AIR TRAFFIC AND NAVIGATION SERVICES CO. LTD

REPUBLIC OF SOUTH AFRICA

REQUEST FOR PROPOSAL: ATNS/RFP007/FY24.25/A-SMGCS REPLACEMENT

APPOINTMENT OF A SERVICE PROVIDER FOR ADVANCED SURFACE MOVEMENT GUIDANCE AND CONTROL SYSTEM REPLACEMENT PROJECT REQUIRED AT OR TAMBO INTERNATIONAL AIRPORT (FAOR) and CAPE TOWN INTERNATIONAL AIRPORT (FACT).

VOLUME 2

Technical Requirements

June 2024

GENERAL INSTRUCTIONS TO TENDERERS

The Tenderer shall submit all responses, diagrams, project management documentation and drawings according to the GENERAL INFORMATION AND INSTRUCTIONS TO TENDERERS document and in the English language.

ALL RESPONSES TO THE REQUIREMENTS IN THIS DOCUMENT SHALL BE PROVIDED AS FOLLOWS:

TENDERERS SHALL RESPOND IN FULL TO EACH ITEM IN THE FORMAT PROVIDED AND REFERENCES (CHAPTER, SECTION, PAGE NUMBER, AND PARAGRAPH NUMBER) TO DOCUMENTS AND RELEVANT INFORMATION SUPPORTING THE RESPONSES SHALL BE INDICATED IN THE SPACE PROVIDED. THIS INFORMATION WILL BE THE **ONLY RESPONSE USED FOR THE EVALUATION AND ASSESSMENT**.

Responses, provided in the space allowed, that are not clear or inadequate or the lack thereof shall be interpreted as **"Not Compliant"** even though the compliance column is declared as "Comply" and/or the Tenderer's offer meets the requirement. Tenderer's shall ensure that each response correctly addresses the requirement stated. Responses not addressing the requirement of the specific paragraph shall be interpreted as **"Not Compliant"**.

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C:	fully compliant	=	2 points:
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Tenderer's shall, for paragraphs declared "PC" or "NC", include a statement as to the nature of the variation and may additionally supply supporting information in the space provided to demonstrate how the proposal meets the needs of ATNS.

1 Introduction

Air Traffic and Navigation Services (ATNS) introduced the Advanced Surface Movement Guidance and Control System (A-SMGCS) at both OR Tambo International Airport (FAOR) and Cape Town International Airport (FACT), during the 2008/2009 and 2009/2010 financial years with the intention to improve airport ground safety and service delivery. This was also done in preparation for the 2010 soccer world cup that was held in South Africa in anticipation of increased demand. Furthermore, a training platform was installed at the Aviation Training Academy (ATA) in the 2008/2009 financial year and a test bench facility was installed in the same financial year at FAOR.

During the implementation and acceptance phase of the system, various stakeholders (i.e. Air Traffic Controllers (ATCs), Airlines, vehicle drivers, Airport Company South Africa (ACSA) and the South African Civil Aviation Authority (SACAA)) were consulted to mutually agree on the responsibilities of each stakeholder that would support the operation of the system in order to realise the benefits of the system. As a result of this consultation process, various initiatives, such as software upgrades, mandating squitter fitment to vehicles entering the manoeuvring area, were undertaken to improve the performance of the A-SMGCS system to meet the requirements of all stakeholders.

The current FAOR and ATA A-SMGCS systems have already reached their end of design life, while the FACT A-SMGCS system reached its end of design life in 2019/2020. Moreover, a decision was taken to replace the FACT A-SMGCS to improve its performance and accommodate operational changes that will be brought about as a result of the FACT runway realignment project.

1.1 Scope of Work

The purpose of this document is to clearly define the technical specifications for an A-SMGCS system required at OR Tambo International Airport (FAOR) and Cape Town International Airport (FACT).

The A-SMGCS replacement project appointment of a service provider for advanced surface movement guidance and control system replacement project required at OR Tambo International Airport (FAOR) and Cape Town International Airport (FACT)..

The Project shall include:

1.1.1. Supply and delivery of the new A-SMGCS Hardware and Software Components;

1.1.2. Supply and delivery of M-LAT/ADS-B and SMR sensors;

1.1.3. Supply and delivery of a dual-purpose Training & Disaster Recovery System:

1.1.3.1. System Support Suite (SSS) FAOR and FACT.

1.1.3.2. Fire Tower (FAOR) and S-Band 2 Tower (FACT).

1.2 Document Context

The principle of “see and be seen” has been adopted for many years to maintain safety at airports. However, inclement weather conditions have the potential to negatively impact aerodrome capacity and safety because of restricted visual line of sight observation and the implementation of Low Visibility Procedures (LVP). For these reasons, the International Civil Aviation Organisation (ICAO) supported the development of an A-SMGCS that provides surveillance and a complementary alerting function for situations that pose a safety risk to operations, irrespective of an aerodrome’s prevailing weather conditions.

1.3 Document overview

1.3.1 Document structure

This document is divided into ten chapters.

Chapter 1 is this introduction. It describes the purpose and scope of the document, the document structure and context, and the methodology used to derive the requirements.
Chapter 2 gives an overview of the complete A-SMGCS, describes the generic architecture, identifies the major building blocks of the ground equipment and describes how the blocks fit together.
Chapter 3 lists overall requirements such as environment, electromagnetic compatibility, and reliability, which are common to all elements of the system. Subsequent chapters allocate specific technical design requirements to each element.
Chapter 4 describes the Surveillance function and its main components and establishes the appropriate technical design requirements.
Chapter 5 describes the Control function and its main components and establishes the appropriate technical design requirements.
Chapter 6 describes the surface movement Routing/Planning function and the component parts for taxi route planning, departure management, sequencing, and runway occupancy planning. Appropriate preliminary technical design requirements are listed.
Chapter 7 describes the Guidance function including Air-Ground Data Link communications. Appropriate preliminary technical design requirements are listed.
Chapter 8 lists technical design requirements pertinent to the controller HMI
Chapter 9 lists the technical design requirements for the supporting functions, such as configuration databases, control and monitoring of equipment, and recording facilities. The required data exchanges with the other A-SMGCS functions.
Chapter 10 is an annex containing lists of references, acronyms and abbreviations used in the document.

1.4 Explanation of Terms

This section provides an explanation of the terms required for a correct understanding of this document. Most of the following explanations are drawn from ICAO documents.

1.4.1 General

Advanced Surface Movement Guidance and Control Systems (A-SMGCS)
A system providing as a minimum Surveillance and can include Airport Safety Support, Routing and Guidance to aircraft and vehicles in order to maintain the airport throughput under all local weather conditions whilst maintaining the required level of safety.

Aerodrome
A defined area on land or water (including any buildings, installations, and equipment) intended to be used either wholly or in part for arrival, departure and surface movement of aircraft.

Aerodrome movement
The movement of a mobile (aircraft or vehicle) on the movement area.

Aerodrome Visibility Operational Level (AVOL)
The minimum visibility at or above which the declared movement rate can be sustained.

Airport Authority
The person(s) responsible for the operational management of the airport.

Alert
An indication of an existing or pending situation during aerodrome operations, or an indication of abnormal A-SMGCS operation, that requires attention/action.

Alert Situation

Any situation relating to aerodrome operations which has been defined as requiring attention or action.

Apron
A defined area on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.

A-SMGCS Capacity
The maximum number of simultaneous movements of aircraft and vehicles that the system can safely support within an acceptable delay commensurate with the runway and taxiway capacity at an aerodrome.

Conflict
A situation when there is a possibility of a collision between aircraft and/or vehicles.

Control
Application of measures to prevent collisions, runway incursions and to ensure safe, expeditious and efficient movement.

Cooperative Target
A target which is equipped with systems capable of automatically and continuously providing information including its identity to the A-SMGCS.
Note: as several cooperative surveillance technologies exist, a target is cooperative on an aerodrome only if the target and the aerodrome are equipped with cooperative surveillance technologies which are interoperable. A target is only cooperative if its equipment is switched on and operating correctly.

Coverage Volume (CV)
That volume of space which encompasses all parts of the aerodrome surface where aircraft movements take place together with those parts of the surrounding airspace which affect surface operations.

Data Fusion
A generic term used to describe the process of combining information from two or more sensor systems or sources.

Departure Management
The planning of the most efficient departure sequence for aircraft departing at an airport, and of optimal departure times for each aircraft, in order to ensure minimum delay and maximum utilization of the available capacity of the aerodrome.

Direction of Movement
The direction in which a tracked target is progressing at the instant of the calculation of its position.

Fail Safe
A term meaning that enough redundancy is provided to carry data to the display equipment to permit some components of the equipment to fail without any resultant loss of data displayed.

Fail Soft
A term meaning that the system is so designed that, even if equipment fails to the extent that some loss of data occurs, enough data remain on the display to enable the controller to continue operations.

False Alert
An alert which does not correspond to an actual alert situation.
Note: It is important to understand that it refers only to false alerts and does not address nuisance alerts (i.e. alerts which are correctly generated according to the rule set but are inappropriate to the desired outcome).

Guidance
Facilities, information and advice necessary to provide continuous, unambiguous and reliable information to pilots of aircraft and drivers of vehicles to keep their aircraft or vehicles on the surfaces and assigned routes intended for their use.

Heading
The direction in which the longitudinal axis of a mobile is pointed, expressed in clockwise degrees from North. Usually *magnetic* heading (with respect to magnetic North Pole).

Identification
The correlation of a known aerodrome movement callsign with the displayed target of that mobile on the display of the surveillance system.

Identity
A group of letters, figures or a combination thereof which is either identical to, or the coded equivalent of, the mobile call sign to be used in air-ground communications, and which is used to identify the mobile in ground-ground air traffic services communications.

Incursion
The unauthorized entry by an aircraft, vehicle or obstacle into the defined protected areas surrounding an active runway, taxiway or apron.

Low Visibility Procedures (LVP)
Specific procedures applied at an aerodrome for the purpose of ensuring safe operations during Category II and III approaches and/or departure operations in RVR conditions less than a value of 550m.

Manoeuvring Area
That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.

Mobile
A mobile is either an aircraft or a vehicle.

Modularity
Capability of a system to be enhanced by the addition of one or more modules to improve its technical or functional performance.

Movement Area
That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and apron(s), but excluding passive stands, empty stands, and those areas of the apron(s) which are exclusively designated to vehicle movements.

Non-Cooperative Target
A target which is not equipped with systems capable of automatically and continuously providing information including its identity to the A-SMGCS.

Non-Cooperative Surveillance
The surveillance of mobiles is non-cooperative when a sensor, named non-cooperative surveillance sensor, detects the mobiles, without any action on their behalf. This technique allows determining the position of any mobile in the surveillance area and in particular to detect intruders. Examples of non-cooperative surveillance sensors are the Primary Surveillance Radars.

Normal Visibility
Visibility conditions enough for personnel of control units to exercise control over all traffic on the basis of visual surveillance (corresponding to visibility condition 1 defined by ICAO).

Nuisance Alert
An alert which is correctly generated according to the rule set but inappropriate to the desired outcome.

Obstacle
All fixed (whether temporary or permanent) and mobile obstacles, or parts thereof, that are located on an area intended for the surface movement of mobiles or that extend above a defined surface intended to protect aircraft in flight.

Protection Area
A protection area is a virtual volume around a runway, a restricted area or a mobile. This protection area is used to detect an alert situation. For instance, an alert situation is detected when a mobile is on a runway and one or more mobiles enter the runway protection area.

Reduced Visibility
Visibility conditions insufficient for personnel of control units to exercise control over all traffic based on visual surveillance (corresponding to visibility conditions 2, 3, and 4 defined by ICAO).

Reported Target
An aircraft, vehicle or other object which is reported by the Surveillance Element of an A-SMGCS.

Restricted Area
Aerodrome area where the presence of an aircraft or a vehicle is permanently or temporarily forbidden.

Route
A track from a defined start point to a defined endpoint on the movement area.

Routing
The planning and assignment of a route to individual aircraft and vehicles to provide safe, expeditious and efficient movement from its current position to its intended position.

Runway Incursion
The unintended presence of an aircraft, vehicle or person on the runway or runway strip.

Stand
A stand is a designated area on an apron intended to be used for the parking of an aircraft.

Surveillance
A function of the system which provides identification and accurate positional information on aircraft, vehicles and obstacles within the required area.

Target
Any aircraft, vehicle or obstacle, whether stationary or moving, which is located within the Coverage Volume of the A-SMGCS and which is of significant size to be operationally significant.

Track
A progressive series of estimates of a target position.

Unit
A physical item of equipment that performs a specified function, for instance an SMR or a data fusion unit.

Update
A renewal of target reports relating to all targets under surveillance by the A-SMGCS.

1.4.2 Performance Parameters

Alert Response Time (ART)
The time delay between an alert situation occurring at the input to the Alert Situation Detection Element and the corresponding alert report being generated at its output.

Display Resolution (DR)
The number of individually addressed picture elements (pixels) along each axis of the display screen. (For a raster-scan display, the resolution is normally expressed in terms of the number of raster lines and the number of pixels per line.)

Information Display Latency (IDL)
The maximum time delay between a report, other than a target report, being received by the A-SMGCS HMI and the corresponding presentation on the HMI display of the information contained in the report.

Position Registration Accuracy (PRA)
The difference between the position contained in the dynamic input data to the HMI and the corresponding geographical position represented on the HMI display.

Probability of Detection (PD)
The probability that each actual target is reported at each update at the output of the Surveillance Element of an A-SMGCS.

Probability of Detection of an Alert Situation (PDAS)
The probability that the Monitoring/Alerting Element correctly reports an alert situation.

Probability of False Alert (PFA)
The probability that the Control service reports anything other than actual alert situations.

Probability of False Detection (PFD)
The probability that the Surveillance Element of an A-SMGCS reports anything other than actual targets.

Probability of False Identification (PFID)
The probability that the identity reported at the output of the Surveillance Element of an A-SMGCS is not the correct identity of the actual target.

Probability of Identification (PID)
The probability that the correct identity of a target is reported at the output of the Surveillance Element.

Reported Position Accuracy (RPA)
The difference, at a specified confidence level, between the reported position of the target and the actual position of the target at the time of the report.

Reported Velocity Accuracy (RVA)
The difference, at a specified confidence level, between the reported target velocity and the actual target velocity at the time of the report.

Response Time to Operator Input (RTOI)
The maximum time delay between the operator making an input on a data entry device of an A-SMGCS HMI and the corresponding action being completed or acknowledged on the HMI display.

Surveillance Capacity
The number of target reports in each period which the Surveillance Element is able to process and output without degradation below the minimum performance requirements.

System Availability
Availability is the ability of an A-SMGCS to perform a required function at the initiation of the intended operation within an A-SMGCS area.

System Capacity
The maximum number of simultaneous movements of aircraft and vehicles that the system can safely support within an acceptable delay commensurate with the runway and taxiway capacity at an airport.

System Continuity
Continuity is the ability of an A-SMGCS to perform its required function without non-scheduled interruption during the intended operation in an A-SMGCS area.

System Integrity
Integrity relates to the trust which can be placed in the correctness of the information provided by an A-SMGCS. Integrity includes the ability of an A-SMGCS to provide timely and valid alerts to the user(s) when an A-SMGCS must not be used for the intended operation.

System Reliability
Reliability is defined as the ability of an A-SMGCS to perform a required function under given conditions for a given time interval.

Target Display Latency (TDL)
The maximum time delay between a target report being received by the A-SMGCS HMI and the corresponding presentation on the HMI display of the target position contained in the report.

Target Report Update Rate (TRUR)
The frequency with which target reports are output from the Surveillance Element of the A-SMGCS.

2 A-SMGCS System Description

This Chapter gives an overview and describes the architecture of a complete A-SMGCS, in accordance with the current conceptual definition. It identifies the major functional elements of the ground equipment and defines the interoperability requirements between them. A-SMGCS is a key enabler for the Integrated Tower Controller Working Position which combines surveillance, controller tools and safety nets for tower controllers.

2.1.1 A-SMGCS Services

This project seeks to outline A-SMGCS services required for the higher implementation levels for FAOR and FACT. The various operational services that constitute the A-SMGCS considering the different users (ATC, flight crew, vehicle drivers). In this way, services can be automated to various degrees. Any service can be added to the basic A-SMGCS service, namely the provision of improved situational awareness to air traffic controllers (ATCOs).

The following Services shall be implemented at both FAOR and FACT.

2.1.1.1 A-SMGCS Surveillance Service
2.1.1.2 Airport Safety Support Service
2.1.1.3 A-SMGCS Routing/Planning Service
2.1.1.4 A-SMGCS Guidance Service

2.2 A-SMGCS System Architecture

2.2.1 A-SMGCS Ground System Functional Architecture

The following data flow chart presents the generic functional architecture of an A-SMGCS Ground System as required.

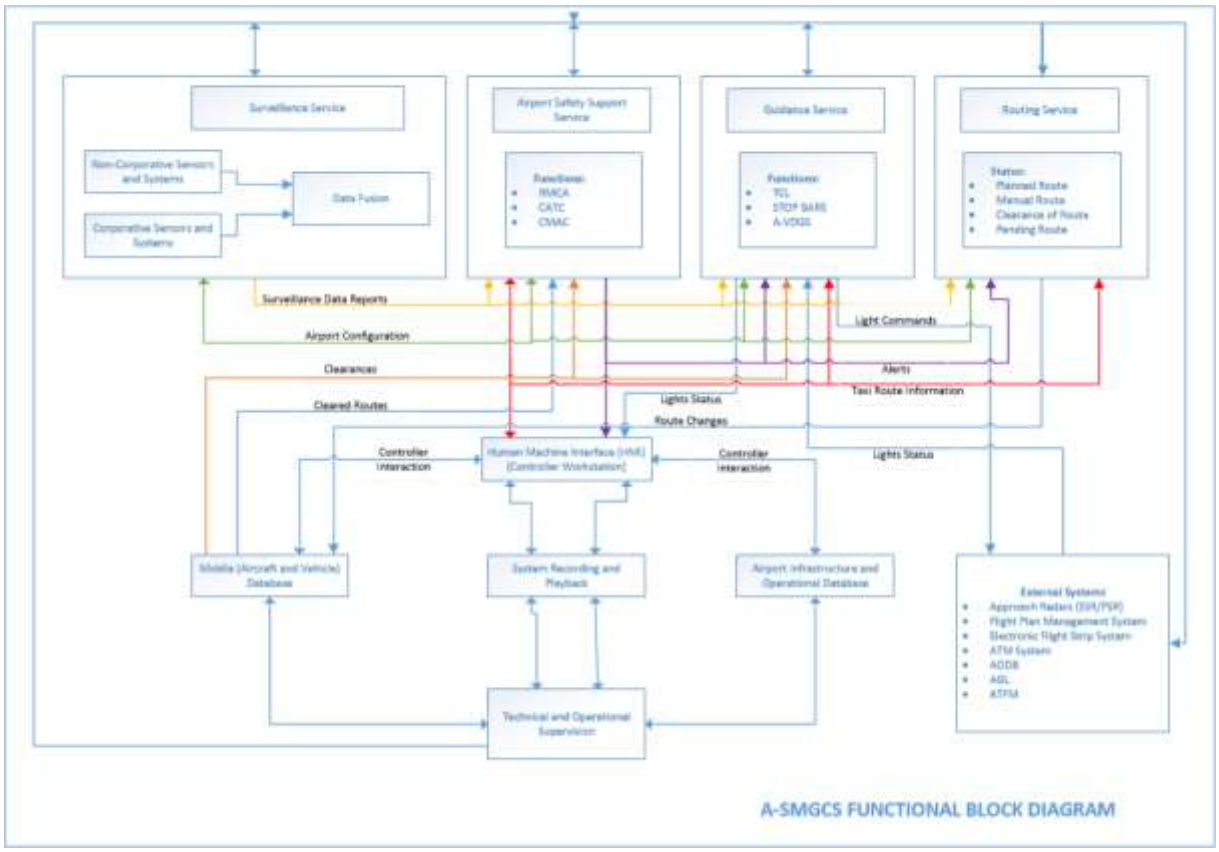

Figure 2-1: Functional Architecture for A-SMGCS Ground System

The various functions are briefly described in the following section. For each connection between two functions, the information exchanged is defined.

2.2.1.1 Provide Traffic Information Function

This function is responsible for the collection and collation of information about mobiles and obstacles relevant to the A-SMGCS application (position, velocity, identity, etc.).

The traffic information shall be collected from different systems: cooperative / non-cooperative surveillance sensors, approach surveillance systems, and vehicle squitters.

2.2.1.1.1 Acquisition of Traffic Information

Traffic information shall be acquired by a combination of cooperative and non-cooperative surveillance means:

- A cooperative surveillance system shall be used to detect and provide the identity of the participating mobiles on the aerodrome surface and in the airspace surrounding the aerodrome. The participating mobiles are those known by the aerodrome authority, and likely to move on the manoeuvring area. All the participating mobiles shall be cooperative, allowing the cooperative surveillance system to collect information about the mobiles, at least their position and identity. In order to ensure rapid deployment, the cooperative surveillance system shall be based on current technologies being

implemented on aircraft, such as transponders for Automatic Dependent Surveillance - Broadcast (ADS-B) and Mode S Multilateration (MLAT).

- A non-cooperative surveillance system shall be used to detect any mobile or obstacle on the surface, whether participating or not, including intruders. Depending on the bidder's system design, this system may comprise multiple sensors of different types (e.g. SMR). The non-cooperative surveillance system shall provide accurate position information and information about the size, and possibly shape, of objects detected on the movement area of the aerodrome surface.

Existing approach Radar Data Processing Systems (RDPS), which are non-cooperative and cooperative surveillance systems, shall be used to provide the information (at least position and identity) on airborne aircraft needed by the A-SMGCS. This surveillance data shall also be collected from other ground sensors such as Multilateration and ADS-B.

2.2.1.1.2 Acquisition of Other Information about Traffic

The A-SMGCS shall use other information about traffic; typically, flight plan, stand allocation, squawk code, etc. Such information shall be available from other ground systems at the airport, such as Flight Data Processing System (FDPS) (for flight plan, etc.), Code-Callsign Database (CCDB) (for allocated Mode A code) and Airport Operational Databases (AODB) (for stand allocation, etc.).

2.2.1.1.3 Data Fusion

All the traffic information provided by these different sources needs to be computed in order to obtain a consistent and continuously updated traffic information picture. This shall be performed by the "Data Fusion" function.

The information provided by the different surveillance sensors and traffic information sources shall be combined by a data fusion process to provide a comprehensive surveillance package. The output shall be continuously updated track for each mobile and obstacle, including all necessary parameters and information associated with each track.

Traffic Information shall be distributed to all users and to other Ground and On-board functions that require it.

2.2.1.2 Provide Traffic Context Function

This function shall be responsible for the provision of traffic context information such as airport configuration, runways status, separation minima, etc. Some of this information, such as the layout of runways and taxiways, shall be relatively static, whereas other, such as runways in use, taxiway closures, weather conditions, shall change frequently. The traffic context data shall be automatically obtained from other systems (airport databases, meteorological systems, etc.), or updated by human operators.

2.2.1.2.1 Acquisition of Traffic Context from Other Ground Systems

This function shall be responsible for the automatic provision of the traffic context information obtained from other systems. It shall interface to Airport Information Databases, Meteorological Information Systems, etc.

2.2.1.2.2 Manual Update of Traffic Context

This function shall be responsible for the provision of traffic context information (airport configuration, runways and taxiway status, etc.) updated by human operators.

2.2.1.2.3 Update Traffic Context

The Traffic Context information provided by the different sources (automatic or manual) shall be combined to provide a comprehensive traffic context package for distribution to users and to other Ground and On-board functions that require it.

2.2.1.3 Conflict Detection and Alerting Function

This A-SMGCS Ground system function shall monitor the Traffic Information and utilise Traffic Context information in order to detect and predict conflicts involving aircraft and to alert users of hazardous situations. Users primarily being Air Traffic Controllers (ATC) but in some situations, for example when there is imminent collision danger, it may be required to transmit alert information directly to pilots and/or vehicle drivers. This function shall also monitor a movement's conformance with the assigned route and provide an alert in the event of deviation.

2.2.1.4 Provide Taxi Route Function

This function shall be responsible for the provision and assignment of a suitable taxi route to each aerodrome movement. It shall make use of Traffic Information and Traffic Context information to compute a taxi route from a stand to a runway entry point for a departing aircraft or from a runway exit point, once detected, to a stand for an arriving aircraft. In addition, it shall provide routes for other movements of aircraft on the aerodrome movement area and for vehicle movements, if required.

From the Traffic Information, the "Provide Taxi Route" function shall obtain information about the:

- Type of movement
- Type of aircraft, if the movement is an aircraft
- Start point (e.g. stand for departures, runway exit for arrivals)
- End point (e.g. stand for arrivals, assigned runway entry point for departures)

From the Traffic Context, the "Provide Taxi Route" function shall obtain information about the:

- Layout of the runways and taxiways
- Stand locations
- Intermediate waypoints (e.g. temporary parking positions)
- Local standard routes
- Local taxi restrictions (closed or restricted-use taxiways, restricted areas)
- Obstacles and temporary hazards

2.2.1.5 Provide Departure Time Function

This function shall be responsible for the computation of an optimal departure sequence aimed at minimising delays from start-up to take-off and the provision of optimum start-up pushback and take-off times for each departing aircraft.

The "Provide Departure Time" function shall make use of the "Provide Traffic Information" function to obtain information about:

- ETA and ATA for Arrivals
- CTOT or ETD or confirmed/estimated Off-Block Time for Departures
- Type of aircraft
- Destination
- Prioritised flights

It shall make use of the "Provide Traffic Context" function to obtain information about:

- Separation minima
- Standard Instrument Departure (SID) Routes
- Runway(s) in operational use (including mixed-mode or single-mode)
- Intersection take-offs (runway entry points)
- Additional constraints set by the ATCO (including runway closures for inspection)

The output of the “Provide Departure Time” function shall be information about optimal (targeted) start-up, pushback and take-off times to the users.

2.2.1.6 Provide Ground Clearances Function

This function shall be responsible for the preparation and provision of clearances and taxi route information to aircraft. It shall be interoperable with the on-board side to receive clearance requests, to transmit clearances and to transmit and receive acknowledgements.

2.2.1.7 Service Monitoring Function

This function shall monitor the quality of service of the A-SMGCS (equipment status, performances, operational failures, etc.) and shall generate an alert when the A-SMGCS must not be used for the intended operation. As well as monitoring the status of the ground equipment, the “Service Monitoring” function shall receive information about the status of on-board systems used for A-SMGCS.

2.2.1.8 Interface with User Function

This function shall be the interface with the ground-side users, predominantly controllers but also technical staff responsible for monitoring and maintaining the serviceability of the system.

The “Interface with User” function shall provide the ground-side users with the following information:

- Traffic information
- Traffic context information
- Conflict alerts
- Taxi route proposals
- Departure time proposals
- Aircrew requests and acknowledgements
- Serviceability alerts

Via the “Interface with User” function, users shall have a means to interact with the system to filter the information according to their needs and to input or modify some items of information.

2.2.2 Overall Ground System Architecture

In order to meet operational requirements for modularity and expandability, the A-SMGCS shall comprise several primary system elements linked together via local area network (LAN), employing standard data communications interfaces and protocols. The A-SMGCS shall utilise external resources, including surveillance sensors, ATM information systems and Airport information systems, to which it is connected via LAN gateways.

The system shall make maximum use of well-proven COTS hardware and software components. Client-Server architecture and inter-process communication shall be adopted throughout the system.
There are four primary functional elements of an A-SMGCS, as specified by ICAO:

a) Surveillance: to provide accurate position information on all movements within the movement area and to provide identification and labelling of authorized movements;

b) Control: to provide continuous interpretation of the traffic situation, including verification of planned events, and detection and alerting of potential conflicts and other hazardous scenarios;
c) Routing (including Planning): to provide designation of routes and allocation of times to aircraft and vehicles; and
d) Guidance: to provide clear indications to pilots and vehicle drivers to allow them to follow their assigned routes and to maintain situational awareness.

Each of these functions shall be realised by an associated Data Processing System, which may comprise multiple modules and processes.

Requirements for Surveillance, Airport Safety Support Service, Routing/Planning and Guidance are listed in Chapters 4, 5, 6 and 7 respectively.

Each function shall be accessible to controllers via a suitable HMI. The Controller HMI requirements are provided in Chapter 8.

To support the primary functions, the A-SMGCS shall include at least four (4) other elements:

a) A configuration database: to provide topological information and operational status information about the aerodrome, as well as configurable system parameters;
b) A service monitoring system: to monitor and report the serviceability status of the A-SMGCS components and data sources;
c) A recording and playback system: to record data communications, voice communications, and displayed information, including operator inputs, for accident and incident investigation; and

Requirements for these supporting functions are provided in Chapter 9.

The A-SMGCS shall have the capability to provide information to other systems and users to include:

a) Provision of surveillance and planning information to Apron Management;
b) Coordination with Approach Control;
c) Provision of surveillance, guidance and control information to aircraft via air-ground data links;
d) Provision of surveillance, guidance and control information to vehicles via data links
e) Control and monitoring of aerodrome ground lighting; and
f) Provision of event data (actual times of arrival and departure, routes taken, taxi times, etc.).

2.2.3 Interface Standards

It is desirable, wherever possible, to standardise interfaces in order to ensure interoperability of equipment from different manufacturers.

2.2.3.1 Physical Interfaces

The preferred physical interface is the Ethernet/Fast-Ethernet 10/100 Mbit/s (10BaseT/100BaseTX) local area network (LAN) connection.

The A-SMGCS shall provide any necessary format conversion.

2.2.3.2 Protocols and Data Formats

The following OSI protocols are preferred for A-SMGCS interfaces:

- At the Physical Layer, IEEE 802.3/802.3u (Ethernet 10BaseT/100BaseTX)
- At the Network Layer, Internet Protocol (IP)

- At the Transport Layer, User Datagram Protocol (UDP) for surveillance target reports and other time-critical data, and Transport Control Protocol (TCP) for more secure, but less time-critical, data transmission.

Various data formats exist for the different external interfaces. These are listed below. The A-SMGCS shall provide any necessary conversion to its internal format.

- Surveillance Systems
  For surveillance systems and sensors, the EUROCONTROL ASTERIX standard data format is used.
- Airport/ATM Information Systems
  These interfaces will include AFTN/AMHS, Flight Data Processing Systems (FDPS), Code-Callsign Databases (CCDB), Airport Operational Databases (AODB), Meteorological Information Systems (MET), and others.
- Airport Reference Clock
  The A-SMGCS shall be synchronized to its own redundant NTP service. ATNS systems employ GPS clocks and transmit the data via LAN using the network time protocol (NTP).
- Ground Guidance Means
  Interfaces to Airport Ground Lighting (AGL) systems.

3 General Ground System Technical Requirements

In this section are listed the technical requirements related to the Design, Evolution, Operational Range, Environmental Constraints and Interfaces applicable to the overall A-SMGCS ground system and its components. These general requirements are valid at all levels of implementation of an A-SMGCS. Most requirements have been derived from ICAO Doc 9830 documents.

3.1 General Ground System Functional Requirements

3.1.1 Service Provision

A. The A-SMGCS shall provide equipment and interface capabilities to support the Surveillance service.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The A-SMGCS shall provide equipment and interface capabilities to support the Routing service.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The A-SMGCS shall provide equipment and interface capabilities to support the Guidance service for stop bar and runway in use information.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

A. The A-SMGCS shall provide equipment and interface capabilities to support the Airport Safety Support service.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.2 Modularity, Scalability and Adaptability

A. The A-SMGCS equipment shall comprise hardware and software modules.

The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The system shall be based as far as practicable on commercial off-the-shelf (COTS) hardware and software components.
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The modules shall be such that the system can be dimensioned according to the needs of the different aerodromes.
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The modules shall be such that further components can be added in order to expand the system in terms of functionality and number of users and regular software updates provided as and when they become available.
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. It shall be possible to add additional modules of ground equipment when required for the operation of the proposed A-SMGCS infrastructure.
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

F. An open architecture using COTS equipment and standard interfaces shall be proposed in order to permit system enhancements at minimal cost.
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

G. To accommodate changes to the aerodrome layout after installation, it shall be possible to reconfigure the A-SMGCS equipment and to integrate additional modules such as additional surveillance sensors.
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

H. Adaptation of the equipment to different local site configurations, procedures and working methods shall be done through an appropriate database (sensor positions, airport topography/topology, etc.).
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.3 Traffic Types

A. The design of the equipment shall be such that its functional performance is independent of the different types of aircraft and vehicles that are likely to use the aerodrome during the life expectancy of the equipment.
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The A-SMGCS equipment shall exchange relevant data with appropriately equipped vehicles operating within the movement area.
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.4 Operating Conditions

A. The performance of A-SMGCS equipment shall not be significantly degraded due to meteorological conditions, topographical conditions or poor visibility conditions in which operations would otherwise be possible.
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The outdoor equipment shall operate in the following environmental conditions:
   a. Temperature: -10°C to +55°C
   b. Rainfall: Up to 150mm/hr
   c. Hail: Up to 25mm diameter at 17m/s
   d. Wind Speed: Up to 150 km/h operational;
   e. Up to 186 km/h survival (3s gust)

The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

C. The outdoor equipment, including any enclosure, shall utilise materials, coatings and finishes which are resistant to weathering and to industrial pollutants such as sulphur dioxides and/or nitric oxides and shall be UV resistant.
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The indoor equipment shall operate in the following environmental conditions:
   a. Temperature: +5°C to +35°C
   b. Rel. Humidity: 10% to 80% non-condensing

The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The equipment shall comply with relevant international standards or codes of good practice, including but not limited to the following:
   a. Grounding and power distribution
   b. Inflammable atmospheres
   c. Human exposure to radiation
   d. Hazardous substances

The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.5 Power Requirements

A. Electrical equipment shall operate from standard mains voltage and frequency at the two airports. All equipment shall operate with an un-interrupted AC power supply of 230 Volts (±10%) single phase, 50 Hz (± 5%). Power Supply modules shall withstand above stated variation in mains voltage and frequency.

The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The tenderer shall provide a detailed breakdown of total power requirements of the offered system.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.6 Masts

A. All masts that will be used shall be established on solid foundations to ensure that they remain steady and firm.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. All masts shall support the weight of the components that they are intended to support for the intended life expectancy of the system.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. All masts shall be corrosion resistant and withstand the outdoor environmental conditions as stipulated herein.

The Tenderer shall provide a response detailing how their offered masts meet this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

D. All masts shall adhere to the obstacle limitation in accordance with the latest edition of ICAO Annex 14 Volume 1 Chapter 4 (Obstacle Restriction and Removal).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. All masts shall be installed with obstruction lights that comply with the latest edition of ICAO Annex 14 Volume 1 Chapter 6 (Visual aids for denoting obstacles).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. All parts of the obstruction light that are plastic shall not change colour, crack or disintegrate due to exposure to ultraviolet radiation.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.7 Equipment Cabinets

A. The system shall be installed into a standard equipment cabinet that will fit onto a floor size of 600 mm x 600 mm.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The equipment cabinet shall make provision for access to the system for maintenance purposes.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The equipment cabinet shall be designed to account for natural heat dissipation.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The equipment cabinet shall incorporate a proper cable management system for routing of cables.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The equipment cabinet shall make provision for cooling of equipment.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.8 Training Platform

A. The highly complex working environment and sophisticated HMI required for an A-SMGCS requires training to ensure the continued competence of operating staff (ATC's). The training platform shall be proposed to ensure that staff are able to operate and provide continued maintenance of the equipment, and that they are fully trained in situations where automated functions need to be taken over after a failure. This training platform shall not only be available in the initial phases of introduction but shall be available for continuous training to maintain staff competency.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. A training platform shall have a simulator or simulation software where different scenarios are created with radar tracks, MLAT tracks and flight plans for system calibration and training.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

C. The training platform shall be interfaced to Approach Radars, MLAT, SMRs, AFTN (test platform) and AGL

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The training platform shall simulate the results of some of its functions particularly those that are relevant to external systems interfaced with the system (e.g. switching stop bars on/off).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The training platform shall accommodate the testing of students on the system for instructors to have a better judgement of their level of competency of the students.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. Changes and use of the training platform shall in no way impact on the performance of the operational system.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.9 Networking Requirements

A. The A-SMGCS LAN shall be designed, supplied and installed as a dual redundant network, using separate network equipment and cabling for each LAN. All workstation and servers shall use the redundant LANs in such a way that failure of a single LAN shall not affect any operational functionality of servers or workstations.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

B. ATNS operates a closed redundant fibre communication network for all CNS infrastructure installed at each of the two airports. The fibre routes at each airport are provided to tenderers for information only and should not be a limitation on the placement of the A-SMGCS sensors. The current FACT and FAOR fibre routes are attached as appendices, see “FACT Fibre Upgrade (October 2019).kmz” and “FAOR Fibre Upgrade (October 2019).kmz”.

If the coverage analysis reveals that the ATNS fibre infrastructure requires extension, the tenderer shall propose the necessary measures to ensure that the new A-SMGCS sensors are connected to the fibre network. The associated costs shall be included in Volume 1C.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The Tenderer shall provide all network peripherals and interface media required to connect their proposed sensors and equipment to the ATNS network.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.10 Server Requirements

A. To ensure high system availability, servers shall be supplied in a dual redundant configuration, where one server is the “active”, and the other is a “hot standby”.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.11 Controller Working Position (CWP) Requirements

A. The controller HMI shall be installed at four (4) Controller Working Positions (CWPs) within the FAOR control tower cab and four (4) CWPs within the FACT control tower cab.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The controller HMI shall also be installed at two (2) CWPs within the FAOR fire tower and at two (2) CWPs within the FACT radar tower for disaster recovery purposes.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The system and equipment that will be used for disaster recovery, test and evaluation (software and external sources integration evaluation) shall be installed in the System Support Suites (SSS) at both airports and shall have simulator or simulation software where different scenarios are created with radar tracks, MLAT tracks and flight plans for system calibration and training. This system shall interface with approach radars, MLAT, AFTN, MET, SMRs and AGL.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The system HMI for technical support personnel shall be installed at two (2) positions at both FAOR and FACT, one within the SSS and one within the equipment room.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.12 Installation Requirements

A. Any A-SMGCS equipment installed in the movement area shall comply with obstacle limitations requirements in accordance with ICAO Annex 14.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. Siting of equipment shall consider the adverse effects of signal reflections and shadowing caused by aircraft in flight, vehicles or aircraft on the ground, buildings or other raised obstacles (fixed or temporary) in or near the aerodrome environment, so that performance requirements are met. The contractor shall be responsible for all the necessary aeronautical surveys at each of the aerodromes.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

C. Audible noise and vibration from the equipment shall be confined to within acceptable levels commensurate with the environment. This is particularly important in the tower visual control room(s).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.13 Electromagnetic Compatibility

A. Equipment shall have appropriate EMI/EMC characteristics for operation in an airport environment.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. Equipment and associated data links shall include appropriate lightning conductors and transient protection to ensure continued operation during lightning storms without equipment failure.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.14 Reliability

A. The equipment shall sustain operations for 24 hours a day throughout the year.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The equipment shall be installed and configured in such a way that all possible essential maintenance can be carried out without interrupting operation.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

C. Appropriate data integrity checks shall be employed to ensure that erroneous data is not provided to users.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. Appropriate levels of redundancy shall be provided for equipment that is to be continuously available.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.15 Service Monitoring

A. The A-SMGCS shall include built-in test equipment (BITE) to monitor the operational status of all A-SMGCS equipment.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The BITE shall detect operationally significant failures and shall generate alerts when the system must not be used for the intended operations.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The BITE shall perform a continuous validation of data provided to the user and generate a timely alert to the user when the system must not be used for the intended operation.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

3.1.16 System Failure

A. Appropriate redundancy shall be provided to ensure that a failure of one item of equipment does not result in a loss of basic functions.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. Equipment shall be both fail-safe and fail-soft.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. Operationally significant failures such as loss of a data source or unreliable or degraded performance shall be reported at the local technical desk.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. All critical items of equipment shall be provided with timely audio and visual indications of failure.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.1.17 System Restart

A. All items of the equipment shall be self-restartable.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

B. The recovery time after a restart of any item of equipment shall not exceed 60 seconds.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The restart of an item of equipment shall include the restoration of pertinent information on actual traffic and equipment performance.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.2 General Ground System Performance Requirements

3.2.1 Target Velocity

A. The performance of the A-SMGCS equipment shall as far as possible be independent of target velocity, within the following ranges:
   a. 0 to 250 kt for aircraft on final approach, missed approach and runways
   b. 0 to 80 kt for aircraft on runway exits
   c. 0 to 80 kt for vehicles on the movement area
   d. 0 to 50 kt for aircraft on straight taxiways
   e. 0 to 20 kt for aircraft on taxiway curves
   f. 0 to 10 kt for aircraft on stands and stand taxi lanes
   g. Any direction of movement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.2.2 Capacity

A. The equipment shall have enough capacity to process data for at least 500 targets per second simultaneously.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. When installed, the processing equipment shall have a margin of spare capacity of at least 50%.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.2.3 Coordinate System

A. All geographical information shall be referenced to a common reference point on the aerodrome. This point shall be referenced in WGS-84.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The reference point for target position data shall be the mid-point of the target's longitudinal axis.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The Surveillance Service shall be capable of processing a containment radius of the smallest circle, centred on the Target Position Reference Point (TPRP), which completely encircles the target.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.3 Interface Requirements

3.3.1 Interface Principles

A. Wherever possible and practicable, the A-SMGCS shall utilize standard data communications interface protocols and data formats.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The system software applications shall use extensive client-server architecture and inter-process communication.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The inter-process communication level shall support process distribution via LAN, using TCP/IP.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

3.3.2 Time Synchronisation Interface

A. The A-SMGCS shall be synchronised with its own redundant reference clock Network Time Protocol (NTP) service so that all date and time indications used within the system agree with the reference time.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The synchronisation standard used shall be the Network Time Protocol (NTP)

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4 Surveillance

4.1 Surveillance Sensor Systems

Multiple surveillance sensor systems shall be used to provide acquisition of traffic information for all traffic on and near the aerodrome. In order to detect all types of aircraft, vehicles and obstacles, the sensor systems shall be a mix of cooperative and non-cooperative types. Each sensor system shall include pre-processing and plot extraction.

Outputs from the sensor systems shall be target reports in the ASTERIX data format. Each target report shall be time stamped.

4.1.1 SSR/PSR

Position and identity of airborne aircraft will be provided to the A-SMGCS by existing approach surveillance radars. To ensure both cooperative and non- cooperative surveillance, the approach surveillance system comprises both primary and secondary surveillance radars (PSR and SSR) feeding a multi-sensor Radar Data Processing System (RDPS).

4.1.2 MLAT

A cooperative surveillance sensor shall be used to provide the position and identity of the participating mobiles on the surface. The participating mobiles are those known by the aerodrome authority, and likely to move on the manoeuvring area. All the participating mobiles are required to be cooperative, allowing the cooperative surveillance sensor to collect information about the mobiles, at least their position and identity.

MLAT shall be the main cooperative sensor system for the A-SMGCS ground surveillance because it can utilise the Mode A/C/S transponders that are already standard equipment on aircraft. MLAT ground stations are also capable of receiving and decoding 1090ES ADS-B transmissions.

4.1.3 ADS-B

In the A-SMGCS ground domain, the use of ADS-B is to be used as a supplement to MLAT. In the longer term, it could perhaps replace MLAT once all aircraft are suitably equipped and the reliability and integrity requirements for the A-SMGCS application are met.

4.1.4 SMR

A non-cooperative surveillance sensor shall be used to detect mobiles and obstacles, including intruders, on the aerodrome surface.

The SMR has been chosen for the task of non-cooperative surveillance of the aerodrome surface, being a well-proven technology that is already in use at both airports as part of the A-SMGCS. Multiple SMRs or other non-cooperative sensor systems may be required and proposed by the bidder to meet coverage requirements and/or to provide false target mitigation.

4.2 Traffic Context Information

The Surveillance function of the A-SMGCS requires some traffic context information (e.g. maps of sensor coverage). Traffic context information (airport layout, configuration, runways status, etc.) required by the A-SMGCS shall be provided from the Configuration Database and other systems, such as Airport Operational Database (AODB) and Meteorological System (MET), etc.

There shall be two types of Traffic Context data from different sources:

a) Static (or semi-static) Data, which rarely changes, such as aerodrome layout, and which would require update by a human operator; and
b) Dynamic Data, which can change often, such as runway status and meteorological conditions, and which shall be obtained automatically from other systems.

4.2.1 Other Traffic Information

Other traffic information (e.g. aircraft type, stand, etc.) which shall be required by the A-SMGCS shall be provided by other systems, such as a Flight Data Processing System (FDPS).

4.3 Surveillance Data Fusion

Data from surveillance sensor systems and other information sources shall be fed to the Surveillance Data Fusion (SDF) system via suitable LAN gateways. The surveillance information provided by the different sources shall be combined by a data fusion process to provide a comprehensive surveillance package.

The process of data fusion shall be employed to link together all relevant information pertinent to a specific aerodrome movement.

Surveillance systems shall provide the SDF with target reports for each mobile or obstacle detected by sensors. Target track processing in the SDF shall determine the position of each target based on its previous positions and on each new Target Report received from the surveillance sensor systems.

Flight data processing in the SDF shall assemble all available information related to current or planned movements and maintain a local database, which shall be used to associate each tracked target to its flight plan. If available, information to uniquely identify the target with its callsign shall be linked to the target track.

Complete traffic information in the form of integrated target data shall be distributed to clients for presentation or further processing.

To enable higher-level services, the SDF shall monitor the progress of each aircraft movement and send a flight progress report to declared clients whenever the status of a movement changes (e.g. start-up clearance, pushback clearance, target detected moving from one topological segment of the aerodrome to another, etc.).

For departure management processing the SDF shall receive timing and sequencing data for each departure movement.

The SDF shall monitor the status of each of the attached sensor systems and information sources and send status reports, including its own status, to the central A-SMGCS Service Monitoring System.

4.4 Surveillance Function Requirements

4.4.1 Basic function

A. The surveillance equipment shall detect and continuously provide accurate positional reporting on aircraft, vehicles and obstacles; whether moving or static.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The surveillance equipment shall detect and continuously provide accurate positional reporting on aircraft, vehicles and obstacles; within the aerodrome movement area.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The surveillance equipment shall detect and continuously provide accurate positional reporting on aircraft, vehicles and obstacles; within the runway strips.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The surveillance equipment shall detect and continuously provide accurate positional reporting on aircraft, vehicles and obstacles; within any designated protected area.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The surveillance equipment shall detect and continuously provide accurate positional reporting on aircraft on approach, out to a distance such that inbound aircraft can be integrated into the A-SMGCS operation.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. The surveillance equipment shall detect and continuously provide accurate positional reporting on aircraft on approach, up to an altitude so as to cover missed approaches and low-level helicopter operations.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

G. Having detected a target in any of the areas defined above, the surveillance equipment shall provide users with information on target position.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

H. the surveillance equipment shall provide users with information on target identity (for identifiable cooperative targets).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

I. the surveillance equipment shall provide users with information on target classification (for non-cooperative or unidentifiable targets).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

J. the surveillance equipment shall provide users with information on track history (at least the last three reported positions).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

K. The surveillance equipment shall detect obstacles, whether moving or stationary, located anywhere on the movement area of the aerodrome and having an equivalent radar cross section of 1 square metre or more.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

L. Objects detected on the movement area shall be classified according to size.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

M. The surveillance equipment shall provide users with information on target speed.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

N. The surveillance equipment shall provide users with information on direction of target movement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

O. The geographic volume of interest on and around the airport, within which the A-SMGCS must provide the required surveillance performance capabilities.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.4.2 Surveillance Equipment

A. The surveillance equipment shall comprise multiple sensor systems and data fusion. The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The surveillance system shall be capable of expansion to accept and integrate data from other surveillance sensor sources in the future.
The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The surveillance equipment shall include at least one (1) non-cooperative surveillance sensor system to detect and determine the position of mobiles and obstacles on the movement area of the airport. The bidder shall propose a SMR as a non-cooperative sensor.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. SMR systems shall comply with the minimum operational requirements in EUROCAE ED-116. The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The surveillance equipment shall include at least one (1) cooperative surveillance sensor system to detect and determine the position of cooperative mobiles on the movement area of the airport. The bidder shall propose MLAT/ADS-B as cooperative sensors.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. MLAT systems shall comply with the minimum operational requirements in EUROCAE ED-117. The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

G. The cooperative surveillance sensor system(s) shall also determine the identity of cooperative mobiles on the movement area of the airport. The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

H. The SDF shall connect to the airport's approach RDPS to obtain the positions of airborne aircraft in the required areas. The Tenderer shall provide a response detailing how their offered system meets this requirement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.4.3 Target Reports

A. Each surveillance sensor system shall transmit continuous target position reports to the SDF.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. As a minimum, each target report from a surveillance sensor system shall include the following information:
   a. Data Source Identifier
   b. Target Report Descriptor
   c. Target Position
   d. Time of Measurement

   If available, the following additional information shall be provided:
   a. Target Identifier (e.g. Callsign or SSR Mode A code)
   b. Target Size Classifier
   c. Measured Height
   d. Estimated Accuracy of Position

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. Target position reports shall use a common reference system, WGS-84 datum. Target positions may be in LAT/LON or Cartesian coordinates referred to a common reference point on the aerodrome surface.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. Target position reports shall use a common reference point on aircraft and vehicles. This point has been defined as the geometrical mid-point on the longitudinal axis of the target.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The SDF shall perform correlation of target report data from the sensors and shall track target movements in order to determine the best estimate of the target position at each update.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. The SDF shall provide a seamless transition between the airborne track for an aircraft and its ground track.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.4.4 Other Information about Traffic

A. The SDF shall obtain other information about the traffic through appropriate interfaces to other systems.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. For each aircraft the information required shall include:

a. ATC Callsign
b. Mode A code
c. Mode S code
d. Departure Airport
e. Destination Airport
f. Estimated Time of Arrival/Departure
g. Stand identifier
h. Aircraft type
i. Wake Vortex Category
j. Slot time
k. SID/STAR
l. Stand status (occupied/free)
m. Assigned runway
n. Estimated and Actual Off Block Times

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. For each vehicle the information required shall include:
a. ATC Callsign
b. Transponder code (Mode S or other type)
c. Vehicle type
d. Vehicle fleet identifier

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. For each tracked target, the SDF shall extend the target report data to include the other relevant information available.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.4.5 MLAT/ADS-B Ground Station

A. The MLAT/ADS-B Ground Station cases and antennas shall be mounted on a suitable building, mast, or tower. The chosen site shall permit clear line of sight to all parts of the specified coverage area. If necessary, multiple stations shall be installed, to ensure full coverage for the complete airport movement area.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

B. The MLAT/ADS-B Ground Station shall include performance and integrity monitoring based on one or more field-mounted test transponders, enabling the verification of the end-to-end performance of the MLAT/ADS-B system.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.5 Surveillance Performance Requirements

The performance requirements for surveillance are mainly the accuracy, timeliness and reliability of the target report information provided by the Surveillance function.

4.5.1 Coverage

A. The A-SMGCS equipment shall provide surveillance coverage throughout the movement area up to a height of at least 200 meters.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The RF coverage volume shall be determined by RF field simulation analysis. This should inform the proposed co-operative and non-corporative sensor locations. The tenderer shall provide with their response the proposed sensor locations together with their simulated coverage analysis.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.5.2 Accuracy and Resolution

A. The reported position accuracy of the surveillance data transmitted from the SDF to clients shall be 7.5m or better on the manoeuvring area and 12m or better on the aprons, both at a confidence level of 95%.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The resolution of the position data in a target report shall be better than 1 m.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The accuracy of the target speed data transmitted from the SDF to clients shall be better than 5m/s at a confidence level of 95%.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The accuracy of the direction of movement data transmitted from the SDF to clients shall be better than 10° at a confidence level of 95%.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The resolution of the speed data in a target report shall be better than 1 m/s.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. The resolution of the direction of movement data in a target report shall be better than 1.5°.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

G. For an airborne aircraft, the accuracy of the target measured height, if transmitted from the SDF to clients, shall be 10 m or better at a confidence level of 95%.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

4.5.3 Velocity Range

A. The surveillance equipment shall detect and track targets within the following velocity ranges:
   a. 0 to 250 kt for aircraft on final approach, missed approach and runways
   b. 0 to 80 kt for aircraft on runway exits
   c. 0 to 80 kt for vehicles on the movement area
   d. 0 to 50 kt for aircraft on straight taxiways
   e. 0 to 20 kt for aircraft on taxiway curves
   f. 0 to 10 kt for aircraft on stands and stand taxi lanes
   g. Any direction of movement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.5.4 Update Rate

A. An updated target report shall be transmitted from the SDF to the clients at least once per second for each target.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.5.5 Data Integrity

A. The probability that each actual aircraft, vehicle or object is detected and reported at each update at the output of the SDF shall be 99.9% at minimum.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The probability that anything other than an actual aircraft, vehicle or object is detected and reported at the output of the SDF shall not exceed 10^{-3} per reported target.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The probability that the correct identity of a cooperative aircraft, vehicle or object is reported at the output of the SDF shall be 99.9% at minimum.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The probability that the identity reported at the output of the SDF is not the correct identity of the actual aircraft, vehicle or object, shall not exceed 10^{-3} per reported target.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.5.6 MLAT/ADS-B Ground Station

A. The delay between the Mode S signal reception and outputting the target report from the MLAT/ADS-B Ground Station shall not exceed 0.25 seconds.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The MLAT/ADS-B Ground Station shall support 500 targets at a time creating one target report per target at least once per second.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. For a target that correctly transmits its position, the MLAT/ADS-B Ground Station shall extract and provide the correct target position with a probability of better than 99.9%.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. For a target that correctly transmits its identity, the MLAT/ADS-B Ground Station shall extract and provide the correct target identity with a probability of better than 99.9%.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The probability of the MLAT/ADS-B Ground Station outputs False Targets shall be less than 10^{-4}.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. The probability that the MLAT/ADS-B Ground Station incorrectly identifies a target that correctly transmits its identity shall be less than 10^{-6} over any 5-second period per target.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.5.7 Raw Data Requirements

A. The MLAT system shall continuously time stamp and record all data, including the raw data from all sites, received from the remote sites, the target outputs of the CPS and the status of the system without impacting the operational status as detailed in EUROCAE ED-142.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The MLAT system shall continuously record and time stamp all access attempts, actions and configuration changes.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. A dedicated Technical Maintenance position (RCMS) will be available for MLAT system availability indication, local maintenance and monitoring and control.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. Any software tools required to analyse the MLAT raw data for system performance measurements and/or fault-finding purposes, shall be included.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The MLAT system shall allow ATNS authorised personnel to select an aircraft track for playback and to monitor which receivers were contributing to the reported track.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. The MLAT system shall allow ATNS authorised personnel to select an aircraft track for playback to monitor which interrogators interrogated the selected aircraft.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

G. The MLAT system shall be able to save, print and/or export all tracks, the contributing receivers and interrogators that interacted with the aircraft for a selectable period. The data shall be in saved in standard human readable formats (such as .csv).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

H. The live MLAT situational display system shall allow ATNS authorised personnel to select a live current aircraft track to monitor which receivers are contributing to the reported track.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

I. The live MLAT situational display system shall allow ATNS authorised personnel to select a live current aircraft track to monitor which interrogators are contributing to the reported track.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.6 Interface Requirements

Surveillance data exchange shall use the ASTERIX data format. Surveillance sensor systems, SMR, MLAT and ADS-B, specifically intended for airport surface movement applications, shall use the ASTERIX Category 010, Category 019, Category 020 and Category 021 standard. ASTERIX Category 011 and Category 062 shall be used as the data format for exporting data-fused A-SMGCS surveillance data to other users.

4.6.1 Data Sources

A. The equipment shall interface to the flight data processing system at the airport.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. To receive data on airborne aircraft in the vicinity, the A-SMGCS surveillance equipment shall be interfaced to the approach surveillance system at the airport.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The equipment shall interface to a processing system of the airport to obtain stand information regarding aircraft about to land or depart.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

D. If necessary, to achieve the required performance, the equipment shall interface to a MET system to obtain meteorological data.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. To obtain information about the status of stop bar lights, the equipment shall interface to the aerodrome ground lighting system.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.6.2 Data Communication Protocols

A. The Surveillance function shall comply with the general interface requirements given in section 3.3.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.6.3 Data Formats

A. Target position reports output from surveillance sensor systems shall be in the ASTERIX data format.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The SDF shall receive input target report data from SMR and other non-cooperative ground sensor systems in the ASTERIX CAT010 data format.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The SDF shall receive input target report data from MLAT/ADS-B and other cooperative ground sensor systems in the ASTERIX CAT010, CAT019, CAT020, and CAT021 data format.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The SDF shall receive input target report data from approach radar systems in the ASTERIX CAT001, CAT002, CAT034, and CAT048 data formats.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The output data of the SDF shall be in the ASTERIX CAT011 and CAT062 data format.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. It shall be possible to route the output data of the surveillance data fusion to pre-defined clients.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

G. Client processes using the surveillance data shall receive and decode data in the ASTERIX CAT011 and CAT062 data format.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

4.6.4 MLAT/ADS-B Ground Station

A. The MLAT/ADS-B Ground Station shall output target report data to the SDF via LAN using the ASTERIX CAT010, CAT019, CAT020, and CAT021 data formats.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The MLAT/ADS-B Ground Station shall output a periodic service message to the SDF at a rate of once per second. As a minimum, the system shall report 3 types of status: operational, degraded and NOGO. At a minimum, the message shall contain the following ASTERIX CAT010 or CAT023 data fields:
   a. Message Type
   b. Data Source Identifier
   c. Time of Day
   d. System Status

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The MLAT/ADS-B Ground Station shall interface with the A-SMGCS time reference using the Network Time Protocol (NTP) for the purpose of time synchronisation. The ground station shall work on a distributed time principle.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

5 Airport Safety Support

5.1 Architecture

The Airport Safety Support Service function shall consider traffic information and traffic context information as input data and generate C/I alert when a predefined Conflict/Infringement situation is detected according to a predefined scenario.

The inputs to the Airport Safety Support Service function shall be traffic situation information in the form of integrated target data output from the SDF, and a set of alerting parameters, traffic context data and rules from the supporting Configuration Database [Chapter 9]. The traffic context data shall include topological maps of areas to be monitored.

Clearances and assigned routes shall be input from the Routing/Planning function where applicable for route conformance monitoring.

Outputs from the Airport Safety Support Service shall be routed to various client systems including the Controller HMI and the Routing/Planning and Guidance functions.

The Airport Safety Support Service shall provide alerts and adequate information about each alert situation to controller(s) involved.

Control processes shall be synchronised to the NTP clock. Alert messages and status messages shall be time stamped.

5.2 Airport Safety Support Service Requirements

In this section are listed the technical requirements related to the Airport Safety Support Service of the A-SMGCS.

The A-SMGCS system as offered shall include an “Airport Safety Support Service” functionality that shall include sub-functions for Runway Monitoring and Conflict Alerting (RMCA), Conflicting ATC Clearances (CATC) and Conformance Monitoring Alerts for Controllers (CMAC). The Airport Safety Support Service shall use the Surveillance Service, current information on mobiles (aircraft and vehicles) and stored aerodrome information to enable and trigger alerts for the controllers.

5.2.1 Basic Functions

A. The Airport Safety Support Service shall continuously process the target reports from the SDF to compare the traffic situation in real time with a set of predefined alert situations.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The Airport Safety Support Service shall output an alert report to clients whenever a predefined alert situation occurs.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

5.2.2 Alert Situations

A. The Airport Safety Support Service shall detect any predefined conflict situation on the runway and generate a timely conflict alert report.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The Airport Safety Support Service shall detect whenever a target crosses any predefined runway strip ground boundary and generate an incursion alert report.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

C. The conflict situations shall be configurable from the Configuration Database [9.1.1].

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The runway strip boundaries shall be configurable from the Configuration Database [9.1.1].

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The length of the ground boundary shall at least include the runway strip. The width of the ground boundary shall be defined differently according to good/poor visibility conditions.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. The air boundary shall be defined as a flight time to threshold and take into account the two stages of alert, INFORMATION and ALARM, as well as the visibility conditions.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

G. The Airport Safety Support Service shall make use of relevant traffic context information received from the Configuration Database and/or from the Controller HMI.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

H. The Airport Safety Support Service shall detect whenever a target enters any predefined protected area and generate a protected area alert report.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

I. The protected areas shall be configurable from the Configuration Database [9.1.1].

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

J. The Airport Safety Support Service shall detect whenever an aircraft target enters any predefined restricted area and generate a restricted area alert report. Targets other than aircraft targets shall not trigger the alert.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

K. The restricted areas shall be configurable from the Configuration Database [9.1.1].

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

L. Once a route has been assigned to a mobile, and the mobile has started on that route, the Airport Safety Support Service shall detect when the target begins to deviate from that route by more than a predefined distance and generate a deviation alert report.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

M. The deviation limit shall be configurable from the Configuration Database [9.1.1].

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

N. The Runway Monitoring and Conflict Alerting (RMCA) functionality of the Airport Safety Support Service shall use the Surveillance Service, to monitor the movement of mobiles (aircraft and vehicles) within or approaching the Runway Protection Area (RPA).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

O. The RCMA functionality shall predict short-term conflicts for the following scenarios:
   a. Arriving and/or Departing aircraft with a mobile in the RPA;
   b. Arriving and/or Departing aircraft with an aircraft above, or approaching the RPA, below a defined altitude;
   c. Arriving or Departing aircraft with a mobile moving to, or on, a converging or intersecting runway;
   d. Arriving or Departing aircraft with opposite direction arrival to the runway;
   e. Arriving or Departing aircraft with a mobile approaching the runway on an intersection (crossing) direction with the active runway;
   f. Unidentified traffic approaching the RPA leading to a potential conflict with another mobile;

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

P. The short-term conflict probe utilised by the RCMA functionality shall be offline configurable with parameters such as the RPA limits, ATC operational rules/procedures and aerodrome structures and facilities, for different conflict scenarios.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

Q. The short-term conflict probe utilised by the RCMA functionality shall be configurable to be time based or distance based and selectable from the Controller HMI.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

R. The Conflicting ATC Clearance (CATC) functionality of the Airport Safety Support Service shall use the Surveillance Service, to monitor the movement of mobiles (aircraft and vehicles) within or approaching the Runway Protection Area (RPA) and generate alerts to conflicting ATC clearances.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

S. The CATC functionality shall detect the following minimum ATC "Clearance Conflicts":

a. **Line-Up/Line-Up Conflict**. Two aircraft are cleared to line up from apposing runway entries at the same end of the runway;
b. **Line-Up/Line Up Conflict.** Two aircraft are cleared to line up at opposite ends of the same runway;
c. **Line-Up/Line-Up Conflict.** Two aircraft are cleared to line up on the same or adjacent runway entries on the same runway and multiple line ups are not authorised;
d. **Line-Up/Cross Conflict.** One aircraft is cleared to line up and another mobile is cleared to cross the same runway from an opposing runway entry;
e. **Line-Up/Take-Off Conflict.** One aircraft is cleared to line up and another aircraft is cleared to take-off on the same runway, with the runway entry for the aircraft cleared to line up, in front of the position of the aircraft taking off;
f. **Line-Up/Land Conflict.** One aircraft is cleared to line up and another aircraft is cleared to land on the same runway, and the runway entry of the aircraft lining up is in front of the position of the landing aircraft with the landing aircraft not expected to vacate the runway before the line-up point;
g. **Cross/Cross Conflict.** Two mobiles are cleared to cross the same runway from apposing runway entries;
h. **Cross/Take-Off Conflict.** One mobile is cleared to cross the runway and another aircraft is cleared to take off on the same runway, with the crossing mobile is in front of the position of the aircraft taking off;
i. **Cross/Land Conflict.** A mobile is cleared to cross a runway and another aircraft is cleared to land on the same runway, and the runway entry of the crossing mobile is in front of the position of the landing aircraft, with the landing aircraft not expected to clear vacate the runway before the crossing point;
j. **Take-Off/Take-Off Conflict.** Two aircraft are cleared to take off from the same runway;
k. **Take-off/Land Conflicts.** One aircraft is cleared to take off, and another aircraft is cleared to land on the same runway;
l. **Land/Land Conflicts.** Two aircraft are cleared to land on the same runway.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

T. The CATC functionality shall detect potential ATC clearance conflicts between mobiles, for displaying on the controller's HMI during the selection of a specific clearance allocation to a specific mobile.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

U. The CATC functionality shall provide a means on the controller HMI to either "ACCEPT" or "REJECT" the current ATC clearance.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

V. The CATC functionality shall trigger an alert when an input clearance, compared to previously input clearances is not in accordance with the ATC rules/procedures as offline configured.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

W. The Conformance Monitoring Alerts for Controllers (CMAC) functionality of the Airport Safety Support Service shall use the Surveillance Service, to monitor the movement of mobiles (aircraft and vehicles) within or approaching the movement and/or the manoeuvring areas.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

X. The CMAC function shall issue, but not be limited to the INFORMATION alerts as listed below:

INFORMATION ALERT	**DESCRIPTION**
ROUTE DEVIATION	A mobile deviate from its cleared route on a taxiway/taxi lane.
NO PUSH/NO TAXI APPROVAL	An aircraft pushes-back or taxies without Clearance from a Controller.
STATIONARY	A mobile is given a Clearance (e.g. Push-Back, Taxi, Cross, Enter, Line-Up, Take-Off) but doesn't move

	within a certain time period, or an aircraft was taxiing and stops for a certain time period.
NO CONTACT	An arriving aircraft is at a defined distance or time from the runway and has not contacted the Tower.
NO TRANSFER	A departing aircraft has taken off and is at a defined distance or time from the aerodrome and has not been transferred to the departure controller.
NO TAKE-OFF CLEARANCE	An aircraft is cleared to Line-Up and it takes-off without a Take-Off Clearance.
NO LANDING CLEARANCE	An aircraft is close to the runway without a Landing Clearance.
LANDING ON THE WRONG RUNWAY	An arriving aircraft is detected to be aligned to a runway that differs to the assigned runway.
LINING-UP ON THE WRONG RUNWAY	A departing aircraft is detected lining-up on a runway that differs to the assigned runway.
RUNWAY TYPE	An aircraft is assigned a runway that is not suitable for the aircraft type e.g. runway is too short.
TAXIWAY TYPE	An aircraft is assigned a taxiway that is not suitable for the aircraft type e.g. taxiway is limited to certain types of aircraft.
RUNWAY CLOSED	A runway assigned to an aircraft is closed.
TAXIWAY CLOSED	The assigned taxi route is planned to go through a closed taxiway.
HIGH SPEED	An aircraft taxies with speed exceeding x knots (x=parameter).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

Y. The CMAC function shall issue, but not be limited to the ALARM alerts as listed below:

ALARM ALERT	**DESCRIPTION**
ROUTE DEVIATION	A mobile deviate from its cleared route on a taxiway (close to an active runway).
STATIONARY	An arriving aircraft or mobile crossing a runway has stopped within the RPA and does not move within a certain time period.
NO TAKE-OFF CLEARANCE	An aircraft is cleared to Line-Up and it takes-off without a Take-Off Clearance.
NO LANDING CLEARANCE	An aircraft is close to the runway without a Landing Clearance.
LANDING ON THE WRONG RUNWAY	An arriving aircraft is detected to be aligned to a runway that differs to the assigned runway.
RED STOP BAR CROSSED	A mobile cross a RED stop bar (Intermediate Holding Point or AoR boundary).
LINING-UP ON THE WRONG RUNWAY	A departing aircraft is detected lining up on a runway that differs to the assigned runway.
RUNWAY INCURSION	A mobile is detected entering, or predicted to enter, the RPA without a Land/Line-Up/Take-Off/Cross/Enter Clearance.
RUNWAY TYPE	An aircraft is on a runway that is not suitable for the aircraft type.
TAXIWAY TYPE	An aircraft is on a taxiway that is not suitable for the aircraft type.
RUNWAY CLOSED	An aircraft has entered a closed runway.
TAXIWAY CLOSED	An aircraft has entered a closed taxiway.

RESTRICTED AREA INCURSION	An unauthorised mobile is detected entering, or predicted to enter, a restricted area.
HIGH SPEED	An aircraft taxies with speed exceeding y knots (y=parameter).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

5.2.3 Stages of Alert

A. Conflict alerts shall be configurable in two stages (1 and 2) according to the severity of the situation. Stage 2 (ALARM) is more severe than Stage 1 (INFORMATION).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. Incursion alerts, restricted area alerts and deviation alerts shall be configurable from the Configuration Database [9.1.1] as either Stage 1 or Stage 2.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

5.2.4 Alert Reports

A. As a minimum, each alert report transmitted from the Airport Safety Support Service to clients shall include the following information:
   a. Data Source Identifier
   b. Alert Report Identifier
   c. Type of alert (runway, taxiway, apron, etc.)
   d. Alert severity level
   e. Time of Alert
   f. Identity of target(s) in alert situation

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. An alert report shall be transmitted for each target position update for as long as the alert situation persists.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

5.3 Airport Safety Support Performance Requirements

5.3.1 Data Integrity

A. The probability of detection of an alert situation shall be greater than 99.9%.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The probability of false alert shall be less than 10^{-3}.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

5.3.2 Timeliness

A. Having received the target report from the surveillance element, the time taken for the Airport Safety Support Service to detect and report any alert situation shall be not more than 0.5 s.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

5.4 Interface Requirements

5.4.1 Data Communication Protocols

A. The Airport Safety Support Service shall comply with the general interface requirements given in section 3.3.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

5.4.2 Data Format

A. The Airport Safety Support Service shall receive input target report data from the SDF in the ASTERIX CAT011 and CAT062 data format.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. Alert reports output from the Airport Safety Support Service systems shall be in the ASTERIX CAT011 or CAT004 data format.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

6 Routing/Planning

The A-SMGCS Routing/Planning function shall provide tools to assist the controller in assigning a taxi route for each aerodrome movement and providing sequencing and timing for each departure aircraft.

6.1 Architecture

The inputs to the Routing/Planning function shall be traffic situation information in the form of integrated target data and flight progress data output from the SDF, and a set of planning parameters, traffic context data and rules from the supporting Configuration Database [Chapter 9]. The traffic context data shall incorporate a model of the aerodrome movement area.

Flight plans shall be obtained directly from the airport's Flight Plan Data Processing System (FDPS).

From these sources, the Routing/Planning function shall obtain information about the:

- Start point (e.g. the stand for a departure; the runway exit taken by an arriving aircraft)
- End point (e.g. the allocated stand for an arrival; the assigned runway entry point for a departure)
- Intermediate waypoints (e.g. temporary parking positions, holding positions)
- Local standard routes
- Local taxi restrictions (closed or restricted-use taxiways, restricted areas)
- Meteorological restrictions (i.e. low visibility condition)
- Type of aircraft
- Wake vortex category
- Obstacles and temporary hazards
- ETA, ATA (for Arrivals)
- CTOT, ETD or EOBT (for Departures)
- Standard Departure Route (SID)
- Separation minima
- Runway(s) in operational use (including mixed-mode or single-mode)
- Prioritised flights

The Routing/Planning function shall provide continuously updated routing and timing information, whereby the Routing/Planning function computes the path to be taken and the time needed to perform the movement.

Outputs from the Routing/Planning function shall be the proposed taxi route and timing for each movement. The outputs shall be transmitted to client systems, which will include the Controller HMI and the Airport Safety Support and Guidance functions. The controller shall be given the means to modify a taxi route or choose a different route before the route is assigned to a movement.

The provision to the Controller with a departure management (DMAN) tool that provides optimal off-block times and optimal take-off times for all flights and an optimal take-off sequence taking into account arrivals, wake vortex categories, ATFM slot, and SID. The purpose of the departure management tool is to:

- Assist the controllers to achieve maximum runway capacity
- Maximise slot compliance
- Minimise taxi-out delays.

A departure management tool will need accurate estimations of taxi times for its calculations. Taxi times could be internal parameters of the tool, established in off-line configuration, or they could be obtained from an additional planning process.

All Routing/Planning processes shall be synchronised to the NTP clock.

6.2 Routing/Planning Functional Requirements

6.2.1 Routing Function

A. The Routing/Planning function of an A-SMGCS shall designate a taxi route for each aircraft or vehicle within the movement area based on:
   a. Starting point (start-point)
   b. Destination point (end-point)
   c. Aerodrome configuration

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. Either manually or automatically, the Routing/Planning function shall allow for a change of destination at any time.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. Either manually or automatically, the Routing/Planning function shall allow for a change of a route to the same end-point at any time.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

D. The Routing/Planning function shall meet the needs of dense traffic at complex aerodromes.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The Routing/Planning function shall not constrain the pilot's choice of a runway exit following the landing.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. For a given aircraft type, a given runway and a given taxi route end-point or waypoint, the Routing/Planning function shall provide the optimal runway exit that the aircraft shall use to exit the runway after landing.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

G. For vehicles, the Routing/Planning function shall provide a route to areas outside of the movement area, if necessary.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

H. The Routing/Planning function shall have three modes of operation: Manual, Semi-Automatic and Automatic.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

I. In Manual mode, the Routing/Planning function shall provide the user with a means to select or construct a taxi route between a given start-point and a given end-point and assign it to a movement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

J. In Semi-Automatic Routing/Planning function shall propose an optimal taxi route. The user shall then assign the proposed taxi route or modify it prior to assignment.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

K. In Automatic mode, the Routing/Planning function shall compute and assigning routes automatically.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

L. In Automatic mode, the function shall permit manual intervention (reverting to Semi-Automatic mode). The user shall be able to visualise the taxi route, modify it and assign the new route manually.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

M. In Semi-Automatic and Automatic modes, the Routing/Planning function shall seek to minimise taxi distances in accordance with current constraints that are known to the function.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

N. In Semi-Automatic and Automatic modes, the Routing/Planning function shall seek to minimise crossing conflicts by taking account of taxi routes already assigned.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

O. In Semi-Automatic and Automatic modes, the Routing/Planning function shall receive traffic context information and respond to operational changes, such as:
   d. Runway in use
   e. Taxiways closed
   f. Temporary hazards or obstacles
   g. Meteorological conditions

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

P. The Routing/Planning function shall use standardised terminology or symbology.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

Q. The Routing/Planning function shall provide taxi routes as and when required, in accordance with the performance requirements in section 6.2.3.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

R. In Semi-Automatic and Automatic modes, the Routing/Planning function shall provide a means of validating taxi routes.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

S. In Semi-Automatic and Automatic modes, the Routing/Planning function shall compute an optimised taxi route for each movement, considering the overall time needed for the mobile to complete the route under the current meteorological conditions.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

T. When computing a taxi route, the Routing/Planning function shall take into account the following constraints:
   a. CTOT (or ETD) for departures and EIBT for arrivals, minimising average delays but, where possible, permitting an aircraft to meet its assigned take-off time or reach its allocated gate on time
   b. Wing-tip to wing-tip spacing between aircraft on parallel taxiways
   c. Longitudinal spacing when visibility becomes a factor, including jet blast and propeller / rotor wash
   d. Obstructed, unavailable or temporarily closed parts of the movement area (open/closed taxiway segments
   e. Taxi speeds (to reduce braking and acceleration, and fuel burn)
   f. Unidirectional taxiways
   g. Taxiways closed to certain aircraft

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

U. When computing a taxi route, the Routing/Planning function shall permit intermediate waypoints (e.g. temporary parking positions, holding positions).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

V. The Routing/Planning function permit the user to select an alternative taxi route.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

W. In the event of a conflict being detected by the system, or by user intervention, it shall be possible to cancel or change an already assigned taxi route.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

X. In Semi-Automatic and Automatic modes, if a taxi route already assigned to an aircraft or vehicle is cancelled, the Routing/Planning function shall provide a new taxi route to continue.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

Y. The Routing/Planning function shall have access to a database of aircraft types, containing aircraft parameters relevant for the calculation of optimum taxi routes and departure sequencing.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

Z. The Routing/Planning function shall have access to a database containing details of vehicles authorised to drive on the airport movement area.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

6.2.2 Departure Sequencing

A. The Routing/Planning function shall include a Departure Management (DMAN) component to perform departure and start-up sequencing.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. Departure shall have the following main functions:
   a. Calculation of departure sequence(s) and departure times
   b. Calculation of optimum Target Take-Off Time (TTOT)
   c. Dynamic Constraint Handling for sequence constraints imposed by users.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The Departure Management component shall maintain the association of an operational status with each arrival and departure.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The Departure Management component shall consider possible sequences of operational states.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The Departure Management component shall consider the time durations of operational states.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. The Departure Management component shall have access to a database of aircraft types, containing aircraft parameters relevant for the calculation of optimum departure sequencing, including:

a. Wake vortex weight class
b. Speed class
c. Engine type (propeller or jet).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

G. The Departure Management component shall seek to minimise the queue length at the runway thresholds consistent with an optimal departure sequence taking into account wake vortex categories and other constraints.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

H. The Departure Management component shall ensure that required separation exists among all departures and between all departures and arrivals at all times.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

I. The Departure Management component shall consider minimum separation times between successive landing and take-off operations.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

J. The Departure Management component shall use default constraint values to ensure that all valid separation rules are maintained in case of missing aircraft properties data.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

K. The Departure Management component shall consider required wake vortex separation parameters between a leading and a following aircraft dependent on
   a. Aircraft weight classes and in case of crossing runways
   b. Whether both operations are performed on the same or on different runways.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

L. The Departure Management component shall ensure that the optimum take-off schedule meets all Standard Instrument Departure (SID) separation constraints among a set of departure flights.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

M. The Departure Management component shall able to handle both single mode and mixed mode runway operations for a set of interdependent runways.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

N. The Departure Management component shall distinguish between operations on the same or on different runways when considering minimum separation times between two successive operations.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

O. The Departure Management component shall ensure that every planned take-off schedule ensures the exclusive use of the runway for take-offs and landings.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

P. The Departure Management component shall consider the current runway configuration of the airport.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

Q. The Departure Management component shall consider particular time intervals for specific runway operations like runway inspection, friction test etc., where take-off and landing operations are not allowed.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

R. The Departure Management component shall consider the taxi times resulting from the taxi route for each aircraft based on:
   a. Starting point
   b. Destination point
   c. Aerodrome configuration

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

S. The Departure Management component shall consider the change of a destination at any time.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

T. The Departure Management component shall consider the changed taxi times resulting from a changed taxi route to the same destination at any time.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

U. The Departure Management component shall meet the needs of dense traffic at complex aerodromes.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

V. The Departure Management component shall use standardised terminology or symbology.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

W. The Departure Management component shall calculate and assign an optimum target time of departure (TTOT) and an optimum target off-block time (TOBT) to each departure flight.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

X. The Departure Management component shall start optimising the departure and start-up sequence when the aircraft requests departure clearance.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

Y. The Departure Management component shall consider for every departure an estimated minimum time for being ready for take-off (ETOT).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

Z. The Departure Management component shall ensure that a slotted aircraft receives a TTOT not earlier than the slot starting time.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

AA. The Departure Management component shall consider all clearances and generate the Recommended Time Until next Clearance (RTUC).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

BB. The Departure Management component shall take account of declared ready-time estimates input by the user.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

CC. The Departure Management component shall be able to plan in compliance with all constraints that are accepted in a manual system.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

DD. The Departure Management component shall use adequate constraint models if there are airport specific permanent constraints, either operational or physical.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

EE. The Departure Management component shall consider sequence number constraints, i.e. an aircraft must have a certain position within the departure sequence.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

FF. The Departure Management component shall allow the user to enter constraints to the departure sequence.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

GG. The Departure Management component shall be able to respond to operational changes, such as:

a. Runway in use
b. Meteorological conditions

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

HH. The Departure Management component shall be able to provide different modes of optimisation, so that the planning strategy can be tactically adapted to different traffic demands and operational conditions.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

6.2.3 Routing/Planning Performance Requirements

A. The Routing function shall process an initial route within 10 seconds. Reprocessing to account for tactical changes once the aircraft or vehicle is in motion shall not exceed 1s.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

B. In the processing of optimised routes, the Routing function shall compute the length of taxi distances with a resolution better than 10m, and timing with a resolution better than 1s.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The Routing function shall be capable of processing and designating at least 4 routes during any one second period.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The Routing and Departure Management components shall be capable of continuously exchanging and processing flight plan data for all flights for which flight plans from the FDPS exist.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. For a departing aircraft, the Departure Management component shall compute an optimal Targeted Take-off Time (TTOT). An aircraft reaching the runway entry shall need to wait for take-off not longer than the aircraft specific line-up time plus 1 minute.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. For a slotted flight, the planned TTOT shall not be earlier than the slot starting time and not later than the slot ending time.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

G. For a departing aircraft, the Departure Management component shall compute an optimal Targeted Start-up Approval Time (TSAT).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

H. After start-up, the aircraft shall need to wait for the pushback clearance not longer than 2 minutes.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

I. The Departure Management component shall provide an optimal timing for the planned aircraft operations, and for the respective clearances to be issued.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

J. The accuracy of the Recommended Time Until next Clearance (RTUC) shall be 1 minute.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

6.3 Interface Requirements

6.3.1 Data Communication Protocols

A. The Routing/Planning function shall comply with the general interface requirements given in section 3.3.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

6.3.2 Flight Plan Interface

A. The Routing/Planning function shall be interfaced to an external FDPS to receive flight plans.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The Routing/Planning function shall receive and process
   a. Arrival flight plans
   b. Departure flight plans
   c. Flight plan updates
   d. Flight plan cancellations

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. A departure flight plan shall have at least the following data fields:
   a. ICAO Aircraft Identifier (Callsign)
   b. Aircraft type
   c. Assigned stand / parking position
   d. Assigned destination (if known)
   e. Assigned runway
   f. SID (or heading information for smaller VFR-flights)
   g. ATFM slot (CTOT)
   h. TOBT
   i. Taxi route (if applicable)
   j. Runway entry

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. An arrival flight plan shall have at least the following data fields:
   a. ICAO Aircraft Identifier (Callsign)
   b. Aircraft type
   c. Assigned parking position
   d. Assigned runway
   e. ETA
   f. Proposed exit
   g. Taxi route (if applicable)

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

6.3.3 Flight Progress Event Interface

A. The Routing/Planning function shall receive flight progress event reports, including type of event, for:
    a. Aircraft on final approach
    b. Aircraft landing
    c. Aircraft go-around
    d. Aircraft taking off
    e. Aircraft rejected take-off
    f. Aircraft stopped on runway
    g. Aircraft stopped on taxiway
    h. Aircraft at route start-point, waypoint or end-point, including:
        a. Off-block or on-block
        b. Apron exit or entry point
        c. Taxiway junction
        d. Runway crossing
        e. Runway entry or exit point

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

6.3.4 Traffic Context Interface

A. The Routing/Planning function shall receive traffic context data from the Airport Operational Database (AODB), including:
    a. Airport layout: topological representation of tarmac (RWYs, TWYs, etc.)
    b. Reference points: ARP, RWY thresholds, holding positions, stand locations
    c. Fixed obstacles
    d. Restricted Areas
    e. Unidirectional taxiways
    f. Taxiways closed to certain aircraft types

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The Routing/Planning function shall receive at any time changes to traffic context data, such as:
    a. Runway(s) in use
    b. Taxiways closed
    c. Temporary hazards or obstacles
    d. Meteorological conditions

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

6.3.5 Controller HMI Interface

A. The Routing/Planning function shall be interfaced to an HMI, where the routing and planning results will be presented.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The departure planning function shall provide departure time update data, which can be displayed at the Controller HMI.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. Departure time update data shall have at least the following data fields:
   a. ICAO Aircraft Identifier (Callsign)
   b. Target Start-up Approval Time (TSAT)
   c. Target Take-off Time (TTOT)
   d. Recommended Time Until next Clearance (RTUC)
   e. Next clearance
   f. Number in sequence of departures

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

7 Guidance

The Guidance function shall provide services for pilots and drivers, helping them to keep their aircraft or vehicles on the surfaces and assigned routes intended for their use.

7.1 Ground-based Guidance Means

Ground-based guidance by visual aids has the advantage that guidance can be provided to every aircraft or vehicle, independent of the on-board equipage, and that the controller can interact with every aircraft in the same way.

The proposed A-SMGCS ground-based guidance means shall supplement existing SMGCS by providing additional visual aids, which shall consist of:

a) Selectively or segment-wise switched centreline lights, and
b) Selectively switched stop bars

The Guidance function shall be interfaced to switch on the respective centreline segments from the actual position of a mobile up to the intended holding position, where the red stop bar is switched on. As the mobile progressed along its route, the segments behind it would be extinguished.

The following requirements apply to aerodrome ground lighting in A-SMGCS:
a) The controller shall be provided with clear indications showing the guidance provided to the pilot.
b) The ICAO A-SMGCS Manual requires an actuation time inclusive feedback of not more than 2 seconds and a reversion time of 0.5 seconds maximum.
c) A monitoring function must raise an alert when the visual guidance function fails, deactivate the visual guidance means, and protect the runways from access by switching on the stop bars.

7.2 Air-Ground Data Link

The targeted A-SMGCS Air-Ground Data Link Services are the services used for controller-pilot exchanges of surface movement clearances that are not time-critical. These Air-Ground Data Link Services comprise Departure, Start-up, Pushback and Taxi clearances and instructions.

The Air-Ground Data Link is considered in three parts:

a) Air-Ground Data Link Communications
b) Electronic Clearance
c) Start-up, Pushback and Taxi Clearances

7.2.1 Air-Ground Data Link Communications

The Air-Ground Data Link Communications comprise:

a) The Data Link Communications transport media, ATN over VDL-2, and
b) The selected applications/message sets used to relay the A-SMGCS Data Link Services, ATN CPDLC Bit-Oriented Application messages, documented in the ATN SARPS.

7.2.2 Start-up, Pushback and Taxi Clearances

Start-up, Pushback and Taxi Clearances in A-SMGCS shall be implemented as sub-services of a single Electronic Clearance Input Service.

A summary of the Electronic Clearance description is provided below:

a) The objective of the Electronic Clearance service is to provide automated assistance and additional means of communication to controllers and pilots when performing communication exchanges during ground movement operations.
b) A flight due to depart from an airport, or an aircraft that just landed, must obtain a series of clearances from the Air Traffic Service Unit (ATSU) in order to proceed from/to its stand to/from the runway.
c) In particular, start-up, pushback and routine taxi messages are supported by this service.
d) Routine operations like aircraft taxi from stand to the assigned departure runway as well as taxi from the landing runway to the arrival stand require numerous ATC communication exchanges that, under heavy traffic loads, may saturate the ATC frequencies and reduce airport throughput.
e) Although some non-routine operations, such as helicopter operations, will continue to use voice communications only, others are to be supported by data link exchanges.

7.2.2.1 Guidance Processes

The A-SMGCS Guidance Processes shall interface with the following systems:

a) External Airport Operational Database (AODB) system and external Flight Data Processing System (FDPS): To obtain the Traffic Context dynamic data (e.g. Runway in Use) and other information about traffic (e.g. Aircraft Type, Stand, etc.) necessary for the A-SMGCS Data Link Services to propose Data Link Clearance elements to the responsible controller
b) Routing/Planning Data Processing System: To obtain the clearances given by the responsible controller and the taxi route information necessary to build the Taxi-OUT and Taxi Uplink messages
c) Controller HMI: So that the responsible controller can view requests and acknowledgements from the on-board systems and check the proposed Data Link Clearance elements prior to actual clearance activation and Air-Ground Data Link message exchange
d) ATN Communications Network: To provide and obtain Air-Ground Data Link message elements
e) NTP Clock: To get time synchronisation
f) Recording and Playback System: To record Air-Ground Data Link Services data and events for research purposes (or for accident and incident investigation in an operational system)
g) Configuration Database: To set up parameters for the Guidance Services and Airport Safety Support the Guidance Processes (e.g. Start/Stop of separate processes)
h) Service Monitoring System: To monitor and report the serviceability status of the Air-Ground Data Link Services and data sources.

7.3 Guidance Function Requirements

7.3.1 General Requirements

A. The Guidance function shall clearly indicate any assigned taxi route to an authorised movement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The Guidance function shall be capable of accepting a change of taxi route at any time.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

C. The Guidance function shall output an alert report to clients whenever a guidance aid is detected to be faulty.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The Guidance Service shall interface with the Airport Surface Lighting (AGL) system for triggering lighting commands from the HMI and to display lighting status and colour information on the HMI.
The Tenderer shall provide a response below detailing how the Guidance Service shall physically interface with the AGL.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The Guidance Service shall provide a means to the Controller to selectively display the lit TCL on the HMI.
The Tenderer shall provide a response below detailing how the lit TCL can be selected by the Controller for display on the HMI.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. The Guidance Service shall provide a means to the Controller to selectively display the status of Stop Bars on the HMI.
The Tenderer shall provide a response below detailing how the individual Stop Bars can be selected by the Controller for displaying the selected Stop Bar’s status on the HMI.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

G. The Guidance Service shall provide a means to the Controller to selectively switch on/off any Stop Bar.
The Tenderer shall provide a response below detailing how the individual Stop Bars can be selected by the Controller and how the selected Stop Bar can be switch on/off on the HMI.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

H. The Guidance Service shall be able to filter vehicles operating on service roads adjacent to taxiways/taxi lanes.
The Tenderer shall provide a response below detailing how the Guidance Service will filter out vehicles travelling on service roads next to taxiways and taxi lane and will not be included into any of the functionalities provided by the Guidance Service.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

I. The Guidance Service shall provide the TWR Supervisor with a means to de-activate/activate individual functions of the Guidance Service.
The Tenderer shall provide a response below detailing how the individual functions can be selected by the TWR Supervisor and activated/deactivated on selected controller working positions.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

7.3.2 Automated Switching of Taxiway Centre Line (TCL)
N/A

7.3.3 Automated Switching of Stop Bars

A. The automated switching function of the Stop Bars shall switch taxiway and other defined stop bars “off” and/or “on” to control the movement of a mobile along its cleared route.The Tenderer shall provide a response below detailing how the automated switching of Stop Bars

are achieved and which other services and functionalities are used to determine whether the automated switching of Stop Bar functionality is to switch “on” and/or “off”.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The automated switching function of the Stop Bars shall switch “off” the runway stop bar in front of a mobile following the input of a Line-Up, Cross, Enter, conditional Line-up and Take-off clearance entered by the controller via the HMI.
The Tenderer shall provide a response below detailing how controller clearances entered by the controller via the HMI, automatically switches particular Stop Bars for selected mobiles.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The automated switching functions of the Stop Bars shall use the Surveillance Service to avoid the runway stop bar switching “off” too soon and to ensure that no other uncleared mobile is between the cleared mobile and the runway stop bar.
The Tenderer shall provide a response below detailing how the Surveillance Service shall control the switching timing of the Stop Bars automated switching function.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The automated switching function of the Stop Bars shall automatically switch “on” a runway stop bar when a mobile has passed over it by a user configurable distance or time, unless there is a following mobile that also has a clearance to pass the stop bar.
The Tenderer shall provide a response below detailing how Stop Bars are automatically switched “on”, after a cleared mobile has crossed a Stop Bar.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

7.4 Interface Requirements

7.4.1 Data Communication Protocols

A. The Guidance function should comply with the general interface requirements given in section 3.3.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

7.4.2 API Interface

A. The Guidance function shall interface to Controller HMI to exchange uplink and downlink messages.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8 Controller HMI

The A-SMGCS HMI will concentrate on the Controller Working Position (CWP).

It is envisaged that the CWP will include a data entry device and display(s) providing situation awareness together with the necessary information to support the appropriate levels of A-SMGCS.

The Controller HMI design must take into account the working environment of the controller under various operational conditions. In this respect, the HMI will be required to be adaptable to the various circumstances of the user. The A-SMGCS functions must be designed to have a satisfactory performance during operations based on both visual and non-visual surveillance.

The HMI design must ensure that the advanced A- SMGCS functions of higher-level systems do not have a detrimental effect on the performance of the basic A-SMGCS functions. The HMI design of a higher-level A-SMGCS must be conducted as a whole. As an example, the HMI of the Control, Routing/Planning and Guidance functions must not degrade the quality of the supporting Surveillance HMI.

8.1 Requirements for Controller HMI

Controller HMI shall fulfil the following requirements:

- Permit rapid situation assessment
- Employ user friendly and familiar data entry means
- Minimize the number of input actions required
- Permit the user to make the decisions on those actions for which he/she is responsible
- Maintain a balance between human and machine functions
- Ensure a level of user workload which is consistent with efficient and effective activity
- Permit full manual operation in the event of a failure of an automatic function or whenever manual operation is required

- Immediately forward alerts to users in the event of a failure or when system performance is degraded.

As a minimum, the Controller HMI shall provide basic situational awareness, the ability to alert the user to both operational and system events, and a data entry device. Functions shall be configurable according to the tasks to be performed by the user and integrated where this facilitates the use of the system.

High resolution, colour displays, capable of being viewed in all ambient light levels appropriate to the ATC environment, are required. The information that shall be available for display on the Controller HMI includes, but is not limited to the following:

- Static maps showing the entire airport layout including special overlays appropriate to the task being performed
- Dynamic target symbols with labels showing the reported positions and identities of airport traffic in real-time
- Track history symbols, state vectors, etc., as appropriate
- Alert information (graphical, textual, audible, as appropriate)
- Graphical and textual facilities, such as menus and icons, to present user options for management of the A-SMGCS
- Planning information (e.g. sorted lists of arrivals, departures, vehicles, flight plans)
- Weather data (e.g. visibility, wind conditions)
- System status data
- Time of day
- State of ground-based guidance devices (e.g. taxiway centreline lighting, stop bars)
- Proposed and assigned taxi routes
- Movement mode information (e.g. push back, taxi, hold)
- Runway/taxiway status information (e.g. closed, active)
- Electronic Clearance Input
- Data link messages

The input devices at the Controller HMI shall allow the user access to at least the following A-SMGCS management capabilities:

- Display capabilities (e.g. range scale selection, pan/zoom, brightness, map overlays)
- Label operations (e.g. label contents, label deconfliction)
- Means to input dynamic configuration data (e.g. runway changes, day/night and low visibility procedures, restricted areas)
- Means to acknowledge alerts
- Means to accept, modify or reject a proposed taxi route
- Means to assign a taxi route to a movement
- Means to give clearances and exchange messages via data link.

8.2 Controller HMI Functional Requirements

8.2.1 Basic Functions

A. The HMI shall provide users with displays, indicators and input devices to permit each user to interact efficiently with all of the A-SMGCS functions relevant to his or her role.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.2.2 Display Characteristics

A. The HMI shall employ high resolution, high contrast ratio displays appropriate for viewing in all ambient light levels found in the user environment.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.2.3 Input Devices

A. The HMI shall employ user friendly and familiar data entry means including keyboard, mouse, on-screen icons, menus, touch sensitive screen and pen input devices.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. Input devices for the controllers shall be functionally simple involving the controllers in a minimum number of input actions.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.2.4 Display Controls

A. The HMI shall allow the user to configure the display capabilities (e.g. range scale selection, pan/zoom, brightness, and map overlays).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The HMI shall be adaptable to the various operational conditions (visibility conditions, number of working positions, controller roles, etc.) of the user.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	

[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

C. Where appropriate, it shall be possible to configure the HMI according to local requirements.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The surveillance service shall provide to the user the ability to manually put the correct callsign in the label associated to a vehicle equipped with cooperative equipment used for different vehicles.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.2.5 Design Principles

A. The HMI shall display the complete airport traffic situation in a clear and uncluttered manner to permit rapid situation assessment.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The HMI shall be designed to be modular and scalable such that its functionality can evolve as the A-SMGCS evolves.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. Different sets of traffic data shall be provided in order to assist the controllers in different types of tasks (e.g. updating of data, planning of actions, traffic monitoring and conflict detection). These sets of data shall be presented in a combination of graphical and textual formats.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

D. The HMI shall provide textual data in various formats including:
   a. Labels
   b. Lists of data
   c. Electronic Clearance Display

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.2.6 Traffic Situation Display

A. The HMI shall provide, at each controller working position, a traffic situation display capable to present labelled target tracks superimposed on an airport and approach map.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The HMI shall continuously indicate the position of unauthorised aircraft, vehicles and obstacles, whilst they are in the movement area, the runway strips and within any designated protected area.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The traffic representation shall be updated following:
   a. Target reports received from the Surveillance function
   b. Controller-initiated update of data
   c. Updates of traffic context data
   d. Flight plan updates from the Routing/Planning function

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. Permanently displayed traffic data shall be only the minimum information needed by the controller.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. The selection of an aircraft or vehicle target shall:
   a. Highlight all the available representations of that target wherever such information appears, allowing for an easy location of the traffic information.
   b. Show the surveillance label in the appropriately selected format.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. The HMI shall present a clear 'picture' of the actual traffic situation in the controller's responsibility area, with all the necessary traffic data to assist in the control and guidance tasks, i.e. to easily locate and identify aircraft and vehicles and to have a direct access to essential information.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

G. The HMI shall provide a clear indication that a movement is:
   a. Entering the controller's responsibility area;
   b. Inside the controller's responsibility area;
   c. Leaving the controller's responsibility area.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.2.7 Alert Display

A. On receipt of an alert report, the HMI shall display alerts at the appropriate controller working positions.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

B. The alert information shall include the identification of the involved traffic, if known.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. A visual alert indication shall be provided when a movement is detected to have deviated from its cleared route.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. A visual alert indication shall be provided when a movement is deviating from its clearance or is operating without clearance.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. Additional to the visual alert indication, highly critical events requiring immediate action shall be indicated by an aural alert.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. Alerts shall be indicated with two levels of severity:
   a. Stage 1 alert (INFORMATION)
   b. Stage 2 alert (ALARM)

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

G. In the event of multiple simultaneous alerts, it shall be appropriate to prioritise them, e.g. by listing or colour coding. In any event, a Stage 2 alert will always have higher priority than a Stage 1 alert.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

H. The visual alert shall be displayed continuously if the alert situation persists.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

I. The aural alert shall be terminated when acknowledged by the controller.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.2.8 Taxi Routing HMI

A. The HMI shall provide a means for the user to access the Routing function in order to:
   a. Select or construct a taxi route between a given start-point and a given end-point for each movement; and
   b. View the proposed taxi route (whether manually or automatically generated) for each movement and modify it if necessary; and
   c. Accept the taxi route for assignment to the movement.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. Taxi route information shall be presented textually on the Electronic Clearance Input Display and be easily accessible graphically on the Traffic Situation Display.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The HMI shall clearly distinguish (e.g. by colour and/or line width) between taxi routes that are pending and taxi routes for which clearance has been given.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. Taxi route information (either pending or cleared) shall be distinguishable from all other aerodrome map attributes.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.2.9 The Electronic Clearance Input (ECI)

A. In support of the Airport Safety Alert Service functions CATC and CMAC, the A-SMGCS shall have a means to provide Electronic Clearance Input (ECI) on the controller HMI to input and clear “Clearances” for all mobiles within the controller’s responsibility.
The tenderer shall provide a detailed response below of how an ECI input functionality is provided on the controller HMI.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The HMI shall provide a means for the controller to receive and display START-UP, PUSHBACK, and TAXI clearance requests.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The HMI shall provide a means for the controller to answer the clearance request by sending a related ground clearance.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The HMI shall provide a textual display of the clearance delivery downlink messages received from flight crews and uplink messages from the ATSU.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

E. Means shall be provided to print, store and easily retrieve CPDLC messages.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. Displayed CPDLC message formats shall use standard phraseology and construction with unambiguous terms as established in ATC procedures or data link standards.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

G. Displayed CPDLC messages shall not be automatically overwritten.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

H. The HMI shall provide the means to compose, transmit, receive and display free text messages.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

I. The HMI shall indicate, by a field in the flight list or in the flight plan, whether or not an aircraft is equipped for CPDLC and whether or not it has connected to the CPDLC end-application.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

J. The HMI shall provide a means for the controller to deactivate the data link dialogue and inform the flight crew to revert to voice.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

K. In the event of a failure of the CPDLC communication the HMI shall display a visual alert, accompanied, by an aural alert.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.2.10 Stop Bars

A. Information about the status of the lighting system and protection devices such as stop bars (on/off) shall be easily accessible at the Controller HMI.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The HMI shall continuously present the status of stop bars.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

C. It shall be possible to manually activate or de-activate stop bars.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. It shall be possible to automatically de-activate the stop bar at a runway entrance when an aircraft is cleared to cross or line up and to reactivate the stop bar when the aircraft has crossed the stop bar.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.2.11 MET Display

A. The HMI shall continuously display weather information, including (per runway): surface wind direction (touch down) and strength (graphical and text), QNH (mb), ATIS code, temperature and dew point.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The HMI shall provide easy access to additional weather information including surface wind (Touch Down and Stop End), visibility, current weather, cloud ceiling, QNH and QFE (mb and inches), weather forecast information, RVR conditions and a remarks section.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.2.12 Navaids

A. The HMI shall provide easy means to access the status of airport navaids (i.e. VOR/DME, ILS) equipment.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. An alert shall be given in the event of a failure of navaids equipment.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.3 Controller HMI Performance Requirements

8.3.1 Accuracy and Resolution

A. The accuracy of all map information to be presented on the HMI display(s) shall be 1m or better.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The resolution of the HMI displays shall be sufficiently high that quantisation errors are negligible. As a minimum, the display resolution shall be 1024 lines of 1280 pixels.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The position registration accuracy of all information presented on the HMI display(s) shall be one pixel.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.3.2 Timeliness

A. The Target Display Latency shall not exceed 500ms.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The Response Time to Operator Input shall not exceed 250ms on average and shall never exceed 500ms.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.4 Interface Requirements

8.4.1 Data Communication Protocols

A. The Controller HMI shall comply with the general interface requirements given in section 3.3.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

8.4.2 Data Formats

A. The data interchange with ground systems shall be performed in a standardized format in order to ensure an adequate exchange of information.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. CPDLC uplink messages from the Controller HMI shall be time-stamped with the date (YYMMDD) and time (HHMMSS) when the message is composed.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

9 Supporting Functions

9.1 General Description of Supporting Functions

The Supporting Functions are sub-divided into four (4) functions:

a) Configuration database
b) Service monitoring
c) Recording and playback

These are briefly described in the following sub-paragraphs.

9.1.1 Configuration Database

The Configuration Database shall contain all traffic context data, except traffic information (mobiles position and identity), which is necessary for the ATCO in its surveillance task.

The Configuration Database at least includes:

a) Airport layout: geographical representation of various airport areas (TWY, RWY, etc.)
b) Reference points: ARP, Surveillance sensor locations, RWY thresholds, holding positions, stop bars, stand locations
c) Fixed obstacles
d) Restricted Areas
e) Localizer Sensitive Areas

The traffic context data shall also include:

a) Operational status of runways and taxiways (open / closed)
b) Operational status of ATS systems: landing systems aids, ATIS.
c) Other data: meteorological conditions,

The Configuration Database also contains variable system parameters needed to adapt the system to local requirements and to changes in aerodrome operations or operational rules at the aerodrome.

It includes a means of modifying topological and topographical information and parameters, and a means of transferring selected contents of the database to the respective system elements.

9.1.2 Service Monitoring

This function shall monitor the quality of service of A-SMGCS (equipment status, performances, operational failures, etc.) and generates an alert when A-SMGCS must not be used for the intended operation.

9.1.3 Recording and Playback

This function shall record selected data on communication, control activity and display information to satisfy legislation for accident and incident investigation.

The data shall be archived for the period of time and retrieved at any time for immediate playback, either to the operational system to check that it is functioning correctly or to separate playback equipment for accident or incident investigation.

9.1.4 Fitment of Mode-S Vehicle Squitters

N/A.

9.2 Supporting Functional Requirements

9.2.1 Configuration Database

A. This function shall gather data from other airport systems to provide relevant information about the status of runways and taxiways, the runway(s) in use and meteorological conditions.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. It shall be possible to manually update topological and topographical data that cannot be updated automatically.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. This function shall provide all topological and topographical information necessary for the A-SMGCS, including:
   a. Airport layout: representation of various airport areas (TWY, RWY, etc.)
   b. Reference points: holding positions, stop bars (and other airfield lighting), RWY thresholds, etc.
   c. Fixed obstacles

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The technical support equipment shall have a user-friendly and efficient means of entering and editing traffic context data.

COMPLIANCE (C/PC/NC/NOTED)	

[INSERT FULL RESPONSE FOR EVALUATION HERE]
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]

E. For the Conflict/Infringement detection, the function shall provide updated information on:
   a. Airport Configuration: runways in use, runways status, restricted areas
   b. Applied procedures and working methods: LVP, multiple line-ups

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

F. This function shall be capable of accommodating any operational change of the aerodrome, for instance a physical change in layout (runways, taxiways and aprons), or a change in the aerodrome procedures and rules.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

G. This function shall permit configuration of the Conflict/Infringement detection parameters in order to adapt to local rules.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

H. For each runway, the traffic context function shall define a configurable topological area, the runway protection area, composed of two boundaries: A ground boundary to detect the mobiles on the surface, and an air boundary to detect airborne aircraft.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

I. The length of the ground boundary shall include the runway strip. The width shall be defined according to the meteorological conditions, one width for Non-LVP and a wider width for LVP.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

J. The air boundary shall be parameterised and configurable to take into account the two stages of alert, as well as the meteorological conditions. The time to threshold parameter shall be:
   a. Non-LVP: Prediction around T1 = 30s, Alert around T2 = 15s
   b. LVP: Prediction around T1 = 45s, Alert around T2 = 30s

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

9.2.2 Service Monitoring

A. The system shall provide a technical workstation with suitable HMI for monitoring the status of each major item of equipment.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. A clear indication shall be given in the event of any failure of an item of equipment.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. Operationally significant failures shall be reported to the Controller HMI.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The system shall be capable of expansion to accept and integrate data from other surveillance sensor sources in the future.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

9.2.3 System Configuration and Control

A. The system shall provide a technical workstation with suitable HMI for configuring and controlling each major item of equipment.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

9.2.4 Recording and Playback

A. The system shall provide recording equipment capable of continuously recording and archiving relevant data in order to re-construct the image at any controller working position later for a minimum period of at least 90 days.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

B. The system shall provide playback means to directly replay recorded data within the operational system, as part of the requirement for immediate checking of suspect equipment and initial incident investigation.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

C. The system shall provide capturing the playback in a standard video format for playback on any of the popular operating systems (Windows, Linux etc.).

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

D. The system shall provide the use of recorded data for technical fault finding and testing of configuration changes (what-if-analysis). The playback shall include the playback of the technical/configuration position.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

9.2.5 Fitment of Mode-S Vehicle Squitters

N/A

9.3 Interface Requirements

9.3.1 Data Communication Protocols

A. The Supporting functions shall comply with the general interface requirements given in section 3.3.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

9.3.2 Data Formats

A. The data interchange with ground systems shall be performed in a standardized format in order to ensure an adequate exchange of information.

COMPLIANCE (C/PC/NC/NOTED)	
[INSERT FULL RESPONSE FOR EVALUATION HERE]	
[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]	

10 Annex A

10.1 References

[1] EUROPEAN AIRPORT MOVEMENT MANAGEMENT BY A-SMGCS, Part 2
[2] ICAO Doc 4444: Procedures for Air navigation Services – PANS ATM, Edition 16, 2016
[3] ICAO Doc 9476: Manual of Surface Movement Control and Guidance Systems (SMGCS) First Edition 1986
[4] ICAO Doc 9830: Manual on Advanced Surface Movement Guidance and Control Systems (A-SMGCS), Edition 1, AN/452 - 2004
[5] ICAO Annex 10, Volume III Part 1 - Digital Data Communication Systems, Edition 1, 2003, and Volume IV - Surveillance Radar and Collision Avoidance Systems, Edition 3, 2002
[6] ICAO Annex 14, Volume 1 - Aerodrome Design and Operations, Edition 3, 1999
[7] ICAO Doc 9705: Manual of Technical Provisions for the Aeronautical Telecommunication Network (ATN), Edition 3, 2002
[8] ICAO Doc 9694: Manual of Air Traffic Services Data Link Applications, First Edition, 1999

10.2 List of Acronyms and Abbreviations

Acronym	Long Name
ACARS	Aircraft Communication Addressing and Reporting System
ACC	Area Control Centre
ADEXP	Air Traffic Control Data Exchange Protocol
ADS	Automatic Dependent Surveillance
ADS-B	Automatic Dependent Surveillance - Broadcast
AGL	Aerodrome Ground Lighting
AIDA	Airport Integrated Data link
AIDB	Airport Information Data Base
API	Application Programming Interface
APP	Approach
ARP	Aerodrome Reference Point
ART	Alert Response Time
A-SMGCS	Advanced Surface Movement Guidance and Control System
ASTERIX	All-Purpose Structured EUROCONTROL Surveillance Information Exchange
ATA	Actual Time of Arrival
ATC	Air Traffic Control
ATCO	Air Traffic Controller
ATIS	Automatic Terminal Information Service
ATM	Air Traffic Management
ATN	Aeronautical Telecommunication Network
ATR	A-SMGCS Technical Requirements
ATS	Ait Traffic Service
ATSU	ATS Unit
AVOL	Aerodrome Visibility Operational Level
BDS	Comm-B Data Selector
BETA	Benefit Evaluation by Testing an A-SMGCS (a project the Fifth Framework)
CASCADE	Cooperative ATS through Surveillance and Communication Applications Deployed in ECAC
C-ATSU	Controlling - ATSU
CAMU	Central Airspace Management Unit
CPDLC	Controller-Pilot Data Link Communication
CRC	Cyclic Redundancy Check
CTOT	Calculated Take-Off Time
CWP	Controller Working Position
DCL	Departure Clearance
DCR	Departure Clearance Request
DLASD	Data Link Application Service Document
DLIC	Data Link Initiation Capability

Acronym	Long Name
DMAN	Departure Management
D-TAXI	Data Link - TAXI
ECAC	European Civil Aviation Conference
EMC	Electromagnetic Compatibility
EIBT	Estimated In-Block Time
EOBT	Estimated Off-Block Time
EPU	Estimated Position Uncertainty
ES	Extended Squitter
ESS	Embedded System Status
ESP	Embedded System Performances
ETA	Estimated Time of Arrival
ETC	Expected Taxi Clearance
ETD	Estimated Time of Departure
ETOT	Estimated Take-Off Time
EUROCAE	European Organisation for Civil Aviation Equipment
EUROCONTROL	European Organisation for the Safety of Air Navigation
FANS	Future Air Navigation System
FDPS	Flight Data Processing System
FOM	Figure Of Merit
GMS	Gate Management System
GNSS	Global Navigation Satellite System
HFOM	Horizontal Figure Of Merit
HMI	Human-Machine Interaction
MASPS	Minimum Aviation System Performance Specification
MLAT	Multi-Lateration
NAC	Navigation Accuracy Category
NIC	Navigation Integrity Category
NUC	Navigation Uncertainty Category
ICAO	International Civil Aviation Organisation
IDL	Information Display Latency
IP	Integrated Project
LAN	Local Area Network
LVO	Low Visibility Operations
OR	Operational Requirements
ORD	Operational Requirements Document
OSED	Operational Service and Environmental Description
PAM	Pilot Acknowledgement Message
PAS	Park Air Systems AS
PD	Probability of Detection
PDAS	Probability of Detection of Alert Situation
PFA	Probability of False Alert

Acronym	Long Name
PFD	Probability of False Detection
PFID	Probability of False Identification
PID	Probability of Identification
PRA	Position Registration Accuracy
Rc	Containment Radius
RDPS	Radar Data Processing System
RPA	Reported Position Accuracy
R/T	Radio/Telecommunication
RTCA	Radio Technical Commission for Aeronautics
RTOI	Response Time to Operator Input
RVA	Reported Velocity Accuracy
RWY	Runway
SDF	Surveillance Data Fusion
SID	Standard Instrument Departure
SIL	Surveillance Integrity Level
SMAN	Surface Manager
SMR	Surface Movement Radar
SP	Sub-Project
SPOR	Services, Procedures and Operational Requirements document
SSR	Secondary Surveillance Radar
TDL	Target Display Latency
TIS-B	Traffic Information Service - Broadcast
TRD	Technical Requirements Document
TRUR	Target Report Update Rate
TWY	Taxiway
UAT	Universal Access Transceiver
VDL	VHF Data Link
VDL-2	VDL - Mode 2
VFR	Visual Flight Rules
VHF	Very High Frequency