would be difficult to procure. The assessment team supports this position. Off-field landline communications is unserviceable because the lines were channelled through the destroyed central communications centre in Baghdad.

43. **Recommendations:**

- a. ATC 6 - Assess the feasibility of the short-term repair of equipment.
- b. ATC 7 - Replace consoles and associated inter-face equipment as required in the short term.
- c. ATC 8 - Re-establish landline communications in the short term.

### VHF Radios

44. VHF radios are serviceable. However, Iraqi maintainers advise that there are no spares available, and frequent outages can be expected due to the age and condition of the equipment.

45. **Test Transmissions.** Test transmissions with aircraft were not attempted. Internal testing revealed that the transmission/receive functions are operating from the

equipment room. Test transmissions from the Control Tower were not successful because of unserviceable lines, consoles and inter-faces. These radios are not suitable for on-going operation without adequate spares. Standby VHF communications are available from the control tower but the switching gear from primary to standby is manual and located in the equipment room below the tower.

46. **Assessment.** Transmitters and receivers appear to be in a reasonable condition, and could remain in service provided spares support is available. The interface between the transmitters and receivers (wiring, consoles) is unserviceable. Standby VHF communications cannot be initiated from the control tower.

47. **Recommendations:**

- a. VHF 1 -Assess the availability of spares in the short term.
- b. VHF 2 -Replace the inter-face between the transmitters and receivers in the short term.
- c. VHF 3 - Install the means to activate standby VHF communications from the control tower in the medium term.

### **Voice Recorders**

48. Voice recording equipment is located in the ATC building equipment room. Iraqi technicians advise that spares are not readily available due to the age of the equipment. Therefore voice recording equipment may not be supportable in the medium to longer term.

49. **Assessment.** The voice recorders are unserviceable but may be recoverable if spares can be sourced.

50. **Recommendations:**

- a. VR 1 - Assess availability of spares in the short term.
- b. VR 2 -Conduct servicing and maintenance as required in the short term.
- c. VR 3 -Replace equipment in the short term if spares are not available.

### **Radar**

51. The BIAP radar has been destroyed.

52. **Assessment.** There is no radar system to assess.

53. **Recommendations:**

- a. RDR 1 - Procure and install an approach radar system, which is capable of being integrated into the Iraqi airspace architecture in the medium term.

### **Aeronautical Fixed Telecommunication Network (AFTN)**

54. An AFTN facility had been linked to the international distribution system. The Iraqi SME advised that the AFTN was serviceable until recently. The equipment was removed to the maintainer's residence before hostilities for safekeeping, and is reportedly still available. All AFTN transmissions were channeled through the Baghdad Communications Centre, which has been destroyed. Discussions with the RAAF ATC team indicated a degree of urgency in acquiring AFTN capability to enable timely dissemination and receipt of NOTAMs and other urgent message traffic.

55. **Assessment.** The AFTN is currently not installed. The equipment is reportedly new but could not be assessed by the team as it had been removed to private residences. There is no means to link AFTN traffic to the World Wide Network.

56. **Recommendations:**

- a. AFTN 1 - AFTN equipment be procured and installed as a priority in the short term.
- b. AFTN 2 - Establish means (possibly satellite) of linking AFTN traffic to the World Wide Network in the short term.

### **Power Supply**

57. Refer to 'Utilities' section.

### **Uninterrupted Power Supply**

58. Refer to 'Utilities' section.

### **Navigation Aids**

59. Jeppesen Airways Manual indicates that there are a number of navigation aids installed at BIAP of which the Iraqi maintainers were unaware. It appears that over time a number of aids have deteriorated to the point of becoming unserviceable, and due to poor management they have not officially been removed from service. The RAAF ATC section, after a survey of this equipment, concluded that all navigation aids at BIAP are out of service and have issued a NOTAM to this effect. A copy of the NOTAM is at Annex C.

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

60. There are two ILS's associated with the civil runway, one for runway 33R and one for runway 15L. Both are out of service, were last calibrated (flight checked) in 1989 but the calibration results were unavailable. Although the ILS equipment appears to be in reasonable condition, it is old technology and procurement of spares may be

difficult. Due to the glide slope and localiser being powered from opposite ends of the runway for each ILS, power supply becomes a problem because of the destruction of No 1 substation. This results in the localiser not being available on the approach to runway 33R and the glide slope not being available for the approach to runway 15L. Locators associated with these approaches are positioned off the aerodrome and were not inspected by the assessment team. The RAAF ATC organization has advised that the locators are out of service.

61. **Assessment.** Both ILS's are unserviceable and out of calibration.
62. **Recommendations:**
- a. ILS 1 - Assess both ILS systems for their suitability for refurbishment and the availability of spares (including associated locators) in the short term.
  - b. ILS 2 - Bring both ILS's to a serviceable state (by refurbishment or replacement) in the medium to long term.

### **Visual Omni Range/Distance Measuring Equipment (VOR/DME)**

63. Over time there have been three VOR/DMEs installed at BIAP. However, the RAAF assessment of all VOR/DME equipment is that they are out of service. The VOR/DME that has been reported as operational, was last calibrated (flight checked) in 1989; calibration results are not available.

64. This VOR/DME is located outside the aerodrome boundary and was not sighted by the assessment team. There are reportedly insufficient spares for the ongoing maintenance of this equipment. Anecdotal evidence suggests that there are major azimuth errors with the VOR/DME. Power to the VOR/DME is provided from substation 1 which has been destroyed.

65. **Assessment.** All civil VOR/DME equipment at BIAP is out of service.

66. **Recommendations:**
- a. VOR/DME 1 - Assess the most recently operational VOR/DME to ascertain its viability for refurbishment in the short term.
  - b. VOR/DME 2 - Bring into service a VOR/DME (by refurbishment or replacement) in the short term.

### **Safety Oversight**

67. 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. Iraqi CAA ATC personnel advised that such a system was not in place at BIAP.

68. **Assessment.** There is no safety management system in place at BIAP.

69. **Recommendations:**

- a. SAF 1 - Develop a safety management system for the oversight of air traffic control in the short term.
- b. SAF 2 - Implement the safety management system in the medium term.



## EMERGENCY

### References:

- A. ICAO Annex 14 - Aerodromes
- B. ICAO Doc 9137 - Airport Services Manual
- C. IATA Dangerous Goods Regulations

### Medical Facility

70. There are two medical facilities at BIAP:
- a. The Preventative Health Unit, which is located in Terminal C, does not respond to aircraft emergencies, as it is a passenger screening service only.
  - b. The Medical Centre, located behind the Cargo Terminal, responds to aircraft emergencies.
71. Prior to Operation Iraqi Freedom, the Medical Centre was staffed by a team of health professionals of varying levels of competence including three doctors and a dentist. Two ambulances were attached to the medical department; one for aircraft emergencies and another for general medical use. These vehicles were stolen during the hostilities and have yet to be recovered. Communications with the tower was via telephone landline.

72. **Assessment.** There is no medical emergency response capability at BIAP. There is no communication between the control tower and the Medical Centre. **There is no extant Emergency Plan for the aerodrome.**

### Recommendations:

- a. MED 1 - Establish a medical emergency response capability in the medium term.
- b. MED 2 - Develop and implement an aerodrome Emergency Plan in the medium term.
- c. MED 3 - Re-establish effective communications between the control tower and Medical Centre in the medium term.

### Rescue and Fire Fighting (RFF)

74. There are two fire stations at BIAP. The new fire station is located adjacent to the civil runway, and the old station is located beside taxiway P. The new fire station was commissioned in 1982 purely as a fire fighting facility with no rescue capability. The old station was not used between 1982 and 2003 but is being refurbished by the US military to provide services for military aircraft movements.

75. There are three serviceable aircraft fire tenders, two serviceable general purpose fire trucks, and four others in varying states of disrepair.
76. Communication between the new fire station and tower was via telephone landline. The new fire station has an observation platform, which is fitted with crash alarm, hot line, and firewater activation switch.
77. It should be noted that the US military's fire fighting and rescue capability at BIAP is in place. A CAT 9 capability could be achieved in the short term using predominantly US military equipment.
78. **Assessment.** Currently there is no:
- a. Aircraft fire fighting or rescue capability at BIAP.
  - b. Communications (telephone or hot line) between the control tower and the new fire station.
  - c. Serviceable crash alarm.
  - d. Fire fighting foam.
  - e. Personal protective clothing for fire fighters.
  - f. Emergency plan for the aerodrome.
79. The firemain is not sufficiently pressurized to fight aircraft fires.
80. **Recommendations:**
- a. RFF 1 - Establish a civil fire fighting and rescue capability (to Cat 9) in the medium term.
  - b. RFF 2 - Develop and implement an aerodrome Emergency Plan in the medium term.
  - c. RFF 3 - Re-establish effective communications between the control tower and fire station in the medium term.

## GROUND HANDLING

### References:

- A. ICAO Annex 2 – Rules of the Air
- B. IATA Airport Handling Manual

### Overview

81. BIAP ground handling is configured along the lines of normal international terminals. Baggage is moved by a conveyor system to and from the make-up/break-down areas, and is transported to/from the aircraft on standard GSE. Iraqi Airways officials advised that prior to Operation Iraqi Freedom, there was sufficient serviceable GSE to simultaneously handle up to nine passenger aircraft, as well as the cargo terminal requirements. The lack of ground handling capability post-hostilities has the potential to halt the flow of cargo and passengers through BIAP and should be addressed as a matter of priority.

82. Turn-around servicing includes refueling, provision of ground power, catering, cleaning, water and toilet servicing. Tankers provided refueling services because the hydrant system was never commissioned. The assessment team located eight 40,000 litre tankers at the aerodrome. Although none were serviceable at the time of assessment, a small number may be repaired. Of the 16 GPUs reported as serviceable prior to hostilities, the team located only one serviceable unit. Although aircraft may not require GPUs for turn around, the degradation in this capability is representative of the current poor state of GSE at BIAP. The catering building was completely gutted by fire following occupation by coalition forces. The assessment team did not locate any serviceable catering or toilet servicing trucks and only two serviceable water trucks. The assessment team did not locate any toilet servicing trucks. Only one baggage trolley was found within the aerodrome. Numerous nitrogen cylinders and manifolds were scattered across the aprons; all appeared to be poorly serviced and well out of test date. Additionally, a large number of towbars in various states of serviceability, suitable for a range of aircraft from B727 to Concorde, were scattered across the aerodrome.

83. BIAP has a maintenance facility for GSE and other aerodrome vehicles. The facility sustained some minor structural damage during Operation Iraqi Freedom and much of the cladding was damaged. The infrastructure included two 5000 kilogram overhead cranes (one was unserviceable), three hydraulic vehicle inspection/maintenance jacks (one unserviceable), wheel and battery shops, a store room, and offices. The Iraqi Airways official interviewed stated that up to 60 mechanics of varying levels of competence were employed at the facility. All personnel with Iraqi drivers licences were permitted to drive airside.

84. A list of GSE identified at BIAP during the Assessment visit is at Annex D.

85. **Recommendations:**

- a. GH 1 - Consolidate all GSE in one secure and controlled location in the short term.
- b. GH 2 - Service all GSE and fuel tankers in the short term.
- c. GH 3 - Identify shortfalls in GSE and refuelling capability on completion of initial servicing in the short term.
- d. GH 4 - Acquire additional GSE and tankers in the medium term.
- e. GH 5 - Implement planned maintenance for all GSE, fuel tankers and aerodrome vehicles in the medium term.
- f. GH 6 – Refurbish the GSE maintenance facility in the medium term.
- g. GH 7 - Refurbish and restore in-flight catering in the long term.
- h. GH 8 - Institute an airside licencing program in the medium to long term.

## AIRFIELD INFRASTRUCTURE

### References:

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

### Civil Runway

86. Runway 33R/15L (4000 metres long, 60 metres wide and 7.5 metre asphalt shoulders), was constructed in 1982 and has been used as the sole civil runway since. The runway is marked, and fitted with lights and signage. Runway light switching from the control tower has never been commissioned and is controlled from substations 3 and 10.

87. **Assessment.** The pavement is in good condition with evidence of minor repair work. The US Military Global Assessment Team (GAT) conducted a survey in April 2003 using a Deep Core Penetrometer, and determined a runway PCN of 62. The 7.5 metre asphalt shoulders are in reasonable condition. Runway markings are evident. Approximately 20 percent of runway lighting is unserviceable on 33R. The team was unable to assess the lights on 15L because of the destruction of substation 1 but noted that many lights were damaged. The signage was incomplete and did not comply with ICAO standards. There is no primary windsock and the secondary windsocks need refurbishment. There are no runway strip markings (gable markers - white cones). Some electrical service pits are exposed or collapsed inside the flight strip thereby creating a flight safety hazard. There is also a significant amount of debris scattered within the flight strip adding to the safety hazard.

88. Taxiways S (including S1-6), W and X (width of approximately 30 metres) are associated with the civil runway. 7.5 metre asphalt shoulders line each taxiway. Taxiway markings, signage and lighting are installed. There is one bomb crater on the centreline of taxiway S, 400 metres from the northern threshold (to be repaired by 30 June 2003).

89. **Assessment.** The pavements are in good condition with some evidence of minor repair work. The US Military GAT survey determined a rough PCN of 61 for these taxiways. The 7.5 metre asphalt shoulders are in reasonable condition. Taxiway lighting on taxiway S6 and the northern parts of taxiway S is controlled from substation 1, which has been destroyed. Consequently, these lights are not available. Taxiways W, X and the remainder of S are controlled from substation 3; only 10 to 15% of this taxiway lighting is operable. The signage is incomplete and does not comply with ICAO standards and standard practice. Some electrical service pits beside the taxiways are exposed or collapsed thereby creating a flight safety hazard. There is also a significant amount of debris scattered around the taxiways adding to the safety hazard.

## **Civil Aprons**

90. Aprons B, C and D service the passenger terminals. Docking aids are installed for the aerobridges and there are other parking positions on the aprons. Apron A is associated with the disused passenger terminal and is constructed of concrete, covers approximately 70000m<sup>2</sup>, and provides access to maintenance hangars from all parts of the aerodrome. The apron associated with the Iraqi Airways maintenance hangars is constructed of concrete and covers approximately 60000m<sup>2</sup>. Apron markings, signage and lighting are in place. Floodlighting covers all civil aprons.

91. **Assessment.** The pavements on aprons B, C and D are in good condition. Aprons A and the maintenance apron are in a satisfactory condition. Apron markings are indistinct. Apron edge lighting is inoperable on all aprons on the civil side of the airport. Apron signage is incomplete and does not comply with ICAO standards and established practices. The parking aids are indistinguishable and require refurbishing. Some floodlighting on Aprons B, C and D works; floodlighting on Apron A, and the maintenance apron could not be tested because of the unreliable power supply.

92. **Recommendations:**

- a. CA 1- Repaint civil runways, taxiways and apron markings in accordance with ICAO Doc 9157 – Aerodrome Design Manual in the medium term.
- b. CA 2 -Repair civil runway, taxiway and apron lighting in accordance with ICAO Doc 9157 – Aerodrome Design Manual in the medium term.
- c. CA 3 -Replace all civil runway, taxiway and apron signage in accordance with ICAO Doc 9157 – Aerodrome Design Manual in the medium term.
- d. CA 4 -Refurbish parking aids for apron C in the medium term
- e. CA – 5 Repair service pits and clear debris within the flight strips in the medium term.
- f. CA 6 - Install primary windsocks at the civil runway in the medium term.
- g. CA 7 - Ensure runway, taxiway and apron lighting can be operated from the control tower in the long term.
- h. CA 8 -Refurbish parking aids for apron B and D in the long term.
- i. CA –9 Repair floodlighting in the long term.
- j. CA – 10 Install runway strip markings in accordance with ICAO Doc 9157 – Aerodrome Design Manual in the long term.

### **Old Runway, Taxiways and Aprons**

93. Runway 33L/15R, and all associated taxiways and aprons are being used to support ongoing coalition military operations. They are described in a later section of this report.

94. Advice from the various military commanders interviewed during the assessment of BIAP revealed that these facilities would not be available for civil operations in the medium to long term.

### **Perimeter**

95. Access to the perimeter fence was severely restricted by the ongoing military operations. The assessment team examined several large sections of the fence and noted many large breaches. The fence is constructed with different materials along its length ranging from four metre brick, topped with barbed wire to chain wire. Within the confines of the perimeter fence is a network of wildlife control fences. These fences are ineffective as several goats and dogs were observed running freely across the tarmac throughout the assessment period.

96. There is an extensive service road system within the aerodrome, which is satisfactory for movement of vehicles. The perimeter road is in various states of disrepair but is passable in its entirety for four-wheel drive vehicles.

97. **Recommendations:**

- a. PF 1 - Repair all wildlife control fences in the short term.
- b. PF 2 - Repair perimeter fences in the long term.
- c. PF 3 - Repair perimeter road in the long term.

## CARGO HANDLING

### References:

- A. ICAO Annex 17 – Security
- B. ICAO Annex 18 – Safe Transportation of Dangerous Goods by Air
- C. IATA Dangerous Goods Regulations
- D. IATA Airport Handling Manual

### Cargo Terminal – General Condition

98. The cargo terminal is situated adjacent to taxiway S2 towards the South Eastern end of the civil runway. The complex consists of a terminal, of approximately 4000m<sup>2</sup> floor space, fronted by an apron, and backed by a vehicle docking area. The terminal has the following features:

- a. Two cold storage areas of approximately 270m<sup>2</sup> within the terminal building.
- b. A secure bonded area of approximately 400m<sup>2</sup>.
- c. A large three-tiered cargo stacking system.
- d. An electronic cargo transfer (ETV) system with three receiving stations.
- e. Close circuit security camera system.
- f. Expansive office spaces on the mezzanine level.
- g. 12 five tonne scales at the vehicle docking stations (two at each dock).
- h. A plant room for air conditioning and fixed fire fighting system.
- i. A Ground Support Equipment (GSE) storage area.
- j. Flood lighting for the apron and vehicle docking stations.
- k. In-ground hydrant refueling system.

99. **Assessment.** The terminal building is structurally sound but has extensive battle damage to the exterior cladding. There was limited power and no water and sewerage supply to the building. The cold storage areas were not tested but should be functional after servicing. Only one of the many security cameras is serviceable. The fixed fire fighting system requires a complete overhaul. Fire fighting stations were denuded of equipment. The five-tonne scales were not tested, nor have they been calibrated. Although the air conditioning was reported to be working, there were several large leaks in the system. There is no security screening equipment. Although there are no defined Dangerous Goods (DG) and Hazardous Material (HAZMAT) storage areas, there is sufficient space to cater for this requirement. Furthermore there are no



DG and HAZMAT procedures in place. The ETV is unserviceable but the assessment team concludes that it is recoverable after overhaul and maintenance. The storage racks and cages are in good condition.

100. **Recommendations:**

- a. CTML 1 - Install security screening equipment to comply with ICAO Annex 17 – Security in the medium term.
- b. CTML 2 - Establish DG and HAZMAT storage areas and develop handling procedures in accordance with both IATA DG Regulations in the medium term.
- c. CTML 3 - Service and overhaul the following in the short to medium term:
  - i. Power, water and sewerage.
  - ii. Cold storage areas.
  - iii. ETV system.
  - iv. Close circuit security camera system.
  - v. Five tonne scales.
  - vi. Air conditioning.
  - vii. Fixed fire fighting system.

**Cargo Apron**

101. The apron covers an area of approximately 27000m<sup>2</sup> and is capable of accommodating up to three MD11 aircraft.

102. **Assessment.** The pavement is in good 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. Although installed in 1982, the hydrant refueling system has never been set to work and is unserviceable. There are no eye-washes, deluge showers or fuel spill functionality built into the cargo terminal infrastructure. There is considerable debris scattered around the edges of the apron.

103. **Recommendations:**

- a. CA 1 - Clear debris in the short term to comply with ICAO Annex 14 - Aerodromes.
- b. CA 2 – Re-establish the power supply in the short term.
- c. CA 3 - Install a deluge shower and eye-wash in the short term.
- d. CA 4 - Refurbish apron signage, light and markings in accordance with ICAO Annex 14 – Aerodromes in the medium term.

- e. CA 5 - Service and overhaul the hydrant refueling system in the long term.

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## PASSENGER HANDLING

### References:

- A. ICAO Annex 17 – Security
- B. ICAO Annex 18 – Safe Transportation of Dangerous Goods by Air
- C. IATA Dangerous Goods Regulations
- D. IATA Airport Handling Manual
- E. ICAO Doc 9249 – Dynamic Flight-related Public Information Displays
- F. ICAO Doc 9303 – Machine Readable Travel Documents

### Passenger Terminals – General Condition

104. Passenger handling is conducted in three identical terminals, B - Samara, C - Babylon and D – Nineveh; each with a design capacity to process 2.5 million passengers per year.

105. The terminals are arranged on three/four levels, and are connected by large structures housing shops, cafes and administrative offices. The floor area of each level in the passenger terminals is approximately 9000m<sup>2</sup>. Each level in the connecting structures has a floor area of approximately 2700m<sup>2</sup>. Each terminal has six Thyssen aerobridges, passenger and baggage screening equipment, customs and immigration gates, baggage make-up/break-down areas and carousels, and check-in booths and waiting lounges.

106. At the time of the assessment, utilities connected were limited to an unreliable power supply, with no water and sewerage services. The structure appears sound. A lack of attention since 1991 has led to the deterioration of building services (air-conditioning, fire detection and fighting, lifts) and passenger handling equipment (X-ray machines, metal detectors, baggage handling equipment and aerobridges). There is some damage to plate glass windows, walls and aerobridges caused by small arms and medium calibre weapons during Operation Iraqi Freedom. One bomblet was dropped on Babylon terminal and passed through one floor, ending up in the baggage make-up area (did not explode).

107. Subsequent vandalism and looting has resulted in superficial but extensive damage as follows:

- a. Destruction of furniture.
- b. Looting.
- c. Human waste.
- d. Blocked toilets.
- e. Cosmetic damage.

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108. **Recommendations:**

- a. TML 1 - All terminal buildings are cleaned and utilities restored in the short term.

109. **Terminals B and D.** Since 1991, Terminals B and D have been cannibalised to enable Terminal C to continue functioning. This practice has resulted in a complete gutting of the systems in Terminals B and D, rendering them un-salvageable without a considerable renovation program. Terminal C is considered recoverable if a major servicing program is adopted.

110. **Recommendations:**

- a. TML 2 - Service fire protection systems in all Terminals in the short term.
- b. TML 3 - Service all major systems in Terminal C in the short term.
- c. TML 4 - Completely renovate Terminal C in the medium to long term.
- d. TML 5 - Service all major systems in Terminals B and D in the long term.
- e. TML 6 - Completely renovate Terminals B and D in the long term if passenger throughput warrants.

111. **Flight Information Display System (FIDS).** The ageing Conrac Elektron system, with main and back-up computers, services the three terminals. The back-up computer is unserviceable while the main computer is not reliable. Therefore, flight information cannot be displayed throughout each terminal. It should be noted that prior to the conflict, an interviewee claimed that the Iraqi CAA had signed a MOU to the value of Euro2.5 million for a replacement system. The assessment team could not verify this information, nor was any evidence sighted to support this claim.

112. **Recommendations:**

- a. FIDS 1 - FIDS should be replaced in the medium to long term when passenger volume increases in accordance with ICAO Doc 9249.
- b. FIDS 2 - Determine the status of the MOU in the short term.

113. **Passenger Check-in.** The passenger departure suite consists of 26 check-in counters, each serviced by the French made Teleflex conveyor system. The conveyor system is functioning on manual operation only. All scales are out of calibration and require servicing. Seat allocation and baggage control are manual processes. Customs and immigration checks are also manual processes.

114. **Recommendations:**

- a. PAX 1 - Service the baggage handling conveyor system in Terminal C in the short term.

- b. PAX 2 - Automate the customs and immigration checks in the medium term in accordance with ICAO Doc 9303.
- c. PAX 3 - Upgrade the baggage handling conveyor and seat allocation systems in Terminal C in the long term.
- d. PAX 4 - Upgrade the baggage handling conveyor and seat allocation systems Terminals B and D in the long term if passenger throughput warrants.

115. **Passenger Arrivals.** Each terminal is fitted with three German made Semag baggage conveyor belts. The conveyor system is functioning on manual operation only. The Iraqi CAA claimed that all belts were serviceable on 10 May 03. The assessment team could not verify this claim because of unreliable power supplies. Customs and immigration checks are manual procedures.

116. **Recommendations:**

- a. PAX 5 - Service the baggage handling conveyor system in Terminal C in the short term.
- b. PAX 6 - Automate the customs and immigration checks in the medium term in accordance with ICAO Doc 9303.
- c. PAX 7 - Upgrade the baggage handling conveyor system in Terminal C in the long term.
- d. PAX 8 - Upgrade the baggage handling conveyor system Terminals B and D in the long term if passenger throughput warrants.

117. **Escalators.** All escalators throughout the terminal buildings are unserviceable. 12 new Kone escalators were delivered on 25 January 2003, and are currently located under cover in front of Terminal C. An Iraqi CAA interviewee claimed that payment had been made to Kone for decommissioning and removal of the old system, installation and setting to work of the new escalators, and operator/maintainer training.

118. **Recommendations:**

- a. PAX 9 - Contact Kone and arrange completion of contract in the short term.

119. **Elevators.** 36 Kone elevators are installed in the three terminals, car park and ATC building. The elevators are in various states of serviceability and all require comprehensive maintenance. The assessment team was unable to check operability of all elevators due to unreliable power supplies. Nevertheless, many were observed to be functioning. An interviewee advised that the Iraqi CAA had purchased 12 new Merve brand motor/gearbox sets, which have not yet been installed; the assessment team could not locate these items.

120. **Recommendations:**

- a. PAX 10 - Verify status of Merve elevator motor/gearbox sets.

- b. PAX 11 - Service all elevators in the medium term.

121. **Aerobridges.** Each terminal is serviced by six Thyssen aerobridges, designated B21-26, C31-36 and D41-46. Iraqi CAA interviewees stated that they were all operational in February 2003. The operation of C32 was demonstrated to the assessment team. Nevertheless, the assessment team did not consider the aerobridges to be in a satisfactory working condition. For example, B737 main landing gear tyres had been fitted to some of the items, there is wear and tear on aircraft mating shrouds, and there is some deterioration of electrical cables and exposed perishable components.

122. **Recommendations:**

- a. PAX 12 - Service all Terminal C aerobridges in the medium term.
- b. PAX 13 - Service all Terminal B and D aerobridges in the long term if passenger throughput warrants.

123. **Public Announcement (PA) System.** The PA system was not tested because of power supply problems but was reported by Iraqi CAA interviewees as being serviceable (albeit unreliably) with interference problems. Consequently, the system cannot be relied upon to announce emergencies and therefore represents an unnecessary risk.

124. **Recommendations:**

- a. PAX 14 - Service the PA system in Terminal C in the short term.
- b. PAX 15 - Replace the system in all terminals in the long term.

125. **Airside Roller Doors to Baggage Make-up Areas.** Several roller doors are unserviceable. Therefore, security of baggage under the custody of baggage handlers cannot be ensured.

126. **Recommendations:**

- a. BAG 1 - Repair and/or service all roller doors in Terminal C in the short term.
- b. BAG 2 - Repair and/or service all roller doors in Terminals B and D in the long term if passenger throughput warrants.

127. **Automatic Doors for Passenger Access to Terminal.** There are approximately 46 Beasam automatic doors in each terminal; approximately 50% are unserviceable. This situation represents both a security problem as well as a safety hazard.

128. **Recommendations:**

- a. PAX 16 - Repair and/or service all automatic doors in Terminal C in the short term.
- b. PAX 17 - Repair and/or service all automatic doors in Terminals B and D in the long term if passenger throughput warrants.

129. **Fire Fighting System.** The fire fighting system could not be adequately assessed because of an unreliable power system, the potential damage to other equipment in the vicinity of flooding systems, a lack of water pressure, and a lack of understanding of the affect of testing on the system. The team did however assess that the poor state of fire protection arrangements in the terminals represented an unacceptable risk. Iraqi CAA interviewees advised, or the team noticed the following:

- a. The system is powered by a 48v DC supply
- b. There is sufficient equipment and spares to service one terminal by cannibalising other terminals.
- c. Fire doors are fitted between each terminal – rating unknown.
- d. The terminals are fitted with water sprinklers, which are pressurised by electric-driven pumps. The diesel-driven back-up pumps are unserviceable.
- e. Hose stations and hydrants throughout building are missing important items of equipment such as hoses, couplings, nozzles and portable extinguishers.
- f. There is no gas in the Halon fixed fire fighting systems located in electrical areas.
- g. One fire panel in each terminal is linked to a single panel in Terminal C, which then links to the fire station.
- h. There is no regular testing of the system.
- i. Audible alarms are located throughout terminals.
- j. Three domestic fire trucks are operational.

130. **Recommendations:**

- a. FFS 1 - An appropriately licensed SME be engaged to overhaul and upgrade the entire fire protection system in Terminals B, C and D, as well as the connecting administrative areas in the short term.

131. **Security Screening Machines.** The Scanray Xray screening equipment fitted throughout the terminals are reportedly unserviceable. They could not be tested because of an unreliable power supply. The metal detecting equipment is damaged beyond repair. Unserviceable screening equipment represents a security problem.

132. **Recommendations:**

- a. PAX 18 - Carry out random searches in the short term.
- b. PAX 19 - Install new security screening equipment in Terminal C in the medium term
- c. PAX 20 - Install new security screening equipment in Terminals B and D in the long term if passenger throughput warrants.

133. **Car Parking.** There is a 1000 vehicle car park supporting the passenger terminals.

134. **Recommendations:**

- a. PAX 21 - Clean the car park in the short term.



## GENERAL INFRASTRUCTURE

### Hangars

135. There are four hangars and associated workshops at BIAP. Access to the hangar at the old side of the aerodrome was denied by the US military. The remaining three civil hangars are known as “old”, “new no. 1” and “new no. 2” and are operated by Iraqi Airways. The workshop facilities are extensive and include brake and wheel, avionics, upholstery, sheet metal and painting areas. There is also a spare parts warehouse. Iraqi Airways employs 200 aircraft engineers and 400 aircraft technicians, some trained by Lufthansa and British Airways.

136. **Assessment.** The facility is capable of maintenance up to D-level servicing on B707, B727 and B737 aircraft, and C-level for B747. The hangars are of steel frame construction, clad in metal sheeting and are structurally sound. Each hangar has its own air-washing, fire fighting water, lighting, compressed air and overhead gantry facilities. All are in various states of disrepair due to a lack of maintenance and spare parts. Each hangar has drainage but the team could not ascertain whether drainage is via the sewerage or storm-water systems. No safety signage is displayed in the hangars. First aid cabinets are installed but are empty. There are no deluge showers or eyewashes, apart from one in “new no. 1” hangar’s paint shop. Specific assessments for each hangar are as detailed in the following paragraphs.

137. **Assessment - Old Hangar.** The old hangar was built in the 1970’s and is capable of D-level servicing for B727 and B737 aircraft. The team could not confirm serviceability of one 10 tonne and two five tonne motorized overhead gantries in the hangar because of the unreliable power supply. The hangar can be fully closed with sliding doors. The 3,200kg goods elevator is unserviceable. Two B747 cargo nose loaders were sighted in the hangar but reportedly have never been used because Iraqi Airways did not operate B747 freighters.

138. **Assessment - Hangar “new no. 1”.** The new no.1 hangar was completed in 1982 and had its cladding replaced in 1994 after being damaged during the 1991 war. It is capable of D-level servicing for B727 and B737 and C-level servicing for B747. The automatic hangar doors can be closed. Nose docks are fitted and serviceable; side and tail docks are installed but unserviceable. Two 10 tonne overhead gantries are unreliable. The hangar is fed by an underground 400Hz power supply for aircraft maintenance; the system is unserviceable and a mobile 400Hz supply is used in lieu. The Iraqi Airways SME advised that a MOU has been signed for the supply of five mobile 400Hz carts but the assessment team could not verify the status of this agreement. The air-conditioning system for aircraft in the hangar is unserviceable. Fitted fire fighting equipment includes six water cannons connected to the fire main, and one portable dry chemical trolley. The water cannons could not be tested because of a lack of pressure in the fire main. The dry chemical system was in poor condition.

139. **Assessment - Hangar “new no. 2”.** Construction identical to “new no. 1” but never fitted out for full aircraft servicing; it is basically a shed.

140. **Assessment - Workshops.** Workshops appeared to be fit-for-purpose with adequate tooling. The avionics and electrical workshops were cleaned by the US military and appear to be in good condition. The following workshops (all within new no.1 hangar) are in a reasonable condition, the only concern being serious flaws in workplace safety:

- a. Wheel/brake shop.
- b. Sheet metal shop.
- c. Paint shop – no drying capabilities, no extraction fans, no paint/water separation, only one safety shower, no personal protective equipment.
- d. Upholstery shop.

141. **Assessment – Spare Parts Store.** A separate spare parts store was also assessed. Iraqi Airways staff advised that inventories are available; however the assessment team received conflicting advice on this point. A fixed fire fighting sprinkler system was installed approximately six months ago but has not yet been set to work.

142. **Recommendations:**

- a. HNGR 1 - Erect appropriate safety signs, install appropriate first aid equipment, deluge showers and eyewashes in the short term.
- b. HNGR 2 - Service gantries and elevators in the medium term.
- c. HNGR 3 - Verify status of the MOU for the supply of mobile 400Hz power supplies in the medium term.
- d. HNGR 4 - Service all utilities including fire fighting and air washers in the medium term.
- e. HNGR 5 - Service the aircraft air conditioning system in the long term.
- f. HNGR 6 - Service the side and tail docks in the long term.
- g. HNGR 7 - Inventory spare parts in the long term.
- h. HNGR 8 - Refurbish and render safe the paint shop in the long term.

## **Refueling**

143. The Iraqi Ministry of Oil is reportedly responsible for fuel supply and the fuel farm. No contact was made with the Ministry despite the best efforts of the assessment team. Iraqi CAA authorities consulted advised that aircraft are fuelled using Air Iraq tankers and not the underground hydrant system. Three areas of fuel distribution were inspected:

- a. The diesel/mogas station filling station for airport vehicles.
- b. The jet fuel filling station for tankers.

- c. The fuel farm, which was designed to service 25 underground hydrants at Aprons B, C and D, as well as the cargo apron.

144. **Diesel/Mogas Station.** The diesel/mogas station is set up in the style of a conventional commercial fuel station, with 12 bowsers, and is used for refueling airport service vehicles including GSE. The four underground 10,000 litre mogas tanks, and two underground 10,000 litre diesel tanks are empty.

145. **Assessment.** The station is unserviceable, with all pumps damaged. This is of major concern as all GSE and jet fuel tanker trucks require diesel or mogas to operate.

146. **Recommendations:**

- a. POL 1 - Bring two mogas and two diesel pumps (bowsers) into service in the short term.
- b. POL 2 - Increase bowser capacity in line with demand in the medium to long term.

147. **Jet Fuel Filling Station for Tankers.** The jet fuel filling station is located near Apron A. Jet fuel is pumped from the main fuel farm to tankers via the filling station. The only advantage this station has over the fuel farm pumps is that it is closer (5 minutes by road) to the apron than the main fuel farm and pumps. The fuel station is fed by an 17cm line from the fuel farm and can service two tankers at a time. The fuel farm pumps are fed by a 44cm header and can service three tankers at a time.

148. **Assessment.** The station is unserviceable and dangerous with many hazardous area electrical fittings missing or damaged. There is no requirement to reinstate the jet fuel filling station because tankers can be filled at the main fuel farm.

149. **Recommendations:**

- a. POL 3 - Decommission the jet fuel filling station in the short term.

150. **Fuel Farm.** The fuel farm comprises three 3,500m<sup>3</sup> (estimated) jet fuel storage tanks, which are approximately half full, and two underground 10,000 litre AVGAS tanks, which are currently filled with what appears to be diesel fuel. The jet fuel tanks have concrete wall construction. The assessment team could not determine if they feature a steel inner tank or are lined/painted. AVGAS tanks are buried steel tanks fitted with level instrumentation. The installation includes facilities for pumping fuel from tankers into storage tanks, fuel to tankers, and transferring fuel to the jet fuel filling station. There is a valve station with pig catcher, reportedly connecting the tank farm to an external supply at Daura (approximately 25 kilometers from the aerodrome). Discharge pumps are located in a single underground area. Connection to tankers is with "Buckeye" brand couplings. Switchgear for the fuel pumps is located below the control room. A diesel generator located next to the switch room provides backup power for the fuel farm. The switchgear is protected by a halon fire suppressant system. There is a fixed fire fighting system for the farm and pump room, which apparently comprises two independent distribution circuits. Two fire mains, believed to be independent systems, surround the entire fuel farm. The fire fighting system services above and below ground facilities.

151. **Assessment.** On the basis that a B747 carries 200 tonnes of fuel, the fuel farm at BIAP is capable of supporting about 50 B747s. Further analysis of fuel requirements is dependent upon rates of effort and aircraft types. The team could not test the fuel farm because of the lack of power to the installation, the unknown capability of the fire suppressant systems, and because the team could not confirm that the electrical equipment had been installed correctly. The USAF had tested (in Qatar), a two gallon sample from each jet fuel tank and reports indicated the fuel met specifications; the team did not sight the reports. The contents of the AVGAS tanks have not been tested. Although no certificates were located, electrical equipment appears to be suitable for the hazardous area. All equipment (pumps, valves and instruments) is fitted with equipment tags (eg PD146) and this numbering is carried through to the starter panels (adjacent to substation 11) and the control panel. The switch room and control panel are in very good condition with no signs of wear and tear. Halon pressure gauges indicate the tanks are full. Hour-run meters for pumps ranged from 200-3000 hours although the accuracy of these readings cannot be verified. Many fire hoses and fittings are missing or perished. The assessment team could not determine if a fuel QC system was in place. Overall, the fuel farm appeared to be in good condition.

152. **Recommendations:**

- a. POL 4 - Conduct a safety check of the fire fighting systems installed in the short term.
- b. POL 5 - Conduct a safety check of the hazardous area electrical equipment in the short term.
- c. POL 6 - Re-commission the fuel farm to meet the projected demand from airport in the short term.
- d. POL 7 - Establish a fuel QC system in the short term.
- e. POL 8 - Establish maintenance routines in the medium term.

**Telephones**

153. There is a telephone system installed in the aerodrome. Public phone booths are located in the passenger terminals.

154. **Assessment.** The assessment team did not identify any serviceable phones and noted that handsets were not fitted to all public phone booths in the passenger terminals. The US Military is addressing the restoration of the phone system and is also installing a GSM network, to be operating by late May 2003.

155. **Recommendations:**

- a. COMS 1 - Install a phone system of approximately 100 lines in the short term.
- b. COMS 2 - Expand the phone system to off-field exchange in the medium term.

## UTILITIES

### Potable Water

156. The potable water system provides water for drinking, as well as to amenities in the terminal buildings, ATC building, VVIP building, new fire station, GSE fuel station, cargo terminal building and central plant room. The potable water system consists of three systems termed “old”, “new” and “military”. The “military” system is no longer used. The “old” system includes a pump house containing 14 pumps, some of which are reported as pumping water off the airfield site to surrounding communities. Drawing number 14001 shows the basic layout of the “new” system, and location of reservoirs. There are two pumps in the pump station supplying potable water to a 21 metre water tower (estimated capacity of 120m<sup>3</sup>). The potable water is gravity fed throughout the airfield.

157. **Assessment.** The assessment was carried out in conjunction with the US Army’s 94<sup>th</sup> Engineer Battalion and Iraqi CAA SMEs. Tests on the “old” reservoir reveal high quantities of coli form. Both the Iraqi SME and 94<sup>th</sup> Engineer Battalion have advised that the “new” system is operational. The water tower was full at the time of inspection. The 94<sup>th</sup> Engineer Battalion also advised that seven of the 14 pumps in the “old” pump station are operational. Due to power problems, operation of the pumps in the old pump station could not be verified. The old pump station also contained several spare parts for pumps and a complete new pump set (with motor) rated for 300m<sup>3</sup>/hr at 70m head. Several leaks have been detected in the underground system and most have been repaired. The system is reported as mechanically and electrically functional by the 94<sup>th</sup> Engineer Battalion but doubts about the quality of water from Baghdad and in the reservoir has delayed distribution of potable water. A summary of the pumps for the new system is as follows:

158. Pump Station 14BIS (new system)

Potable water electric-motor driven pump 1	4” x 3” centrifugal pump driven by 37kW, 380 V 1,450 rpm motor. 4 bar discharge pressure, delivering water to top of adjacent water tower. When in automatic operation, a level controller starts the pump.
Potable water electric-motor driven pump 2	4” x 3” centrifugal pump driven by 37kW, 380 V 1,450 rpm motor. 4 bar discharge pressure, delivering water to top of adjacent water tower. When in automatic operation, a level controller starts the pump. Witnessed pump operating in manual mode.
Chlorine dosing system	In dismantled state and unserviceable.

159. **Recommendations:**

- a. WAT 1 - Repair leaks in the piping system in the short term.
- b. WAT 2 - Repair all pumps in the short term.
- c. WAT 3 - Chemically treat water in old system reservoirs to ensure water is potable in the short term.
- d. WAT 4 - Clean piping system in the short term.

- e. WAT 5 - Engage a SME to conduct a comprehensive review of the potable water system at BIAP in the medium term, and implement the required improvement program.
- f. WAT 6 - Establish maintenance and testing routines for the system in the medium term.
- g. WAT 7 - Procure an adequate supply of spare parts in the long term.

### **Water Treatment**

160. Two types of water treatment are used at BIAP to ensure water is drinkable, and to ensure water used for services (for example chilled water, hot water, cooling water, fire fighting water) is treated to prevent corrosion. There are 18 (nine duty, nine standby) water treatment packages installed in various locations around the airport, including the central plant room, the ATC plant room, and in the potable water pump house.

161. **Assessment.** Trade sanctions have limited the supply of chemicals for water treatment, and coli form has been found in one potable water reservoir. Water treatment equipment has not operated for several years, and is in a state of disrepair. Spare parts and chemicals are required to restart the water treatment systems.

162. **Recommendations:**

- a. WAT 8 - Test and treat water contained in potable water reservoirs to ensure water is fit for human consumption in the short term.
- b. WAT 9 - Test water in other systems and determine necessary chemical treatment regime in the medium term.
- c. WAT 10 - Engage a SME to conduct a comprehensive review of the water treatment systems at BIAP in the long term, and implement the required improvement program.
- d. WAT 11 - Establish maintenance and testing routines for the system in the long term.
- e. WAT 12 - Procure an adequate supply of spare parts in the long term.

### **Sewerage**

163. The sewerage system provides drainage of sewerage and oily water from the terminal buildings, ATC building, VVIP building, new fire station, GSE fuel station, cargo terminal building central plant room, fuel farm and incinerator. The system includes eight pump stations and routes all sewage to the Baghdad South Karkh Waste Water Treatment Plant as shown in drawing number 14003. There is a sewerage treatment facility within the grounds of BIAP but it has never been set to work.

164. **Assessment.** The assessment was carried out in conjunction with the US Army's 94<sup>th</sup> Engineer Battalion and Iraqi CAA SMEs. The 94<sup>th</sup> Engineer Battalion reported that all pump stations were operational, but this could not be confirmed due to the unreliable power supply. Toilets still remain blocked and unusable despite the fact that the potable water and sewerage systems are working. The motors for the two pumps at the main sewerage pump station have burnt out due to poor quality motor rewinds in Baghdad the US Army's 94<sup>th</sup> Engineer Battalion advised that the pumps had been operational until 14 May 2003.

165. **Recommendations:**

- a. WAT 13 - Rewind pump motors or purchase new motors for main pump station in the short term.
- b. WAT 14 - Clear blockages in all toilets in the short term.
- c. WAT 15 - Establish maintenance and testing routines for the system in the long term.
- d. WAT 16 - Procure an adequate supply of spare parts in the long term.

## **Power**

166. Power to the aerodrome is supplied through four cables from Baghdad, three of which are 33kV (the new system) and one is 11kV (the old system). Emergency power supply is provided by a series of diesel powered generators located throughout the aerodrome. The 33kV cables feed into the "Main Station" and are reduced to 11kV by three 22MVA transformers, which connect to a common busbar. The 11kV cable enters "Station 14" and connects to a separate busbar. An 11kV cable between these two stations can transfer 11kV power from Station 14 to the Main Station. Generally, the Main Station serves the civil side and infrastructure, while Station 14 serves the old side (military side). The Iraqi SME advised that the Main Station distributes power to 12 substations, including substation 3 (ATC tower - civil taxiway lights), substation 1 (destroyed - civil runway lights), and substation 10 (civil runway lights). The Iraqi SME advised that Station 14 distributes power to four substations, including substation A (military runway lights), substation B (military taxiway lights) and substation C (military taxiway lights).

167. **Assessment.** There is no reliable power to the aerodrome from Baghdad because the cables have been severed. The US Army's 94<sup>th</sup> Engineer Battalion is currently working to restore full, reliable power to the airfield. Their work includes sourcing splice joints for the main incoming cables, and restarting diesel generator sets. Work on the generator sets is complicated due to lack of maintenance and limited spare parts. Restoration of full power via the 33kV and 11kV feeders from Baghdad cannot be relied upon until the cables are re-joined and a secure, dependable power supply is available from Baghdad. Standby and portable generators are being used to power the airport. Due to poor maintenance and a lack of spare parts, many of the standby and portable generators are not in a 'ready-to-run' condition.

168. **Assessment – Main Station.** The following equipment is located in the Main Station:

- a. Three 22MVA 33/11KV step-down transformers (Metz of France), which were reported as operational by Iraqi SMEs in March 2003.
- b. Two 11,000/380 V step-down transformers for 380V power distribution in immediate vicinity, reported as operational by Iraqi SMEs in March 2003.
- c. Three 3.5MVA diesel powered generator sets comprising:
  - i. Alsthom Unelec alternator.
  - ii. Cockerill 16-cylinder diesel engine.
- d. Genset #1: Diesel engine has blown turbocharger but reported as operational by Iraqi SMEs in March 2003.
- e. Genset #2: Witnessed operating (on 15 cylinders) when 249<sup>th</sup> Engineer Battalion started the equipment.
- f. Genset #3: was reported as operational by Iraqi SMEs in March 2003. This conflicts with the views of the 249<sup>th</sup> Engineer Battalion who believe it had been “years” since the equipment last ran. The 249<sup>th</sup> Engineer Battalion has ordered parts for the water pump from Cockerill in Belgium.
- g. A 16-tonne gantry crane can be used for maintenance.

169. **Assessment – Station 14.** Station 14 contains two 2.5 MVA diesel powered generator sets comprising:

- a. Siemens alternator.
- b. Deutz 16-cylinder diesel engine.
- c. Each item shows less than 100 hours on hour-run meters.
- d. Assessment team witnessed both items running independently but a lack of maintenance and spare parts means that these engines are currently not 100% reliable.

170. **Assessment - Uninterruptible Power Supply (UPS) for Air Traffic Management.** There are several UPS for air traffic management located on the ground floor of the ATC building. Equipment inspected by the assessment team includes the following:

- a. 48VDC emergency outlets for ATC consoles - new system installed January 2003, and reported by RAAF as good for 12 hours on battery supply.
- b. 24VDC for radio emergency system. The battery bank needs replacement as they drain after approximately 1 hour.



- c. System for remote control of airfield ground lighting control – unable to assess condition because the Iraqi SME was not available.
- d. System for remote control of ILS – unable to assess condition because the Iraqi SME was not available.
- e. The buildings containing glideslope indicators and localizer equipment have their own UPS. These UPS' require new batteries and spare parts.

171. **Summary.** The lack of power for the aerodrome is hampering many activities including the following:

- a. Accurate assessment of electrically powered equipment.
- b. Restarting of equipment.
- c. Reinstatement of ATC systems and equipment.
- d. Reinstatement of safety systems including fire protection systems.
- e. Starting of air conditioning to ensure sensitive instruments do not overheat.
- f. Starting of other utilities.

172. **Recommendations:**

- a. ELEC 1 - Complete repairs on the main power supply lines in the short term.
- b. ELEC 2 - On the basis that the regular power supply is not available from Baghdad, in the short term:
  - i. Restart generators.
  - ii. Install temporary generators for those that cannot be restarted or have long lead times for spare parts
- c. ELEC 3 - Rebuild substation No. 1 in the short term.
- d. ELEC 4 - Purchase batteries for UPS in the short term.
- e. ELEC 5 - Establish regular maintenance on all existing power generation equipment in the medium term.
- f. ELEC 6 - Establish an adequate supply of spare parts and consumables (oil, filter elements etc) for existing equipment in the medium term.
- g. ELEC 7 - Engage a SME to conduct a comprehensive review of the power utilities at BIAP in the medium term, and implement the required improvement program.

## **Air Conditioning**

173. Air-conditioning is typically provided by pumping chilled and hot water to air handling units in each building. The Central Plant Room houses the refrigeration plant and boilers for the main terminal building. The ATC building has its own plant room. There are also many small room air-conditioners provided in locations that have sensitive electronic equipment. The equipment in the Central Plant Room is in good condition; the maintainer has looked after this area very well and it suffers only from the effects of trade sanctions where spare parts could not be sourced. The remaining air-conditioning equipment is run down and requires considerable maintenance effort or total replacement.

174. **Central Plant Room.** The Central Plant Room is located to the south of the main terminal building, and is in excellent condition. The Central Plant Room is a completely enclosed brick building with the refrigeration equipment and boilers on the ground floor, and pumping equipment in the basement. A mezzanine level contains offices and the Central Control Monitoring System (CCMS). It includes the following:

- a. Four refrigeration packages for producing chilled water.
- b. Two fuel-oil boiler packages for producing hot water.
- c. Four fuel-oil storage tanks outside the central plant room.
- d. Chilled and hot water pumps for distributing water to the air handling units.
- e. Evaporative coolers for condenser water for refrigeration equipment (located adjacent to the building).
- f. Demineralised water, chemical treatment and water softener packages.
- g. Instrument air package for compressed air for pneumatic control valves.
- h. 16 tonne gantry crane for maintenance.

175. **Refrigeration.** The main refrigeration plant comprises four (three duty, one stand-by) Carrier 17CB packaged centrifugal chillers driven by 1.69MW, 11kV Alsado electric motors. Power supply to the auto-transformer starters is from substation 7. A bank of evaporative coolers, two per chiller package, cools 1,080m<sup>3</sup>/hr of condensing water for each chiller. Each cooler has six fans, driven via belt drives from electric motors. Many belts for fan motors were missing from the evaporative coolers. The Iraqi SME advised that they can be sourced in Baghdad. The mist eliminators on the evaporative coolers were in poor condition; again the SME advised that they can be sourced in Baghdad. A closer inspection identified new eliminators adjacent to the condensers but these had not been installed. The Iraqi SME commented that the evaporative coolers were undersized for the chiller packages and would be inefficient. The assessment team noticed that the water piping to and from the evaporative coolers is uninsulated, and the system would benefit from insulation on the piping outside the

Central Plant Room. Trade sanctions have prevented the import of chemicals for water treatment and this has led to the deterioration of the evaporative coolers. However, it is noted that one refrigeration package was reported as operating in March 2003 so there must be capacity in the coolers. The Iraqi SME advised that approximately 7,000kg of refrigerant R114 had been delivered to the airport in early 2003 but its current location is unknown. Details of the chiller packages are as follows:

Item	#1	#2	#3	#4
<b>Make</b>	Carrier	Carrier	Carrier	Carrier
<b>Model</b>	17CB88	17CB88	17CB88	17CB88
<b>Serial No</b>	01473	01468	01465	01476
<b>Refrigerant</b>	R114	R114	R114	R114
<b>Suction °C</b>	+4	+4	+4	+4
<b>Condensing °C</b>	+32	+32	+32	+32
<b>Capacity, TonR</b>	1,700	1,700	1,700	1,700
<b>Chilled Water Supply °C</b>	+6	+6	+6	+6
<b>Chilled Water Return °C</b>	+10	+10	+10	+10
<b>Motor Make</b>	Ansaldo	Ansaldo	Ansaldo	Ansaldo
<b>Voltage</b>	11kV	11kV	11Kv	11kV
<b>Motor Speed, rpm</b>	2,976	2,976	2,976	2,976
<b>Motor Power, kW</b>	1,690	1,690	1,690	1,690
<b>Assessment Condition</b>	Shut down in 1998, Requires actuator for vanes, compressor drive end thrust bearings and motor journal bearings.	Controlled shut down in Nov 2002.	Controlled shut down in Nov 2002.	Controlled shut down in March 2003. Requires actuator for vanes and motor journal bearings.

176. **Recommendations:**

- a. ACON 1 - Provide and fit spare parts to restart two chiller packages (one duty, one standby) in the short term.
- b. ACON 2 - Drain and isolate other packages and seal with dry nitrogen in the short term for long term preservation.
- c. ACON 3 - Implement maintenance schedule in accordance with manufacturers recommendations in the short term.
- d. ACON 4 - Obtain spare parts including consumable items, lubricants and refrigerant in the short term.
- e. ACON 5 - Start the third and fourth chiller packages as airport use increases in the medium to long term.
- f. ACON 6 - Conduct de-bottlenecking study and plan for major overhaul in the long term.

177. **Chilled Water Pumps.** There are four chilled water pumps (three duty, one standby) in the basement of the Central Plant Room. The Iraqi SME advised that there is one spare motor requiring new bearings. Although The Iraqi SME advised that pumps #1, #2 and #3 are working, and the motor for #4 has been sent to Baghdad for a rewind, the assessment team could not confirm operation because of the unreliable power supply. It was noted that all motors had been rewound and upon return, they

operated less efficiently and at higher temperatures compared with the original windings. The Iraqi SME advised that bearings for the pumps and motors are available in Baghdad, but are not of the same quality as the original equipment supply. Details of the chilled water pumps are as follows:

Make: Salmson, France  
Type: Centrifugal  
Model: 300.450 B5  
Suction: 16"  
Discharge: 14"  
Motor: 200kW, 4 pole, 380 V

178. **Recommendations:**

- a. CWAT 1 - Implement maintenance schedule in accordance with manufacturers recommendations in the short term.
- b. CWAT 3 - Obtain spare parts in the medium term.

179. **Hot Water Pumps.** There are five hot water pumps (four duty, one standby) in the basement of the Central Plant Room. The Iraqi SME advised that pumps #2, #3 and #4 are functional, but #1 has a crack in the shaft. The assessment team could not confirm operation because of unreliable power supplies.

180. **Recommendations:**

- a. HWAT 1 - Implement maintenance schedule in accordance with manufacturers recommendations in the short term.
- b. HWAT 2 - Repair/replace #1 pump shaft in the medium term.
- c. HWAT 3 - Obtain spare parts in the medium term.

181. **Boilers.** There are two (one duty, one standby) 30MMBtu/hr (approximately 8.7MW) fire-tube fuel oil boilers on the ground floor of the Central Plant Room. The boilers provide hot water for the air-handling units for the main terminal building for heating in winter. Water is heated from 70°C to 90°C at a rate of 900m<sup>3</sup>/h. Hot water for amenities for the airport is provided by seven electric heaters (unsighted) located throughout the airport. The Iraqi SME advised that both boilers were operating in February 2003, although unserviceable photocells for the pilot flames prevents automatic ignition.

182. **Water Softeners.** There are two Hydrex of France cation-anion exchange water softeners (one duty, one standby). These have not been operating due to lack of spare parts for the pneumatically operated solenoid valves.

183. **Recommendations:**

- a. SWAT 1 - Re-commission to prevent further deterioration of water piping systems in the short term.

184. **Chemical Treatment for Cooling Water.** The assessment team located a chemical dosing package adjacent to the water softeners. There has been no chemical treatment since trade sanctions prevented chemicals from being imported into Iraq.

185. **Recommendations:**

- a. CHEM 1 - Re-commission to prevent further deterioration of evaporative coolers and water piping systems in the short term.

186. **Instrument Air Package.** An instrument air package is located in the basement of the Central Plant Room and provides clean, dry compressed air for pneumatic valves on the refrigeration chillers. The Iraqi SME advised that moisture and oil are present in the instrument air system. This situation will lead to malfunctioning and corrosion of the valves. The SME also advised that the instrument air package was functioning in March 2003.

187. **Recommendations:**

- a. AIR 1 - Clean and dry instrument air system in the short term.
- b. AIR 2 - Check source of oil leak and repair in the short term.
- c. AIR 3 - Fit de-humidifiers in the short term.

188. **Central Control Monitoring System (CCMS).** The CCMS (Honeywell  $\Delta 1000$ ) is located on the mezzanine level of the Central Plant Room. The CCMS monitors alarms from the refrigeration and boiler packages as well as common alarm conditions from other mechanical packages. It monitors approximately 300 input/output signals and limited remote control such as start/stop functions is possible. The Iraqi SME advised that there has been no engineering effort expended on the CCMS since 1992, and the system is "out of order". The assessment team believes that this system has been vandalised. A MOU for a new central processing unit had been established with the Iraqi CAA receiving offers in February 2003. Details and current status of the MOU is unknown.

189. **Recommendations:**

- a. CCMS 1 - Verify that mechanical plant items can operate without CCMS in the short term, and operate plant items from local control panels.
- b. CCMS 2 - Verify that safety related functions such as fire main pressure, can be remote-monitored in the short term.
- c. CCMS 3 - Prepare specification and bill of materials for replacement CCMS in the medium term.
- d. CCMS 4 - Install and commission replacement CCMS in the long term.

190. **ATC Building Plant Room.** Air-conditioning to the ATC building is provided by pumping chilled and hot water to air handling units on each floor. There are three Carrier 19DH centrifugal liquid chillers located in the ground floor plant room that are used for producing chilled water. Three 400kW electrical heaters adjacent to the chiller packages produce hot water. There are also two 40,000 litre (approximate capacity) hot water storage tanks, water treatment equipment and a small compressed air package in the plant room. The Iraqi SME advised that the chillers were operating on refrigerant R11, a substance banned under the Montreal Protocol. One chiller had an opened

compressor casing and missing motor, a second also had an open casing, and it appears that these two packages were cannibalised to keep the third running. The general condition suggests that there is no refrigerant in the system. Some components are missing from the electrical power and control boards. The air-handling units are sound but filters and coils are dirty and require cleaning or replacement. The units were not tested because of the unreliable power supply.

191. **Recommendations:**

- a. ACON 7 - Supply and fit air conditioning units to rooms housing sensitive equipment in the short term.
- b. ACON 8 - Consider replacing the equipment in plant room in the medium to long term.

192. **Other Air-conditioning Plants.** The following summary is taken from information provided by the Iraqi SME. Due to time restrictions, not all the equipment was inspected. Again, lack of power and water prevented start-up of this equipment.

Location	Equipment	Qty
VVIP	Carrier 19DH centrifugal liquid chiller, water cooled, R11, 180 TonR	3
Assorted throughout airport	Carrier reciprocating liquid chiller, water cooled models 30HK, HR, typically 16-100 TonR, R22	12

193. **Recommendations:**

- a. ACON 9 - Install air conditioning in ILS and VOR/DME equipment buildings in the short term.
- b. ACON 10 - Assess, repair or replace air conditioning in each area and its criticality to ATC and safety in the medium to long term.

**Fire Fighting Water**

194. The fire fighting water system services the terminal, ATC, cargo and VVIP buildings, fuel farm, new fire station, diesel/mogas station, and central plant room. The fire fighting water system consists of two pump stations, an underground piping system, and fixed sprinkler systems and hydrants in buildings. Drawing number 14002 shows the basic layout of the piping system, and location of reservoirs and pumps. Two sets of pumps are located in adjacent stations, designated “14” and “14BIS”. Each set comprises one jockey pump, one electric motor driven pump, and one diesel driven pump. The pumps draw water from one of two 4,500m<sup>3</sup> potable water reservoirs. A single pipe from Baghdad supplies both reservoirs. All pumps discharge into a common header for distribution around the airport.

195. The assessment was carried out in conjunction with the US Army’s 94<sup>th</sup> Engineer Battalion and Iraqi CAA SMEs. There is one major break in the underground piping feeding the new fire station. The assessment team identified leaks in the terminal building and has no confidence in the integrity of the firemain. The 94<sup>th</sup> Engineers continue to repair leaks. The unreliable power supply, coupled with a

subsequent lack of firemain pressure prevented a full examination of the leaks. Looting and vandalism of hoses, fittings and portable extinguishers has further degraded the fire fighting system. A summary of pumps is as follows:

Pump Station 14

Item	Description
Firewater jockey pump	Missing, sent to repair company in Baghdad Jan/Feb 2003 for service. Current status unknown. SMEs interviewed stated original pump maintained firemain pressure at 8bar.
Firewater electric-motor driven pump	Pump is 6" suction, 5" discharge, by Nyhuis of Holland, to start if firemain pressure dropped below 8bar, for example if a hydrant was opened. Original motor was 90kW, 2,900rpm, and the pump pressurised mains to 10bar. However motor has been rewound and operates at high temperature. Iraqi SMEs have fitted a temporary 75kW, 1,450rpm motor that can hold the firemain pressure at 4bar. Assessment team witnessed this pump running at 4bar discharge pressure.
Firewater diesel-driven pump	Pump is 6" suction, 5" discharge, by Nyhuis of Holland, to start if electric-motor driven pump could not hold mains pressure. Iraqi SMEs advised Cummins diesel engine last operated in 1997/1998 and requires overhaul.

Pump Station 14BIS

Item	Description
Firewater jockey pump	Original pump missing, location unknown. Iraqi SMEs have fitted temporary pump (multistage Ebsray model 50M3SM, 3 bar discharge) driven by 2.2kW, 1,450rpm motor. Original motor power was 9kW, and design discharge pressure 8bar, so this pump cannot hold system at original design capacity.
Firewater electric-motor driven pump	Pump is 6" suction, 5" discharge, by Nyhuis of Holland, to start if firewater mains pressure dropped below 8bar, ie if a hydrant was opened. Motor fitted is 90kW, 2,900rpm, and Iraqi SMEs ran pump in manual mode, but lack of water prevented pump from loading up.
Firewater diesel-driven pump	Pump is 6" suction, 5" discharge, by Nyhuis of Holland, to start if electric-motor driven pump could not hold mains pressure. Cummins diesel sent to IBN Al Rushed in Baghdad in March 2003 for service. Current status unknown

196. Recommendations

- a. FF 1 - Repair leaks in piping and sprinkler systems in the short term.
- b. FF 2 - Repair or replace all pumps to meet design specifications in the short term.
- c. FF 3 - Refurbish all fire fighting hose stations in the short term.
- d. FF 4 - Install a control system to allow for operation of valves and pumps in automatic modes, as well as to allow for fire detection in the medium term.
- e. FF 5 - Establish routine for testing system regularly in the medium term.

- f. FF 6 - Install fire detection and annunciation system in the medium term.
- g. FF 7 - Review building codes to ensure that the aerodrome complies with relevant national standards in the long term.
- h. FF 8 - Establish maintenance routines and an adequate supply of spare parts in the long term.

### **Cleaning Services**

197. Prior to hostilities, Al Mullah cleaning company provided cleaning services to the aerodrome. The Director (designate) of BIAP, Mr Mohammed Auda advised that Al Mullah's services would be sought in the near future. The aerodrome's incinerator was reported as unserviceable; the assessment team did not inspect the incinerator.

198. **Recommendations:**

- a. SAN 1 - Engage the services of a cleaning contractor in the short term.
- b. SAN 2 – Implement a daily waste pick up service from waste consolidation points.
- c. SAN 3 - Burn all rubbish off site in the short to medium term.
- d. SAN 4 - Repair/replace incinerator in the medium term.

### **Storm Water**

199. Storm water is collected and drains to a pump station. The storm water pump station is fitted with a duty and a standby pump. Although the US Military's 94th Engineer Battalion has assessed both pumps as operational, the assessment team could not confirm this fact due to unreliable power supplies.

200. **Recommendations:**

- a. SAN 5 -Establish maintenance routines and an adequate supply of spare parts in the long term.



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## ENVIRONMENTAL CONSIDERATIONS

### Environmental Impact

201. **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.

202. **Recommendations:**

- a. SEW 1 - Verify as-built configuration of sewerage collection system in the short term.
- b. SEW 2 - Procure fuel spill kits for apron use in the short term.
- c. SEW 3 - Confirm that the system can separate oily water in the medium term; install system if required.

203. **Aircraft Systems Fluids**. Hydraulic fluid, engine oils and fuels need to be disposed during aircraft maintenance. The assessment team noted open drains installed in hangars, but were unable to confirm whether these drained into a specific recovery system.

204. **Recommendations:**

- a. SEW 4 - Confirm adequacy of drainage system to separate, collect and treat contaminants in the short term.
- b. SEW 5 - Upgrade drainage as required in the medium term.

205. **Noise**. Aircraft noise from airfield operations has no impact on the population because the airfield is 20 kilometres from Baghdad, and there are no significant residential areas in the vicinity.

206. **Waste**. The Iraqi CAA had previously contracted cleaning and waste disposal to an external party.

207. **Recommendations:**

- a. SEW 6 - Renew cleaning and waste disposal contract in the short term.

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

209. **Recommendations:**

- a. UXO 1 - Deny access to areas where UXO searches have not been conducted.

210. **Dust**. The aerodrome is located in a dusty environment and is exposed to regular dust storms. Dust restricts visibility, and may damage sensitive equipment.

211. **Recommendations:**
- a. DUST 1 - Prohibit vehicle movement on unsealed surfaces in the short term.
  - b. DUST 2 - Seal buildings to restrict ingress of dust in the medium term.
  - c. DUST 3 - Establish positive pressure in room housing sensitive equipment in the medium term.
  - d. DUST 4 - Regenerate vegetation or seal areas between runways, taxiways and adjacent areas in the long term.
212. **Heat.** The reliability and calibration of sensitive equipment is compromised by extreme heat, which in turn, affects aircraft safety. BIAP's employees and customers need relief from the extreme temperatures (up to 60°C)
213. **Recommendations:**
- a. Air condition all compartments housing sensitive equipment in the medium term.
  - b. Air condition domestic areas and provide adequate hydration facilities throughout the aerodrome in the medium term.
214. **Animals.** The assessment team observed uncontrolled wildlife (goats, dogs and cats) within the airfield perimeter.
215. **Recommendations:**
- a. FEN 1 - Repair perimeter fences in the short term.
  - b. FEN 2 – Implement boundary fence monitoring to maintain perimeter fence integrity.
216. **Foreign Object Damage (FOD).** Aircraft movement areas are littered with debris capable of causing FOD.
217. **Recommendations:**
- a. FOD 1 - Clear apron and aircraft movement areas of debris in the short term.
  - b. FOD 2 - Sweep apron areas on a regular basis.
218. **Foul Ground.** The use of field toilets during the hostilities will continue to present a potential environmental and medical hazard.
219. **Recommendations:**
- a. SAN 6 - Replace field toilets with chemical facilities in the short term.
  - b. SAN 7 - Identify foul ground with signage and appropriate barriers in the short term.
  - c. SAN 8 - Treat foul ground in the medium to long term.

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

### Local and International Airport Requirements

220. 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:

- a. 1982-1990. The aerodrome was ICAO compliant.
- b. 1991-2000. The aerodrome did not handle any flights, and compliances, licences, procedures and adherence to local requirements lapsed.
- c. 2000-2003. Although the aerodrome operated approximately four flights daily during this period, there was no evidence to indicate a proactive approach to regaining ICAO certification.

### Leases and Agreements

221. Despite the best efforts of the assessment team to locate any documented evidence of ordinances, leases, agreements, laws and regulations, none were identified.

222. A search of the extensive library at BIAP (Terminal C) failed to locate any reference to these types of documents. 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 BIAP by the executive government. Although the assessment team could not verify their status, the following anecdotal evidence was gathered in relation to recent activities:

- a. Mr Mohammed Auda (Director Designate BIAP), referred to a lease or agreement between either BIAP and Iraqi CAA, or Iraqi Airways and Iraqi CAA, for aerodrome real estate. He stated that there was no payment associated with this agreement.
- b. Mr Mohammed Auda claimed that the Iraqi CAA had signed a MOU with Conrac Elektron to the value of Euro2.5 million for a replacement FIDS for the passenger terminals.
- c. Mr Abdullah Natheer (Iraqi Airways) advised that a MOU had been signed for the supply of five mobile 400Hz carts.
- d. Mr Jabbar Daghar (Director of Power and Aerodrome Lighting – Iraqi CAA) advised that a MOU for a new central processing unit (CCMS) had been established with the CAA.

- e. The presence of new Kone escalators outside the passenger terminals indicate that an agreement had been reached with Kone for the purchase and installation of 12 new escalators. Mr Mohammed Auda claimed that payment in full had been made for this equipment.
- f. Mr. Mohammed Auda advised that the Iraqi CAA had purchased 12 new Merve brand motor/gearbox sets, which have not yet been installed.

223. The assessment team located proposals to completely upgrade air traffic management services and equipment as described earlier in this report.

### **Laws, Regulations and Ordinances**

224. Discussions with Judge Zakia Hakki (an Iraqi national engaged by the State Department to assist with the reconstitution of the judicial system) advised that her first priority would be to assist the Ministry for Justice in rewriting the Constitution. Therefore, all previous laws in contravention to the new Constitution would be revoked.

225. The assessment team was advised repeatedly throughout that no documented ordinances and regulations existed to govern aerodrome operations. The Iraqi CAA was totally responsive to the whims and directions of both the military and regime functionaries.

226. **Recommendations:**

- a. LEG 1 - Assist Iraqi personnel assigned to BIAP senior management positions to conduct a complete review of ordinances, leases, agreements, laws and regulations required for an international aerodrome in the medium term.
- b. LEG 2 - Develop those ordinances, leases, agreements, laws and regulations required to operate an international aerodrome in the long term.

## MILITARY OPERATIONS AND RECONSTRUCTION ACTIVITIES

227. The old runway and associated infrastructure was used exclusively by the Iraqi Air Force between 1982 and 1991 when military operations ceased. Air operations at the old runway recommenced on arrival of coalition aircraft post Operation Iraqi Freedom.

228. The old runway and infrastructure consists of the following:

- a. Runway 33L/15R – old runway.
  - i. Concrete surface with asphalt shoulders. GAT survey in April 2003 using a Deep Core Penetrometer indicates PCN 48.
  - ii. Length - 3300 metres.
  - iii. Width – 45 metres.
- b. Taxiways (23 metres wide) associated with the old runways (including L, P, T, C, B, J, H, G and F). Concrete surface. GAT survey in April 2003 indicates a rough PCN 48. Taxiway P is a parallel taxiway, the remainder forming a complex network allowing access to the passenger terminal and maintenance areas. Two burnt out B727 hulks litter the pavement near taxiway P.
- c. Passenger terminal building.
- d. Hangar of approximately 6000m<sup>2</sup> floor space (access denied by US Military).
- e. North, Mid and South aprons comprising a vast expanse of concrete pavement adjacent the old runway. This area is being utilized as a runway for current military operations. Aircraft up to C17s have operated on this converted runway. The aprons have a combined length of approximately 2700 metres with a PCN of approximately 61.
- f. Eight hardened aircraft shelters in various conditions.
- g. Three large hardstand areas, suitable for cargo handling, about the temporary runway.

229. **Assessment.** There are nine craters on the old runway and taxiway P, all the result of Operation IRAQI FREEDOM. The USAF is repairing this battle damage to design specifications with an anticipated completion date of 30 June 2003. The runway and taxiway lighting system has not been serviceable for a considerable period, nor is it considered salvageable. Runway and taxiway markings are indistinct, and signage does not comply with ICAO requirements. The US Military has stated that they will retain exclusive use of the old runway and associated infrastructure for the medium to long term. The road network servicing this area is in reasonable condition with some

areas requiring restoration work. Utilities and services to the old runway and associated infrastructure are severely limited.

230. **Recommendations:**

- a. Funding should not be assigned to restoring the old runway and associated infrastructure.

## COSTING

231. The cost for the improvement initiatives detailed herein is approximately USD196.1M. The figures are exclusive of any taxes and duties, and are based on year 2003 dollars.

232. The estimate is based on assumptions regarding scope of work, together with historical data obtained from comparable projects already completed, with costs adjusted to take into account factors such as construction date, production capacity in the case of plant, dimensions and other similar general information. It is brief, based on limited information, and as a result, may have errors in the range of +/- 20%. Further scrutiny will be required during project definition stages to obtain accurate costs.

## CONCLUSION

233. The assessment team examined the capability of BIAP in accordance with CLIN 001, as well as making a thorough assessment of ATM in acknowledgement of the importance of this capability to the control, safety, service and security of civil aircraft.

234. As a consequence of successive wars, sanctions and general neglect by Saddam's regime, what was once a state of the art aerodrome has degenerated to the point where the resources, systems, utilities and facilities of BIAP are incapable of supporting civil air operations. Not one single element examined by the assessment team met or even came close to the standards expected of an international aerodrome.

235. The project of reconstituting BIAP to achieve ICAO compliance and adopt best practice is immense. 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 aerodrome's ability to handle the flow of rehabilitation aid in the short term, through to BIAP achieving ICAO compliance in the long term.

236. In its present state, BIAP is incapable of providing compliant civil air traffic services at any level. The RAAF and USAF are providing limited aerodrome control services using military equipment. This military equipment will be removed on departure of both the RAAF and USAF; therefore a complete, integrated ATM system needs to be installed during reconstruction.

237. There are no civil aircraft fire fighting, rescue or medical emergency capability at BIAP. The USAF is providing these services, primarily for military air movements. It is reassuring to note that the USAF has displayed a willingness to work with their Iraqi counterparts to build an aircraft fire fighting and rescue capability. The USAF is providing RFF Cat 8 coverage and is confident of achieving Cat 9 coverage in the near future using a combination of USAF and Iraqi CAA resources.

238. BIAP has limited aircraft ground handling capability with less than 20% of the GSE inventory serviceable. This is a severe restriction on BIAP's capacity to simultaneously handle more than four passenger aircraft movements. There is good cargo handling capacity through the cargo terminal now. Aircraft fueling is currently not possible and effort should be devoted to reintroducing a tanker refueling capability.

239. The passenger terminals are structurally sound but the systems to support passenger handling are in a poor state of repair. Significant effort is required to upgrade Terminal C to process international travelers in the short to medium term. Terminals B and D should be upgraded only if passenger throughput exceeds the capacity of Terminal C.

240. The runway, taxiways and aprons associated with the civil airfield are in reasonable condition but all markings, signage and lighting require extensive refurbishment. There is one crater on taxiway S, which should be repaired by 30 June 2003 (this damage does not preclude the use of the civil airfield). The assessment team does not support any expenditure by USAID on the military runway.



241. Establishing reliable power, water, sewerage air conditioning services must be afforded the highest priority in the short term as the entire functioning of the aerodrome is dependant upon them. General infrastructure and utilities supporting air operations are unreliable or unserviceable.

242. Despite the best efforts of the assessment team, no documentary evidence of agreements, leases, ordinances and legislative requirements were identified. The general response from Iraqi CAA personnel to the assessment team's enquiries was that these administrative functions were not documented by the regime.

## RECOMMENDATIONS

232. 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 – USD54.2M
  - b. Medium term improvements – those required to facilitate a transition from military to civil control of BIAP, but short of ICAO certification, and should be completed between six and 18 months after the commencement of CLIN 003. Indicative cost – USD56M
  - c. Long term improvements – those required to take BIAP 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 – USD85.8M

PREPARED BY:

SkyLink Airfield Assessment Team 2  
KUWAIT

27 May 2003

### ANNEXES:

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

**ANNEX A - LIST OF AUTHORITIES CONSULTED**

<b>Name</b>	<b>Appointment</b>
<b>CIVIL AUTHORITIES</b>	
Mr Mohammed S. Auda	Director (designate) BIAP, Deputy Director Iraqi CAA
Mr Jabbar Daghar	Director Aeronautical Lighting and Power – Iraqi CAA
Mr Ayad Wheib	Director Air Conditioning and Pumps – Iraqi CAA
Mr Farouk	Director of Electrical and Mechanical Engineering – Iraqi CAA
Mr Salman Douad	Director of Mechanical Engineering – Iraqi CAA
Mr Abbas Mussen	Director of Electrical Engineering – Iraqi CAA
Mr Faker Farage Mohammed	Director of Air Traffic Control – Iraqi CAA
Mr Abdullah Shaker Ahmed	Director of Aeronautical Information Services – Iraqi CAA
Mr Maher Yaceen	Director of ATC Communications – Iraqi CAA
Mr Ismael Medi Romi	Senior ATC Officer – Iraqi CAA
Mr Mahommed Shafic	Director of Meteorology – Iraqi Meteorology Organisation
Mr Khaldoon Ramal	Fire Fighting Engineer – Iraqi CAA
Mr Sali	Fire Chief (tbc)
Mr Raad Mahmood	Superintendent of Fire Services – Iraqi CAA
Dr Wafa Saleh Rushdy Tahir	Chief Medical Officer and Flight Surgeon – Iraqi CAA
Mr Abdullah Natheer	Director Engineering - Iraqi Airways
Mr Usama Allwan	Director Technical Agreements - Iraqi Airways
Mr Faiz S. Aldleamy	Director Ground Equipment - Iraqi Airways
Mr Salah Nazal	Manager Electrical and Mechanical - Iraqi Airways
Mr Omer Shihab	Mechanical Engineer - Iraqi Airways
<b>MILITARY AUTHORITIES</b>	
Col Ron Watkins	Base Commander – BIAP USAF
Lt Col David Jones	OHRA – Airport Liaison
Lt Col Wright	US Military Mayor – BIAP
WGCDR Ian Browning	CO RAAF Contingent
SQLDR F Breckenridge	RAAF SATCO
SQLDR S Edgley	RAAF Operations
SQLDR S Mallet	RAAF Executive Officer
FLTLT A Walmsley	RAAF Communications
Col Myers	USAF GAT
Maj David Coxwell	USAF 15 <sup>th</sup> Air Support Operations Squadron
Capt David Hoskins	USAF 3CCG Airfield Operations Commander
SmSgt Michael Cavaliero	USAF – Fire Chief BIAP
SmSgt Sam Varnicle	USAF 193 <sup>rd</sup> Special Operations Wing PA Air National Guard
LT Stephanie Chase	US Army 94 <sup>th</sup> Engineer Battalion (Prime Power)
<b>FORMER IRAQI EXPATRIATES ENGAGED BY THE US STATE DEPARTMENT</b>	
Judge Zakia Hakki	Ministry for Justice
Dr Joawn Masum-Thomas	Ministry of Transportation and Telecommunications

## ANNEX B - AERODROME DATA

(source: www.worldaerodata.com)

### General Information

Country	Iraq
ICAO ID	ORBS
Time	UTC + 3 (+4 DT)
Lat	33DEG15MIN 43.52N
Long	44DEG14MIN 02.11E
Elevation	113' (34metres)
Type	Joint User
Mag Variation	3DEG E (01/03)
Bn	Yes
Operating Agency	Military (civil joint use)
International Clearance Status	Airport of Entry
Daylight Saving Period	1 April – 30 September

### Communications

TWR	118.9/118.7
Baghdad Radar	120.4/125.9
RDO	2992/5667/8918
Ground	121.7/168.925
ATIS	120.4/125.9
Baghdad Approach	127.1/121.0/122.9/119.4/121.5

### Runways

ID	Dimensions	Surface	ILS
15R33L	10827' x 150' 3300m x 46m	Concrete	No
15L33R	13123' x 197' 4000m x 60m	Concrete	No

### Nav Aids

Type	ID	Name	Channel	Freq	Dist fm Field	Bng fm Nav Aid
VOR/DME	SDA	Saddam	076X	112.9	2.5nm	163.1

## ANNEX C - LIST OF BIAP (ORBS) MILITARY NOTAMS

1. RWY 33L/15R CLOSED
  - a. NO RMD's
  
2. ORBS MOVEMENT AREAS
  - a. TWY X CLOSED
  - b. TWY W CLOSED
  - c. TWY P CLOSED
  - d. TWY T CLOSED
  - e. TWY J CLOSED
  - f. TWY H CLOSED
  - g. TWY G CLOSED
  - h. TWY S-6 TO S-5 CLOSED
  
2. AIRFIELD LIGHTING
  - a. RWY 15R/33L APPCH LIGHTS OTS
  - b. RWY 15R/33L THRESHOLD LIGHTS OTS
  - c. RWY 15R/33L EDGE LIGHTS OTS
  - d. RWY 15R/33L CNTR LINE OTS
  - e. RWY 33R APPCH LIGHTS BELOW SERVICEABLE MIN
  - f. RWY 33R RWY CNTR LINE LIGHTS AVAILABLE WITH MINIMAL SERVICE AT 200 FOOT INTERVALS
  - g. RWY 33R WIE RWY EDGE LIGHTS AVAILABLE EVERY 400 FEET FIRST 10 THOUSAND FEET
  - h. DEPARTURE END RWY 33R REIL'S NOT AVAILABLE
  - i. RWY 15L APPCH LIGHTS OTS
  - j. RWY 15L THRESHOLD OTS
  - k. RWY 15L NO RWY CNTR LINE LIGHTS FIRST 3,500 FT
  - l. RWY 15L NO RWY EDGE LIGHTS FIRST 3,500 FT
  - m. TWY W LIGHTING OTS
  - n. TWY X LIGHTING OTS
  - o. TWY C LIGHTING OTS
  - p. TWY B LIGHTING OTS
  - q. TWY T LIGHTING OTS
  - r. TWY P LIGHTING OTS
  - s. TWY T LIGHTING OTS
  - t. TWY J LIGHTING OTS
  - u. TWY H LIGHTING OTS
  - v. TWY G LIGHTING OTS
  - w. TWY F LIGHTING OTS
  - x. TWY L LIGHTING OTS
  - y. TWY S-6 LIGHTING OTS
  - z. TWY S-5 LIGHTING OTS
  
3. TWY MIKE IS THE CURRENT MIL RWY
  - a. TWY MIKE LANDING DISTANCE AVAILABLE 9600 FEET X 90 FT
  - b. TEMPORARY RUNWAY SIDE LIGHTING (EALS) INSTALLED
  - c. NO HOLDING POINTS ARE MARKED FOR TWY MIKE, ACFT ARE TO HOLD SHORT OF TWY MIKE UNLESS SPECIFICALLY APPROVED TO ENTER BY BAGHDAD

TOWER. ACFT ARE TO ENTER AND EXIT TWY MIKE VIA MARKED ENTRANCES TO AVOID DAMAGING RWY LIGHTS. TWY MIKE HOLDING POINT MARKED BY SOLID YELLOW LINE, ACFT ARE TO HOLD WEST OF THIS LINE.

5. AIRFIELD SERVICES
  - a. LIMITED FUEL AVAILABLE
  - b. NO GROUND HANDLING SERVICES AVAILABLE UNLESS BY PRIOR ARRANGEMENT THROUGH RAMCC. NOTAM A0016/03 REFERS
  - c. FIRE PROTECTION RFF CAT 8
  - d. AIR TRAFFIC SERVICES AVAILABLE H24
  
6. NAV
  - a. LCTR (OM) BD OTS
  - b. LCTR (OM) BH OTS
  - c. LCTR (OM) BL OTS
  - d. LCTR (MM) BM OTS
  - e. LCTR (MM) MN OTS
  - f. VOR/DME AD OTS
  - g. VOR/DME IB OTS
  - h. VOR/DME SDA OTS
  - i. ILS YIB RWY 15R OTS
  - j. ILS YD RWY 15L OTS
  - k. ILS YIA RWY 33L OTS
  - l. ILS YC RWY 33R OTS
  
7. OBSTRUCTION DATA
  - a. NO CURRENT OBSTRUCTION DATA AVAILABLE FOR ORBS
  - b. CAUTION CONTROL TOWER (APPROX 190FT) POSITIONED NORTH OF CIVIL TERMINAL BETWEEN THRESHOLD RWY 15L AND THRESHOLD RWY 15R
  - c. CAUTION COMMUNICATIONS MASTS (APPROX 1180FT) APPROXIMATELY 3NM NNE OF THE AIRFIELD.

**ANNEX D - LIST OF GSE**

<b>Type</b>	<b>No. and Condition ID by Assessment Team</b>	<b>No. reported as serviceable prior to conflict</b>
Mobile Stairs	1 – serviceable but requires maintenance	• 18
Tug	4 - serviceable but require maintenance	• 5 x TPX 200 • 2 x TMX 400 • 3 x TPX 200 MT
Tow bars	9 - serviceable but require maintenance	• Nil reported but numerous located by assessment team around aerodrome
Scissor Lift	3 - serviceable but require maintenance	• 16 (incl 14 Sovam acquired in 2001)
Ramp Tractor	1 - serviceable but requires maintenance	• 20
Water truck	2 - serviceable but require maintenance	• 10
Mobile conveyor	1 - serviceable but requires maintenance	• 10 (Sovam acquired in 2001)
Mobile rollerbed	3 - serviceable but require maintenance	• 10 (Sovam acquired in 2001)
Baggage Trolley	1 – serviceable	• Sufficient to simultaneously handle 9 pax aircraft
Pallets and nets	Numerous	Numerous
Air Conditioning Trucks	Nil	• 13 (acquired in 1982 – require servicing)
Aircraft Starters	Nil	• 8 (4 acquired in 2002, 4 in 1989)
Toilet Trucks	Nil	• 10 (acquired in 2001)
GPU	1 - serviceable but requires maintenance	• 16 (acquired 10 from Lebanon 2002, 6 from USA in 1982)
Manlifts	2 – serviceability not assessed	• 8 (acquired 4 ea from Chile 2001, France 2002)
Catering Trucks	Nil	• 5 (acquired from France in 2002)
Cherry Pickers	Nil	• 2 (acquired from Turkey 2001)
Forklifts	Nil	• 15 (acquired 11 from Japan 2002, 4 from UK 1978)
Passenger Busses	4 - serviceable but require maintenance	• 10 (acquired from Germany 2001)
Runway Sweepers	2 - serviceable but require maintenance	• 4

## Annex E

### List of Recommendations

PARA No.	ITEM	DESCRIPTION
<b>AIR OPERATIONS</b>		
<b>Control Tower, Approach and Area Control Centre - Baghdad ATC</b>		
<b>Recommendations:</b>		
29	a	Provide all Iraqi controllers with on-job training (under the guidance of RAAF controllers) in the short term.
	b	Develop policy and procedures for the day-to-day management of operations, record keeping and a safety oversight in the short term.
	c	Re-train all Iraqi controllers as required by the needs of the emerging ATM system in the medium to long term.
	d	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.
	e	Refurbish ATC tower and building
<b>Weather</b>		
<b>Recommendations:</b>		
33	a	Establish weather observation capability at BIAP in the short term.
	b	Procure aviation weather forecasts from a third party in the short term.
	c	Establish weather forecasting capability at BIAP in the long term.
<b>Aeronautical Information Service (AIS)</b>		
<b>Recommendations:</b>		
37	a	Survey the aerodrome environment for obstructions in the short term.
	b	Establish GPS approach procedures in the short term.
	c	Dependent upon navigational aid serviceability, re-establish instrument approach/departure procedures (ILS/VOR) in the short to medium term.
	d	Re-establish national AIS service in the medium to long term.
<b>ATC Consoles (Tower Cab, Approach Room, and Area Control Centre)</b>		
<b>Recommendations:</b>		
43	a	Assess feasibility of short-term repair of equipment.
	b	Replace consoles and associated inter-face equipment as required in the short term.
	c	Re-establish landline communications in the short term.
<b>VHF Radios</b>		
<b>Recommendations:</b>		
47	a	Assess availability of spares in the short term.
	b	Replace the inter-face between the transmitters/receivers in the short term.
	c	Install the means to activate standby VHF communications from the control tower in the medium term.
<b>Voice Recorders</b>		
<b>Recommendations:</b>		
50	a	Assess availability of spares in the short term.
	b	Conduct servicing/maintenance as required in the short term.
	c	If spares are not available, replace equipment in the short term.
<b>Radar</b>		
<b>Recommendation:</b>		
53	a	Procure and install approach radar capable of integration into the Iraqi airspace architecture in the medium term.
<b>Aeronautical Fixed Telecommunication Network (AFTN)</b>		
<b>Recommendations:</b>		
56	a	AFTN equipment be procured and installed as a priority in the short term.
	b	Establish means (possibly satellite) of linking AFTN traffic to the World Wide Network in the short term.



## Annex E

### List of Recommendations

PARA No.	ITEM	DESCRIPTION
<b>Instrument Landing System (ILS)</b>		
<b>Recommendations:</b>		
62	a	Both ILS systems be assessed for their suitability for refurbishment and the availability of spares (including associated locators).
	b	Both ILS's to be made serviceable by refurbishment or the installation of new equipment in the medium to long term.
<b>Visual Omni Range/Distance Measuring Equipment (VOR/DME)</b>		
<b>Recommendations</b>		
66	a	An assessment of the most recently operational VOR/DME be made to ascertain its viability for refurbishment in the short term.
	b	A VOR/DME be made serviceable by refurbishment or a new installation in the short term.
<b>Safety Oversight</b>		
<b>Recommendations</b>		
69	a	Develop a safety management system for the oversight of air traffic control in the short term.
	b	Implement the safety management system in the short to medium term.
<b>EMERGENCY</b>		
<b>Medical Facility</b>		
<b>Recommendations:</b>		
73	a	Establish a medical emergency response capability in the medium term.
	b	Develop and implement an aerodrome Emergency Plan in the medium term.
	c	Re-establish effective communications between the control tower and Medical Centre in the medium term.
<b>Fire Fighting and Rescue</b>		
<b>Recommendations:</b>		
80	a	Establish a civil fire fighting and rescue capability (to Cat 9) in the medium term.
	b	Develop and implement an aerodrome Emergency Plan in the medium term.
	c	Re-establish effective communications between the control tower and fire station in the medium term.
<b>GROUND HANDLING</b>		
<b>Recommendations:</b>		
85	a	Consolidate all GSE in the short term.
	b	Service all GSE and fuel tankers in the short term.
	c	Identify shortfalls in GSE and refuelling capability on completion of initial servicing in the short term.
	d	Acquire additional GSE and tankers in the medium term.
	e	Implement planned maintenance for all GSE, fuel tankers and aerodrome vehicles in the medium term.
	f	Refurbish GSE maintenance facility in the medium term.
	g	Refurbish and restore in-flight catering in the long term.
	h	Institute an airside licencing program in the medium to long term.
<b>AERODROME INFRASTRUCTURE</b>		
<b>Recommendations:</b>		
92	a	Repaint civil runways, taxiways and apron markings in accordance with ICAO Doc 9157 – Aerodrome Design Manual in the medium term.
	b	Repair civil runway, taxiway and apron lighting in accordance with ICAO Doc 9157 – Aerodrome Design Manual in the medium term.
	c	Replace all civil runway, taxiway and apron signage in accordance with ICAO Doc 9157 – Aerodrome Design Manual in the medium term.
	d	Refurbish parking aids for apron C in the medium term.

## Annex E

### List of Recommendations

PARA No.	ITEM	DESCRIPTION
	e	Repair service pits and clear debris within the flight strips in the medium term.
	f	Install primary windsocks at the civil runway in the medium term.
	g	Ensure runway, taxiway and apron lighting can be operated from the control tower in the long term.
	h	Refurbish parking aids for apron B and D in the long term.
	l	Repair floodlighting in the long term.
	j	Install runway strip markings in accordance with ICAO Doc 9157 – Aerodrome Design Manual in the long term.
		<b>Perimeter</b>
		<b>Recommendations:</b>
97	a	Repair all wildlife control fences in the short term.
	b	Repair perimeter fences in the long term.
	c	Repair perimeter road in the long term.
		<b>CARGO HANDLING</b>
		<b>Cargo Terminal – General Condition</b>
		<b>Recommendations:</b>
100	a	Install security screening equipment to comply with ICAO Annex 17 – Security in the medium term.
	b	Establish DG and HAZMAT storage areas and develop handling procedures in accordance with both IATA DG Regulations in the medium term.
	c	Service and overhaul the following in the short to medium term:
		i. Power, water and sewerage.
		ii. Cold storage areas.
		iii. ETV system.
		iv. Close circuit security camera system.
		v. Five tonne scales.
		vi. Air conditioning.
		vii. Fixed fire fighting system.
		<b>Cargo Apron</b>
		<b>Recommendations:</b>
103	a	Clear debris in the short term to comply with ICAO Annex 14 - Aerodromes.
	b	Service and overhaul the power supply in the short term.
	c	Install a deluge shower and eye-wash in the short term.
	d	Refurbish apron signage, light and markings in accordance with ICAO Annex 14 – Aerodromes.
	e	Service and overhaul the hydrant refueling system in the long term.
		<b>PASSENGER HANDLING</b>
		<b>Passenger Terminals – General Condition</b>
		<b>Recommendations:</b>
108	a	All terminal buildings are cleaned and utilities restored in the short term.
110	a	Service fire protection systems in all terminals in the short term.
	b	Service all major systems in Terminal C in the short term.
	c	Completely renovate Terminal C in the medium to long term.
	d	Service all major systems in Terminals B and D in the long term.
	e	Completely renovate Terminals B and D in the long term if passenger throughput warrants.
		<b>Flight Information Display System (FIDS).</b>
		<b>Recommendations:</b>
112	a	FIDS should be replaced in the medium to long term when passenger volume increases in accordance with ICAO Doc 9249.
	b	Determine the status of the MOU.
		<b>Passenger Check-in.</b>

## Annex E

### List of Recommendations

PARA No.	ITEM	DESCRIPTION
<b>Recommendations:</b>		
114	a	Service the baggage handling conveyor system in Terminal C in the short term.
	b	Automate the customs and immigration checks in the medium term in accordance with ICAO Doc 9303.
	c1	Upgrade the baggage handling conveyor and seat allocation systems in Terminal C in the long term.
	c2	Upgrade the baggage handling conveyor and seat allocation systems in Terminal C in the long term.
	d	Upgrade the baggage handling conveyor and seat allocation systems in Terminals B and D in the long term if passenger throughput warrants.
<b>Passenger Arrivals.</b>		
<b>Recommendations:</b>		
116	a	Service the baggage handling conveyor system in Terminal C in the short term.
	b	Automate the customs and immigration checks in the medium term in accordance with ICAO Doc 9303.
	c	Upgrade the baggage handling conveyor system in Terminal C in the long term.
	d	Upgrade the baggage handling conveyor system Terminals B and D in the long term if passenger throughput warrants.
<b>Escalators.</b>		
<b>Recommendation:</b>		
118	a	Contact Kone and arrange completion of contract in the short term.
<b>Elevators.</b>		
<b>Recommendation:</b>		
120	a	Verify status of Merve elevator motor/gearbox sets.
	b	Service all elevators in the medium term.
<b>Aerobridges.</b>		
<b>Recommendations:</b>		
122	a	Service all Terminal C aerobridges in the medium term.
	b	Service all Terminals B and D aerobridges in the long term if passenger throughput warrants.
<b>Public Announcement (PA) System.</b>		
<b>Recommendations:</b>		
124	a	Service the PA system in Terminal C in the short term.
	b	Replace the system in all terminals in the long term.
<b>Airside Roller Doors to Baggage Make-up Areas.</b>		
<b>Recommendations:</b>		
126	a	Repair and/or service all roller doors in Terminal C in the short term.
	b	Repair and/or service all roller doors in Terminals B and D in the long term if passenger throughput warrants.
<b>Automatic Doors for Passenger Access to Terminal.</b>		
<b>Recommendations:</b>		
128	a	Repair and/or service all automatic doors in Terminal C in the short term.
	b	Repair and/or service all automatic doors in Terminals B and D in the long term if passenger throughput warrants.
<b>Fire Fighting System.</b>		
<b>Recommendation:</b>		
130	a	An appropriately licensed SME be engaged to overhaul and upgrade the entire fire protection system in Terminals B, C and D, as well as the connecting administrative areas in the short term.

## Annex E

### List of Recommendations

PARA No.	ITEM	DESCRIPTION
		<b>Security Screening Machines.</b>
		<b>Recommendations:</b>
132	a	Carry out random searches in the short term.
	b	Install new security screening equipment in Terminal C in the medium term
	c	Install new security screening equipment in Terminals B and D in the long term if passenger throughput warrants.
		<b>Car Parking</b>
		<b>Recommendation:</b>
134	a	Clean the car park in the short term.
		<b>GENERAL INFRASTRUCTURE</b>
		<b>Hangars</b>
		<b>Recommendations:</b>
142	a	Erect appropriate safety signs, install appropriate first aid equipment and deluge showers and eyewashes in the short term.
	b	Service gantries and elevators in the medium term.
	c	Verify status of the MOU for the supply of mobile 400Hz power supplies in the medium term.
	d	Service all utilities including fire fighting and air washers in the medium term.
	e	Service the aircraft air conditioning system in the long term.
	f	Service the side and tail docks in the long term.
	g	Inventory spare parts in the long term.
	h	Refurbish and render safe the paint shop in the long term.
		<b>Refueling</b>
		<b>Recommendations:</b>
146	a	Bring two mogas and two diesel pumps (bowsers) into service in the short term.
	b	Increase bowser capacity in line with demand in the medium to long term.
		<b>Jet Fuel Filling Station for Tanker Trucks.</b>
		<b>Recommendations:</b>
149	a	Isolate the piping using spades (blinds) in the pipeline, remove all damaged and incorrectly fitted electrical equipment, and render safe and isolate the power in the short term.
		<b>Fuel Farm.</b>
		<b>Recommendations:</b>
152	a	Conduct a safety check of the fire fighting systems installed in the short term.
	b	Conduct a safety check of the hazardous area electrical equipment in the short term.
	c	Re-commission the fuel farm to meet the projected demand from airport in the short term.
	d	Establish a fuel QC system in the short term
	e	Establish maintenance routines in the medium term.
		<b>Telephones.</b>
		<b>Recommendations:</b>
155	a	For aerodrome operability and operational safety, install a phone system of approximately 100 lines in the short term. This assumes that the telephone lines installed within the confines of the aerodrome are serviceable.
	b	Expand phone system capability to off-field exchange in the short-medium term, or as Iraqi phone system is restored.
		<b>UTILITIES</b>
		<b>Potable Water</b>
		<b>Recommendations:</b>
159	a	Repair leaks in the piping system in the short term.

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### List of Recommendations

PARA No.	ITEM	DESCRIPTION
	b	Repair all pumps in the short term.
	c	Chemically treat water in old system reservoirs to ensure water is potable.
	d	Clean piping system with, for example, chlorine in the short term.
	e	Engage a SME to conduct a comprehensive review of the potable water system at BIAP in the medium term, and implement the required improvement program.
	f	Establish maintenance and testing routines for the system in the medium term.
	g	Procure an adequate supply of spare parts in the long term.
<b>Water Treatment</b>		
<b>Recommendations:</b>		
162	a	Test and treat water contained in potable water reservoirs to ensure water is fit for human consumption in the short term.
	b	Test water in other systems and determine necessary chemical treatment regime in the medium term.
	c	Engage a SME to conduct a comprehensive review of the water treatment systems at BIAP in the long term, and implement the required improvement program.
	d	Establish maintenance and testing routines for the system in the long term.
	e	Procure an adequate supply of spare parts in the long term.
<b>Sewerage</b>		
<b>Recommendations:</b>		
165	a	Rewind motors for pumps in main pump station and purchase new motors (or parts) with good quality windings in the short term.
	b	Clear blockages in all toilets in the short term.
	c	Establish maintenance and testing routines for the system in the long term.
	d	Procure an adequate supply of spare parts in the long term.
<b>Power</b>		
<b>Recommendations:</b>		
172	a	Complete repairs on the main power supply lines in the short term.
	b	On the basis that the regular power supply is not available from Baghdad:
		i. Restart gensets required for critical aerodrome functions including air traffic management, safety, fire protection, and utilities in the short term.
		ii. Install temporary gensets for those gensets that cannot be restarted or have long lead times for spare parts in the short term
	c	Rebuild substation 1 in the short term
	d	Purchase batteries for UPSs in the short term
	e	Establish regular maintenance on all existing power generation equipment in the medium term.
	f	Establish an adequate supply of spare parts and consumables (oil, filter elements etc) for existing equipment.
	g	Engage a SME to conduct a comprehensive review of the power utilities at BIAP in the medium term, and implement the required improvement program.
<b>Air Conditioning</b>		
<b>Recommendations:</b>		
176	a	Provide and fit spare parts to restart two chiller packages (one duty, one standby) in the short term.
	b	Drain and isolate other packages and seal with dry nitrogen in the short term for long term preservation.
	c	Implement maintenance schedule in accordance with manufacturers recommendations in the short term.
	d	Obtain spare parts including consumable items, lubricants and refrigerant in the short term.
	e	Start the third and fourth chiller packages as airport use increases in the medium to long term.
	f	Conduct de-bottlenecking study and plan for major overhaul in the long term.

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### List of Recommendations

PARA No.	ITEM	DESCRIPTION
<b>Chilled Water Pumps.</b>		
<b>Recommendations:</b>		
178	a	Implement maintenance schedule in accordance with manufacturers recommendations in the short term.
	b	Obtain spare parts.
<b>Hot Water Pumps.</b>		
<b>Recommendations:</b>		
180	a	Implement maintenance schedule in accordance with manufacturers recommendations in the short term.
	b	Repair/replace #1 pump shaft in the medium term.
	c	Obtain spare parts
<b>Water Softeners.</b>		
<b>Recommendation:</b>		
183	a	Re-commission to prevent further deterioration of water piping systems in the short term.
<b>Chemical Treatment for Cooling Water.</b>		
<b>Recommendation:</b>		
185	a	Re-commission to prevent further deterioration of evaporative coolers and water piping systems in the short term.
<b>Instrument Air Package.</b>		
<b>Recommendations:</b>		
187	a	Clean and dry instrument air system in the short term.
	b	Check source of oil leak and repair in the short term.
	c	Fit de-humidifiers in the short term.
<b>Central Control Monitoring System (CCMS).</b>		
<b>Recommendations:</b>		
189	a	Verify that mechanical plant items can operate without CCMS in the short term, and operate plant items from local control panels.
	b	Verify that safety related functions such as fire main pressure, can be remote-monitored in the short term.
	c	Prepare specification and bill of materials for replacement CCMS in the medium term.
	d	Install and commission replacement CCMS in the long term.
<b>ATC Building Plant Room.</b>		
<b>Recommendations:</b>		
191	a	Supply and fit room air conditioning units to rooms housing sensitive equipment in the short term.
	b	Replace refrigeration equipment in plant room in the medium to long term.
<b>Other Air-conditioning Plants.</b>		
<b>Recommendation:</b>		
193	a	Install airconditioning in ILS and VOR/DME equipment buildings.
	b	Assess requirement for air-conditioning in each area and its criticality in terms of ATC and safety in the medium to long term, and repair or replace.
<b>Fire Fighting Water</b>		
<b>Recommendations</b>		
196	a	Repair leaks in piping and sprinkler systems in the short term.
	b	Repair or replace all pumps to meet design specifications in the short term.
	c	Refurbish all fire fighting hose stations in the short term.
	d	Install a control system to allow for operation of valves and pumps in automatic modes, as well as to allow for fire detection in the medium term.

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### List of Recommendations

PARA No.	ITEM	DESCRIPTION
	e	Establish routine for testing system regularly in the medium term.
	f	Install fire detection and annunciation system in the medium term.
	g	Review building codes to ensure that the aerodrome complies with relevant national standards in the long term.
	h	Establish maintenance routines and an adequate supply of spare parts in the long term.
<b>Cleaning Services</b>		
<b>Recommendations:</b>		
198	a	Engage the services of a cleaning contractor in the short term.
	b	Burn all rubbish off site in the short to medium term.
	c	Repair/replace incinerator in the long term
<b>Storm Water</b>		
<b>Recommendations:</b>		
200	a	Establish maintenance routines and an adequate supply of spare parts in the long term.
<b>ENVIRONMENTAL CONSIDERATIONS</b>		
<b>Environmental Impact of Operations</b>		
<b>Sewerage.</b>		
202	a	Verify as-built configuration of sewerage collection system.
	b	Procure fuel spill kits for apron use.
	c	Confirm that the system can separate oily water in the medium term; install system if required.
<b>Aircraft Systems Fluids.</b>		
204	a	Confirm adequacy of drainage system to separate, collect and treat contaminants in the short term.
	b	Upgrade drainage as required in the medium term
<b>Waste</b>		
207	a	Renew cleaning and waste disposal contract.
<b>Environmental Factors</b>		
<b>Unexploded ordnance (UXO).</b>		
208	a	Deny access to areas where UXO searches have not been conducted.
<b>Dust.</b>		
211	a	Prohibit vehicle movement on unsealed surfaces in the short term.
	b	Seal buildings to restrict ingress of dust in the medium term.
	c	Establish positive pressure in room housing sensitive equipment in the medium term.
	d	Regenerate vegetation or seal areas between runways, taxiways and adjacent areas in the long term.
<b>Heat.</b>		
<b>Mitigation – Short Term</b>		
213	a	Air condition all compartments housing sensitive equipment in the medium term.
	b	Air condition domestic areas and provide adequate hydration facilities throughout the aerodrome in the medium term
<b>Animals.</b>		
<b>Mitigation – Short Term</b>		
215	a	Repair perimeter fences in the short term
<b>Foreign Objects (FOD).</b>		
<b>Mitigation – Short Term</b>		
217	a	Clean apron and aircraft movement areas of all FOD and debris.
	b	Sweep apron areas on a regular basis.

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### List of Recommendations

PARA No.	ITEM	DESCRIPTION
		<b>Foul ground</b>
219	a	Replace temporary in-ground toilets with chemical facilities
	b	Identify foul ground with signage, and install barriers to prevent access.
	c	Treat the foul ground to ensure environmental safety.
		<b>AIRPORT REQUIREMENTS, ORDINANCES, LEASES, AGREEMENTS, LAWS AND REGULATIONS</b>
		<b>Local and International Airport Requirements</b>
		<b>Recommendations:</b>
226	a	Assist Iraqi personnel assigned to BIAP senior management positions to conduct a complete review of ordinances, leases, agreements, laws and regulations required for an international aerodrome in the medium term.
	b	Develop those ordinances, leases, agreements, laws and regulations required to operate an international aerodrome in the long term.
		<b>MILITARY OPERATIONS AND RECONSTRUCTION ACTIVITIES</b>
		<b>Local and International Airport Requirements</b>
		<b>Recommendations:</b>
230	a	Funding should not be assigned to restoring the old runway and associated infrastructure.



PHOTOGRAPHS



Aerial Photograph – BIAP  
Civil RWY centre right, military RWY bottom left

Air Operations



Control Tower – View from Apron A



Weather Station – View from Control Tower



ATC Consoles – Phone System



ATC Consoles – Missing Radar Display



ATC Consoles – Communications

Emergency



Firemain Pressure – Max of 5m Stream



Fire Fighting Stores – New Fire Station



New Fire Station – Observation

Ground Handling



Wrecked GSE – Adjacent GSE Workshop



Serviceable Tug and Mobile Stairs – Cargo Terminal

Airfield Infrastructure



RWY 33R Approach Lights



RWY 33R Threshold (lights)



RWY33R15L, Apron B, Terminal B (fm Twr)



Perimeter Fence – Breach



Damaged Approach Lights RWY 33R



VASI RWY 33R

Cargo Handling



Cargo Terminal



ETV



Damaged Roller Doors – Truck Docking Station



Storage Racks

Passenger Handling



L-R Terminal B, Administration and Terminal C



Diagram of Terminal



X-Ray Machine



Check-in Counter



Passport Control

General Infrastructure



Inside New No 1 Hangar



Inside New No 1 Hangar



Fuel Farm – Tank Fill Pumps



Fuel Farm – AVGAS System