

# Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

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#### Task contributors

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**EUROCONTROL** 

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#### **Abstract**

This SPR defines the requirements that support Operational Focus Area (OFA) 02.01.02, "Point Merge in Complex TMA". The concept builds on previous development and implementation by further developing it to cater for a Point Merge centric P-RNAV route structure and operating method for Very High Capacity (VHC) TMAs.

The Requirements apply to the following Application/Information types:

- 1. HMI
- 2. Airspace Design
- 3. Operational Procedures
- 4. Information (Air-Ground & Ground-Ground)

There is no counterpart Technical development required in support of this concept so there are no links to System Functions identified.

## **Authoring & Approval**

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| 00.00.02 | 30/03/12   | Draft  |        | Baseline version for NATS.<br>Results of Safety<br>Assessment Report. |
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## **Executive summary**

An SPR defines the requirements that support the operational services and concept elements identified in the Operational Service and Environment Definition (OSED). This SPR details the requirements in support of Operational Focus Area (OFA) 02.01.02, "Point Merge in Complex TMA".

Lack of effective P-RNAV operations across all European TMAs affects arriving and departing aircraft, particularly commercial flights, due to the increasing complexity in such environments. In addition, the increasing environmental needs will be difficult to implement without the use of P-RNAV operations.

Point Merge is an innovative method developed by the EUROCONTROL Experimental Centre (EEC); it enables the merging of traffic flows, whilst incorporating the predictability of P-RNAV routes, but affording Controllers a degree of flexibility in the way they manage aircraft associated with traditional ATM.

This concept builds on previous concept development and implementation by further developing it to cater for a Point Merge centric P-RNAV route structure and operating method for Very High Capacity (VHC) TMAs.

The SPR requirements are applicable to the Application and Information Services invoked by the Operational Processes referred to in the OSED. There is no counterpart Technical development required in support of this concept so there are no links to System Functions identified.

The Requirements are divided by the following Operational Services:

- 1. Plan and Implement ATC Sectors
- 2. Monitor Traffic (climb & descent)
- 3. Separate Traffic (climb & descent)
- 4. Synchronise Traffic (descent)

The Requirements are sub-divided by Application type, where the Applications are:

- HMI
- Airspace Design
- Operational Procedures

Plus, there is also a sub-division for information services:

• Information (Air-Ground & Ground-Ground)

The Performance requirements in this document are a sub-set of the Safety requirements because Safety is an intrinsic part of all the applications.

#### 1 Introduction

## 1.1 Purpose of the document

This Safety and Performance Requirements (SPR) document provides the safety and performance requirements for Application and Information Services related to the operational Processes and Services defined in the corresponding OSED for "Point Merge in Complex TMA" [13].

## 1.2 Scope

This document defines the requirements that support the operational services and concept elements identified in the Operational Service and Environment Definition (OSED) [13]. These services are expected to be operational (IOC) in the 2012 time frame.

This SPR relates to the operational concept for the OFA02.01.02 of **Point Merge in Complex TMA**, which is developed in the OSED as a Point Merge centric P-RNAV route structure and operating method for a complex TMA. Therefore, the concept is centred on Point Merge procedures but also incorporates aspects of P-RNAV route structures for Arrivals & Departures so that a fully effective concept for TMA airspace is developed.

Only Project 5.7.4 contributes to this OFA.

The requirements developed in this document show traceability to the higher level requirements described in the corresponding OSED, which, in turn, show traceability to the higher level KPAs (through DOD), as represented in Figure 1: Requirements traceability.

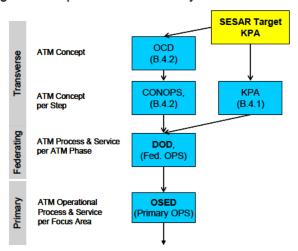


Figure 1: Requirements traceability

#### 1.3 Intended audience

- Primary projects;
  - P5.6.4 for compatibility with queue management concept
  - P5.6.7 for compatibility with Integrated Sequence Building/Optimisation of Queues
  - P5.9 for HMI needs/requirements
  - WP8 for Information needs/requirements
- Federating projects:



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- SWP 5.2 for Consolidation;
- SWP 5.3 for cross-WP integrated validation
- Transversal project:
  - WP B for architecture and performance modelling
- ANSPs with Complex TMAs, who are considering development of a P-RNAV route structure using Point Merge

#### 1.4 Structure of the document

The context and scope of the document is provided in Section 1.

Section 2 provides a brief summary of the concept, taken from the OSED.

Section 3 establishes clear relationships between the concepts and the application/information services through a set of requirements. A traceability matrix for these requirements is provided in Section 4.

## 1.5 Background

Lack of effective P-RNAV operations across all European TMAs affects arriving and departing aircraft, particularly commercial flights, due to the increasing complexity in such environments. In addition, the increasing environmental needs will be difficult to implement without the use of P-RNAV operations.

Point Merge is an innovative method developed by the EUROCONTROL Experimental Centre (EEC); it enables the merging of traffic flows, whilst incorporating the predictability of P-RNAV routes, but affording Controllers a degree of flexibility in the way they manage aircraft associated with traditional ATM.

Support to implementation of Point Merge so far includes:

- EUROCONTROL developed an Operational Services and Environment Definition (OSED) for "Point Merge", an innovative technique developed by the EUROCONTROL Experimental Centre, and designed to improve and harmonise arrival operations in terminal airspace with a pan-European perspective. [14]
- AVINOR (Oslo Gardermoen, planned implementation date: 2011). A large scale assessment carried
  out successfully for Oslo in 2008/2009 through fast time simulations at the EUROCONTROL Central
  European Research, Development and Simulation Centre (CRDS), and controllers' real time
  simulations at the EUROCONTROL Experimental Centre (EEC). [14]
- IAA (Dublin, considered implementation date: 2012). An initial real-time simulation conducted at the EEC for Dublin in 2007, followed by a second simulation in 2010 looking at the expected Dublin TMA 2012 environment including Point Merge and CDAs. [14]
- ENAV (implementation considered in Rome Fiumicino). An initial real-time simulation conducted at the Rome ACC in 2008 and focusing on the TMA, followed by larger scale simulations involving ACC sectors and arrival manager, conducted at ENAV premises in 2009. [14]
- DSNA (Paris ACC). A study undertaken with EUROCONTROL, consisting of a series of small scale Real-Time Simulations and workshops in 2009/2010. Investigated the potential applicability, benefits and limitations of Point Merge for ACC Arrivals, [14]. This now constitutes a basis for the exercise 427 of project 5.6.7
- NATS (London Heathrow). Fast Time Simulations undertaken for the Environmentally Responsible
  Air Transport (ERAT) project in 2010, to analyse the feasibility of CDAs into Heathrow Airport whilst
  using Point Merge Procedures to maintain landing runway throughput.



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## **1.6 Glossary of terms**

| Term                            | Definition   | Source      |
|---------------------------------|--|-------------|
| Actor                           | An implementation independent unit of responsibility that performs an action to achieve an effect that contributes to a desired end state.   | ATM Lexicon |
| Airspace                        | A defined three dimensional region of space relevant to air traffic.   | ATM Lexicon |
| Arrival Manager                 | A planning system to improve arrival flows at one or more airports by calculating the optimised approach / landing sequence and Target Landing Times (TLDT) and, where needed, times for specific fixes for each flight, taking multiple constraints and preferences into account.                     | ATM Lexicon |
| Closed Loop<br>Clearance        | A clearance resulting in a revision of one portion of the Reference Business Trajectory (RBT), e.g. a direct route from a point of the original RBT to another point of the original RBT.  | ATM Lexicon |
| Complexity                      | In the ATM context, complexity refers to the number of simultaneous or near- simultaneous interactions of trajectories in a given volume of airspace.  | ATM Lexicon |
| Constraint                      | Any restriction brought to the preferred trajectory of an aircraft, being either a tactical constraint such as ATCO instruction, or a strategic constraint derived from the operations of the network  | ATM Lexicon |
| Continuous Descent<br>Operation | An operation, enabled by airspace design, procedure design and ATC facilitation, in which an arriving aircraft descends continuously, to the greatest possible extent, by employing minimum engine thrust, ideally in a low drag configuration, prior to the final approach fix /final approach point. | ATM Lexicon |
| Flight Object                   | The system instance view of a flight. It is the flight object that is shared between the IOP stakeholders.   | ATM Lexicon |
| Intermediate<br>Approach        | The downwind, base and intercept approach path segments for positioning and turning on to merge on to final approach ending at the interception of the final approach localiser and glideslope.  | ATM Lexicon |
| Level                           | A generic term relating to the vertical position of an aircraft in flight and meaning variously, height, altitude or flight level.   | ATM Lexicon |
| Level Constraint                | The constraint defined by an objective to set the cleared flight level (CFL) for the flight.   | ATM Lexicon |
| Level Off                       | To manoeuvre an aircraft into a flight attitude that is parallel to the surface of the earth after gaining or losing altitude.   | ATM Lexicon |
| Managed Airspace                | Airspace in which all traffic is known to the Air Traffic System   | ATM Lexicon |
| Open Loop<br>Clearance          | An ATC clearance that does not include a specified or implied point where the restriction on the trajectory ends.  | ATM Lexicon |
| Operational Concept             | A proposed system in terms of the user needs it will fulfil, its relationship to existing systems or procedures and the ways it will be used. It is used to obtain consensus among the acquirer, developer, support, and user agencies on the operational concept of a proposed system.                | ATM Lexicon |
| Operational Focus<br>Area       | A limited set of dependent operational and technical improvements related to an Operational sub-package, comprising specific interrelated Ols designed to meet specific performance expectations of the ATM Performance Partnership.   | ATM Lexicon |
| Operational<br>Improvement      | The result of any operational measure or action taken through time in order to improve the performance of the ATM system.  | ATM Lexicon |
| Operational<br>Package          | A deployment focused grouping of performance driven operational changes and associated technical and procedural enablers.  | ATM Lexicon |



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| Term                               | Definition  | Source      |
|------------------------------------|---|-------------|
|                                    | 2. A (very) high level grouping of (related) Operational Improvement Steps for the purpose of (very) high level communication.  |             |
| Operational Sub-<br>Package        | A sub-grouping of connected operational and technical improvements related to the Operational Package with closely related operational focus, designed to meet performance expectations of the ATM Performance Partnership. | ATM Lexicon |
| Operating<br>Environment           | An environment with a consistent type of flight operations.   | ATM Lexicon |
| Performance-Based<br>Navigation    | Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.   | ATM Lexicon |
| Primary Project                    | Projects that develop and perform validation on aspects of the operational concept and the system   | ATM Lexicon |
| Queue Management                   | The tactical establishment and maintenance of a safe, orderly and efficient flow of traffic.  | ATM Lexicon |
| Required Navigation<br>Performance | A statement of the navigation performance necessary for operation within a defined airspace.  | ATM Lexicon |
| Separation                         | The separation to keep aircraft operating safely on final approach.   | ATM Lexicon |
| Constraint                         | Examples are minimum radar separation to keep risk of collision to an acceptable safe level and wake turbulence radar separation to keep the risk of an adverse wake turbulence encounter to an acceptable safe level.      |             |
| Spacing Constraint                 | The spacing required to be set on final approach for runway operations in the prevailing meteorological conditions.   | ATM Lexicon |
|                                    | Examples are VIS2 spacing, LVP spacing, runway surface inspection spacing and non-nominal runway occupancy spacing.   |             |

## 1.7 Acronyms and Terminology

| Term    | Definition  |
|---------|---|
| ACARS   | Aircraft Communications Addressing and Reporting System |
| ADD     | Architecture Definition Document                        |
| ANSP    | Air Navigation Service Provider                         |
| ATM     | Air Traffic Management                                  |
| ATS     | Air Traffic Services                                    |
| AU      | Airspace User   |
| CAT B   | Category B (flights)                                    |
| DOD     | Detailed Operational Description                        |
| E-ATMS  | European Air Traffic Management System                  |
| FAF     | Final Approach Fix                                      |
| FIN     | Final Approach Director                                 |
| FUA     | Flexible Use of Airspace                                |
| GA      | General Aviation  |
| GS      | Ground Speed  |
| HMI     | Human-Machine Interface                                 |
| IAF     | Initial Approach Fix                                    |
| INT     | Intermediate Approach Director                          |
| INTEROP | Interoperability Requirements                           |
| IRS     | Interface Requirements Specification                    |

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| Term               | Definition   |
|--------------------|--|
| KPA                | Key Performance Area   |
| MAP                | Missed Approach Procedure  |
| OSED               | Operational Service and Environment Definition                                   |
| PBN                | Performance Based Navigation   |
| PMS                | Point Merge System   |
| P-RNAV             | Precision Area Navigation  |
| RF                 | Radius-to-Fix (turns)  |
| RMA                | Radar Manoeuvring Area   |
| SAR                | Safety Assessment Report   |
| SESAR              | Single European Sky ATM Research Programme                                       |
| SESAR Programme    | The programme which defines the Research and Development activities and Projects |
| SID                | Standard Instrument Departure  |
| SJU                | SESAR Joint Undertaking (Agency of the European Commission)                      |
| SJU Work Programme | The programme which addresses all activities of the SESAR Joint Undertaking      |
| SPR                | Safety and Performance Requirements  |
| STAR               | Standard Instrument Arrival Route  |
| TS                 | Technical Specification  |
| TAD                | Technical Architecture Description   |
| VFR                | Visual Flight Rules  |
| VHC                | Very High Capacity   |
| VMC                | Visual Meteorological Conditions   |

## 2 Summary of Operational Concept (from OSED)

## 2.1 Description of the Concept Element

Terminal Control (TC) Approach operations currently employ "Open-loop" techniques to sequence and space the arrival traffic. This entails the use of tactical vectors: heading, speed and vertical altitude intervention, to merge traffic onto the line of the Final Approach ILS (Instrument Landing System).

Point Merge is an innovative method developed by the EUROCONTROL Experimental Centre (EEC) for merging arrival flows with existing technology including Precision Area Navigation (P-RNAV – Precision RNAV). Under a Point Merge System, the aircraft are merged to a point using "Closed-loop" techniques.

This concept builds on previous concept development and implementation by further developing it to cater for a Point Merge centric P-RNAV route structure and operating method for Very High Capacity (VHC) or High Capacity (HC) needs TMAs.

This concept provides a Point Merge centric P-RNAV route structure and operating method for a complex TMA. Therefore, the concept is centred on Point Merge procedures but also incorporates aspects of P-RNAV route structures for Arrivals & Departures so that a fully effective concept for TMA airspace is developed.

Refer to the OSED [13] for a detailed description.

## 2.2 Description of Operational Services

The following ATS Operational Processes apply:

- 1. Plan and Implement ATC Sectors
- 2. Monitor Traffic (climb & descent)
- 3. Separate Traffic (climb & descent)
- 4. Synchronise Traffic (descent)

Refer to the OSED [13] for a detailed description.

## 2.3 Description of Operational Environment

The Operational Environment is a "High Complexity TMA", with the following characteristics:

- o Airspace Constrained (severely limited airspace availability)
- Traffic Volume and Variation Constrained (high traffic density and aircraft mix)
- o Environmentally Constrained (major environmental constraints apply)
- Airfield interaction Constrained (multiple Airfields within the TMA)

The SESAR ATM Master Plan [15] equates complexity with capacity needs. By this scale, the Operational Environment of "Complex TMA" applicable to this concept equates to TMAs with **Very High Capacity (VHC)** needs. This categorisation is for Airports or TMAs with >100 movements per hour (e.g. London or Milan).

Refer to the OSED [13] for a detailed description.

## 3 Requirements

This section describes the safety and performance requirements. The SPR requirements show traceability to the Operational Requirements and Safety Objectives (applicable to Processes and Services (P&S)) described in the OSED.

The SPR requirements are applicable to the Application and Information Services invoked by the Operational Processes referred to in the OSED. There is no counterpart Technical development required in support of this concept so there are no links to System Functions identified. Refer to relevant B.4.3 documents [7] (ADD) for the [System / Service] Architecture description.

This section is structured per Operational Service (P&S), and subdivided into Application and Information Services. The Requirements are divided by Operational Service (as identified in Section 2.2) and subdivided by Application type, where the Applications are:

- HMI
- Airspace Design
- Operational Procedures

Plus, there is also a sub-division for information services:

Information (Air-Ground & Ground-Ground)

The Safety requirements were developed as part of the Safety Assessment Report Error! Reference source not found., which followed the formal SESAR Safety Model. Each Safety requirement is linked to a Safety Objective in the OSED

The Performance requirements in this document are a sub-set of the Safety requirements because Safety is an intrinsic part of all the applications. Therefore, many of the Performance requirements are duplicates, but they are in support of different operational requirements in the OSED [13], as indicated by the links made.

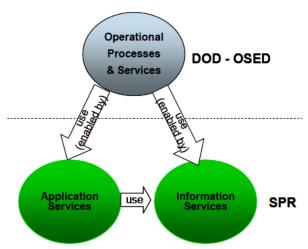


Figure 2: Application services and Information Services dependency to Operational Processes and Services

## 3.1 Operational Service #1 - Plan and Implement ATC Sectors

### 3.1.1 #AppS1 - HMI Requirements (TMA ATCO)

#### 3.1.1.1 Safety Requirements

The following tables show the HMI related Safety Requirements for the service of 'Plan and Implement ATC Sectors':

| Identifier  | REC   | -05.07.04-SPR-SAF0.0016  | 3                              |                     |  |
|---|---|--|--------------------------------|---------------------|--|
| Requirement                                       | P-RI  | P-RNAV status shall be displayed on the radar display.   |                                |                     |  |
| Title   | SR#   | 2.2a   |                                |                     |  |
| Status  | <in f<="" td=""><td>Progress&gt;</td><td></td><td></td></in>  | Progress>  |                                |                     |  |
| Rationale   | not i   | The Controller (Exec/Plan) must be aware of whether an aircraft is P-RNAV capable or not in order to understand and anticipate the performance characteristics of the aircraft (e.g. route following accuracy) and plan accordingly. |                                |                     |  |
| Category  | <saf< td=""><td>ety&gt;<functional> <perform< td=""><td>nance&gt;</td><td></td></perform<></functional></td></saf<> | ety> <functional> <perform< td=""><td>nance&gt;</td><td></td></perform<></functional>  | nance>                         |                     |  |
| Validation Method                                 | <rea< td=""><td>al Time Simulation&gt;</td><td></td><td></td></rea<>  | al Time Simulation>  |                                |                     |  |
| Verification Method                               | N/A   |  |                                |                     |  |
| Relationship                                      |   | Linked Element Type  | Identifier                     | Compliance          |  |
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| <applies_to></applies_to>                         |   | <operational process=""> or<br/><operational service=""></operational></operational>   | Plan and Implement ATC Sectors | N/A                 |  |
| <applies_to></applies_to>                         |   | <operational area="" focus=""></operational>   | OFA 02.01.02                   | N/A                 |  |
| <applied_in_environment></applied_in_environment> |   | <environment class=""></environment>   | VHC TMA                        | N/A                 |  |
| <allocated to=""></allocated>                     |   | <application service=""></application>   | HMI                            | N/A                 |  |

#### 3.1.1.2 Performance Requirements

No performance related HMI Requirements identified for this Operational Service.

## 3.1.2 #AppS2 – Airspace Design Requirements

## 3.1.2.1 Safety Requirements

The following tables show the Airspace Design related Safety Requirements for the service of 'Plan and Implement ATC Sectors':

| Identifier                | REQ   | REQ-05.07.04-SPR-SAF0.0002  |                                |                     |  |
|---------------------------|---|---|--------------------------------|---------------------|--|
| Requirement               |   | Implementation of PMS should provide holding at MPs able to absorb all the traffic  |                                |                     |  |
|                           | withi   | n the PMS and between the   | e MPs and the runway           |                     |  |
| Title                     | SR#   | 1.1e  |                                |                     |  |
| Status                    | <in f<="" td=""><td>Progress&gt;</td><td></td><td></td></in>                | Progress>   |                                |                     |  |
| Rationale                 | runw<br>easie   | The ability of MPs holding to absorb all the traffic within the sequencing legs and the runway, allows the controllers (Exec/Plan) to manage contingency situation in an easier way, then re-activating the approaches while maintaining the previous sequence order. |                                |                     |  |
| Category                  | <saf< td=""><td colspan="4"><safety></safety></td></saf<>                   | <safety></safety>   |                                |                     |  |
| Validation Method         | <rea< td=""><td colspan="4"><real simulation="" time=""></real></td></rea<> | <real simulation="" time=""></real>   |                                |                     |  |
| Verification Method       | N/A   | N/A   |                                |                     |  |
| Relationship              |   | Linked Element Type   | Identifier                     | Compliance          |  |
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| <applies to=""></applies> |   | <airspace design=""></airspace>   | Plan and Implement ATC Sectors | N/A                 |  |
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| <pre><applied environment="" in=""></applied></pre> | <environment class=""></environment>   | VHC TMA         | N/A |
|---|--|-----------------|-----|
| <allocated to=""></allocated>                       | <application service=""></application> | Airspace Design | N/A |

| Identifier                       | REC  | -05.07.04-SPR-SAF0.0015   | 5                           |                     |  |
|----------------------------------|--|---|-----------------------------|---------------------|--|
| Requirement                      | Impl   | Implementation of PMS should provide a segregation from standard departures   |                             |                     |  |
| Title                            | <u> </u>   | 2.1m  |                             |                     |  |
| Status                           | <in f<="" td=""><td>Progress&gt;</td><td></td><td></td></in>         | Progress>   |                             |                     |  |
| Rationale                        | To p<br>withi  | To prevent at strategic level conflicts between departing aircrafts and arriving aircrafts within the PMS structure. This is in accordance with standard TMA design guidelines, where all routes need to be strategically deconflicted. |                             |                     |  |
| Category                         | <saf< td=""><td>ety&gt;</td><td>-</td><td></td></saf<>               | ety>  | -                           |                     |  |
| Validation Method                | <rea< td=""><td>al Time Simulation&gt;</td><td></td><td></td></rea<> | al Time Simulation>   |                             |                     |  |
| Verification Method              | N/A  |   |                             |                     |  |
| Relationship                     | •  | Linked Element Type   | Identifier                  | Compliance          |  |
| <satisfies></satisfies>          |  | <atms requirement=""></atms>  | REQ-05.07.04-OSED-SAF0-0006 | <partial></partial> |  |
| <applies_to></applies_to>        |  | <operational process=""> or<br/><operational service=""></operational></operational>  | Separate Traffic            | N/A                 |  |
| <applies_to></applies_to>        |  | <operational area="" focus=""></operational>  | OFA 02.01.02                | N/A                 |  |
| <a>PPLIED IN ENVIRONMENT&gt;</a> |  | <environment class=""></environment>  | VHC TMA                     | N/A                 |  |
| <allocated_to></allocated_to>    |  | <application service=""></application>  | Airspace Design             | N/A                 |  |

## 3.1.2.2 Performance Requirements

The following tables show the Airspace Design related Performance Requirements for the service of 'Plan and Implement ATC Sectors':

| Identifier                       | REQ  | Q-05.07.04-SPR-PRF0.0007   |                                |                     |
|----------------------------------|--|--|--------------------------------|---------------------|
| Requirement                      |  | ementation of PMS should allow for descent along the sequencing leg structure e constraints permit.  |                                |                     |
| Title                            | SR#  | 2.11   |                                |                     |
| Status                           | <in f<="" td=""><td>Progress&gt;</td><td></td><td></td></in>   | Progress>  |                                |                     |
| Rationale                        | provi<br>insid<br>withous<br>cond<br>redu  | use local constraints appear to be quite workload demanding for feeder sectors in iding aircraft at steady level inbound PMS, the possibility to handle descent traffic the PMS leg structure has to be evaluated in order to relieve pressure from them but having the need to increase track miles prior PMS to achieve the steady level lition. Moreover this condition may also act as a further mitigation in case of ced horizontal separation inside the sequencing leg, acting subsequently on rent "direct to" timing in order to restore it. |                                |                     |
| Category                         | <op< td=""><td colspan="3"><operational>&gt;</operational></td></op<>  | <operational>&gt;</operational>  |                                |                     |
| Validation Method                | <rea< td=""><td colspan="3"><real simulation="" time=""></real></td></rea<>  | <real simulation="" time=""></real>  |                                |                     |
| Verification Method              | N/A  | N/A  |                                |                     |
| Relationship                     | Relationship Linked Element Type Identifier Complian   |  |                                | Compliance          |
| <satisfies></satisfies>          | <satisfies> <atms requirement=""> REQ-05.07.04-OSED-SAF0-0006 <particular< td=""><td><partial></partial></td></particular<></atms></satisfies> |  |                                | <partial></partial> |
| <applies_to></applies_to>        |  | <airspace design=""></airspace>  | Plan and Implement ATC Sectors | N/A                 |
| <applies to=""></applies>        |  | <operational area="" focus=""></operational>   | OFA 02.01.02                   | N/A                 |
| <a>PPLIED IN ENVIRONMENT&gt;</a> |  | <environment class=""></environment>   | VHC TMA                        | N/A                 |
| <allocated_to></allocated_to>    |  | <application service=""></application>   | Airspace Design                | N/A                 |

## 3.1.3 #AppS3 - Operational Procedure Requirements

## 3.1.3.1 Safety Requirements

The following tables show the Operational Procedure related Safety Requirements for the service of 'Plan and Implement ATC Sectors':

| lala matifica u                  | DEC  | 05 07 04 SDD SAE0 004   |                                    |                     |  |  |
|----------------------------------|--|---|------------------------------------|---------------------|--|--|
| Identifier                       |  | -05.07.04-SPR-SAF0.0042   |                                    |                     |  |  |
| Requirement                      |  | lation of maximum entry level should be performed considering the whole   |                                    |                     |  |  |
| -                                | sequ   | encing leg length and the   | encing leg length and the geometry |                     |  |  |
| Title                            | SR#  | 5n  |                                    |                     |  |  |
| Status                           | <in f<="" td=""><td>Progress&gt;</td><td></td><td></td></in>   | Progress>   |                                    |                     |  |  |
| Rationale                        | maxi   | ementing the PMS with one sequencing leg with no steady entry level, the mum entry level has to be determined in order to allow the aircraft enough track is for descent considering the geometry of PMS. |                                    |                     |  |  |
| Category                         | <saf< td=""><td colspan="3">ety&gt;</td></saf<>                | ety>  |                                    |                     |  |  |
| Validation Method                | <rea< td=""><td colspan="3">al Time Simulation&gt;</td></rea<> | al Time Simulation>   |                                    |                     |  |  |
| Verification Method              | N/A  |   |                                    |                     |  |  |
| Relationship                     |  | Linked Element Type   | Identifier                         | Compliance          |  |  |
| <satisfies></satisfies>          |  | <atms requirement=""></atms>  | REQ-05.07.04-OSED-SAF0-0010        | <partial></partial> |  |  |
| <applies to=""></applies>        |  | <operational process=""> or</operational>   | Monitor Traffic                    | N/A                 |  |  |
|                                  |  | <operational service=""></operational>  |                                    |                     |  |  |
| <applies_to></applies_to>        |  | <operational area="" focus=""></operational>  | OFA 02.01.02                       | N/A                 |  |  |
| <a>PPLIED_IN_ENVIRONMENT&gt;</a> |  | <environment class=""></environment>  | VHC TMA                            | N/A                 |  |  |
| <allocated to=""></allocated>    |  | <application service=""></application>  | Operational Procedure              | N/A                 |  |  |

| Identifier                               | REQ  | -05.07.04-SPR-SAF0.0043   |                             |                     |
|--|--|---|-----------------------------|---------------------|
| Requirement                              |  | ementation of PMS should provide a definition of the maximum aircraft capacity on PMS at any one time.  |                             |                     |
| Title                                    | SR#  | 50  |                             |                     |
| Status                                   | <in f<="" td=""><td>Progress&gt;</td><td></td><td></td></in>   | Progress>   |                             |                     |
| Rationale                                | sector<br>the F  | ermining the maximum capacity of PMS allows controllers (Exec/Plan) of feeding ors to clear the subsequent aircraft to hold at upstream holdings without saturating PMS. The need to determine capacity limits applies to all closed STAR edures. |                             |                     |
| Category                                 | <saf< td=""><td colspan="3">ety&gt;</td></saf<>                | ety>  |                             |                     |
| Validation Method                        | <rea< td=""><td colspan="3">al Time Simulation&gt;</td></rea<> | al Time Simulation>   |                             |                     |
| Verification Method                      | N/A  |   |                             |                     |
| Relationship                             |  | Linked Element Type   | Identifier                  | Compliance          |
| <satisfies></satisfies>                  |  | <atms requirement=""></atms>  | REQ-05.07.04-OSED-SAF0-0010 | <partial></partial> |
| <applies_to></applies_to>                |  | <operational process=""> or <operational service=""></operational></operational>  | Monitor Traffic             | N/A                 |
| <applies to=""></applies>                |  | <operational area="" focus=""></operational>  | OFA 02.01.02                | N/A                 |
| <applied environment="" in=""></applied> |  | <environment class=""></environment>  | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>            |  | <application service=""></application>  | Operational Procedure       | N/A                 |

## **3.1.3.2 Performance Requirements**

No performance related Operational Procedure Requirements identified for this Operational Service.

## 3.1.4 # InfS1 – Information (Air-Ground & Ground-Ground) Requirements

## 3.1.4.1 Safety Requirements

The following tables show the information related Safety Requirements for the service of 'Plan and Implement ATC Sectors':

| Identifier          | REQ-05.07.04-SPR-SAF0.0016   |
|---------------------|--|
| Requirement         | P-RNAV status shall be displayed on the radar display.   |
| Title               | SR#2.2a  |
| Status              | <in progress=""></in>  |
| Rationale           | The Controller (Exec/Plan) must be aware of whether an aircraft is P-RNAV capable or not in order to understand and anticipate the performance characteristics of the aircraft (e.g. route following accuracy) and plan accordingly. |
| Category            | <safety><functional> <performance></performance></functional></safety>   |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                             | Linked Element Type                          | Identifier                     | Compliance          |
|--|--|--------------------------------|---------------------|
| <satisfies></satisfies>                  | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0003    | <partial></partial> |
| <applies_to></applies_to>                | <operational process=""> or</operational>    | Plan and Implement ATC Sectors | N/A                 |
|  | <operational service=""></operational>       |                                |                     |
| <applies to=""></applies>                | <operational area="" focus=""></operational> | OFA 02.01.02                   | N/A                 |
| <applied environment="" in=""></applied> | <environment class=""></environment>         | VHC TMA                        | N/A                 |
| <allocated_to></allocated_to>            | <information service=""></information>       | Air-Ground SWIM                | N/A                 |

## 3.1.4.2 Performance Requirements

No performance related Information Requirements identified for this Operational Service.

## 3.2 Operational Service #2 - Monitor Traffic

## 3.2.1 #AppS4 – HMI Requirements (TMA ATCO)

## 3.2.1.1 Safety Requirements

The following tables show the HMI related Safety Requirements for the service of 'Monitor Traffic':

| Identifier          | REQ-05.07.04-SPR-SAF0.0009   |
|---------------------|--|
| Requirement         | ATC shall be aware of Indicated Air Speed (IAS) of each aircraft under their control.  |
| Title               | SR#2.1g  |
| Status              | <in progress=""></in>  |
| Rationale           | Displaying the indicated air speed of aircraft under their control allows Controllers (Exec/Plan) to sequence traffic effectively and prevent catch-up situations occurring. |
| Category            | <safety><functional><performance></performance></functional></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                                      | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
| <satisfies></satisfies>                           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0006 | <partial></partial> |
| <applies_to></applies_to>                         | <operational process=""> or</operational>    | Monitor Traffic             | N/A                 |
|   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied_in_environment></applied_in_environment> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>                     | <application service=""></application>       | HMI                         | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0011  |
|---------------------|---|
| Requirement         | ATC shall be aware of Selected Flight Level (SFL) of each aircraft under their control.   |
| Title               | SR#2.1i   |
| Status              | <in progress=""></in>   |
| Rationale           | Displaying the aircraft Selected Flight Level to Controllers (Exec/Plan) provides additional awareness of what an aircraft is doing, whether a pilot is following an instruction correctly, and allows the Controller to provide corrective action as required. |
| Category            | <safety><functional><performance></performance></functional></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                             | Linked Element Type                          | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
| <satisfies></satisfies>                  | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0006 | <partial></partial> |
| <applies_to></applies_to>                | <operational process=""> or</operational>    | Monitor Traffic             | N/A                 |
|  | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>                | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied environment="" in=""></applied> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>            | <application service=""></application>       | HMI                         | N/A                 |

| Identifier  | REQ-05.07.04-SPR-SAF0.0013   |
|-------------|--|
| Requirement | ATC should be aware of aircraft rate of descent for descending aircraft.   |
| Title       | SR#2.1k  |
| Status      | <in progress=""></in>  |
| Rationale   | Where an aircraft is required to descend (e.g. from a sequencing leg to Merge Point), the rate of descent display will provide an indication of whether the aircraft will meet |



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|                     | the required level/altitude.  |
|---------------------|---|
| Category            | <safety><functional><performance></performance></functional></safety> |
| Validation Method   | <real simulation="" time=""></real>                                   |
| Verification Method | N/A   |

| Relationship                                      | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
| <satisfies></satisfies>                           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0006 | <partial></partial> |
| <applies_to></applies_to>                         | <operational process=""> or</operational>    | Monitor Traffic             | N/A                 |
|   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied_in_environment></applied_in_environment> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>                     | <application service=""></application>       | HMI                         | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0029   |
|---------------------|--|
| Requirement         | ATC shall be aware of real-time Wx in the Point Merge System   |
| Title               | SR#4c  |
| Status              | <in progress=""></in>  |
| Rationale           | Controllers (Exec/Plan) need to be aware where poor weather is situated in the PMS in order to manage the aircraft in the most appropriate way (e.g. radar overlay). |
| Category            | <safety><functional><performance></performance></functional></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                                      | Linked Element Type  | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
| <satisfies></satisfies>                           | <atms requirement=""></atms>   | REQ-05.07.04-OSED-SAF0-0009 | <partial></partial> |
| <applies_to></applies_to>                         | <operational process=""> or<br/><operational service=""></operational></operational> | Monitor Traffic             | N/A                 |
| <applies to=""></applies>                         | <operational area="" focus=""></operational>   | OFA 02.01.02                | N/A                 |
| <applied_in_environment></applied_in_environment> | <environment class=""></environment>   | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>                     | <application service=""></application>   | HMI                         | N/A                 |

| Identifier  | REQ-05.07.04-SPR-SAF0.0044                                   |   |  |                     |
|---|--|---|--|---------------------|
| Requirement                                       | PMS  | PMS design shall minimize the occurrence of label clutter from adjacent airport traffic |  |                     |
| •   | flows  | s providing adequate latera   | I spacing from them.                     |                     |
| Title   | SR#  | 5р  |  |                     |
| Status  | <in f<="" td=""><td>Progress&gt;</td><td></td><td></td></in> | Progress>   |  |                     |
| Rationale   | Clos   | er airports flows may repre   | sent a source of label clutter depending | on how PMS          |
|   | desig  | gn is accomplished.   | -  |                     |
| Category  | <saf< td=""><td colspan="3"><safety></safety></td></saf<>    | <safety></safety>   |  |                     |
| Validation Method                                 | N/A  | N/A   |  |                     |
| Verification Method                               | N/A  |   |  |                     |
| Relationship                                      |  | Linked Element Type   | Identifier                               | Compliance          |
| <satisfies></satisfies>                           |  | <atms requirement=""></atms>  | REQ-05.07.04-OSED-SAF0-0010              | <partial></partial> |
| <applies_to></applies_to>                         |  | <operational process=""> or</operational>   | Monitor Traffic                          | N/A                 |
|   |  | <operational service=""></operational>  |  |                     |
| <applies_to></applies_to>                         |  | <operational area="" focus=""></operational>  | OFA 02.01.02                             | N/A                 |
| <applied_in_environment></applied_in_environment> |  | <environment class=""></environment>  | VHC TMA                                  | N/A                 |
| <allocated to=""></allocated>                     | •  | <application service=""></application>  | HMI                                      | N/A                 |

## 3.2.1.2 Performance Requirements

#### [REQ]

| Identifier  | REQ-05.07.04-SPR-PRF0.0001  |
|-------------|---|
| Requirement | The controller (Exec/Plan) HMI shall facilitate Silent Handovers between TMA controllers. |
| Title       | HMI Silent Handover   |
| Status      | <in progress=""></in>   |



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| Rationale           | Silent Releases reduce controller workload but the controller coordinating-out needs to know that the controller coordinating-in has accepted handover. |
|---------------------|---|
| Category            | <operational></operational>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                             | Linked Element Type                          | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
| <satisfies></satisfies>                  | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0016 | <partial></partial> |
| <applies_to></applies_to>                | <operational process=""> or</operational>    | Monitor Traffic             | N/A                 |
|  | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied environment="" in=""></applied> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>            | <application service=""></application>       | HMI                         | N/A                 |

## 3.2.2 #AppS5 – Airspace Design Requirements

### 3.2.2.1 Safety Requirements

No safety related Airspace Design Requirements identified for this Operational Service.

#### **3.2.2.2 Performance Requirements**

No performance related Airspace Design Requirements identified for this Operational Service.

## 3.2.3 #AppS6 - Operational Procedure Requirements

## 3.2.3.1 Safety Requirements

The following tables show the Operational Procedure related Safety Requirements for the service of 'Monitor Traffic':

| Identifier  | REQ  | REQ-05.07.04-SPR-SAF0.0045  |                             |                     |
|---|--|---|-----------------------------|---------------------|
| Requirement   | over<br>(Exe   | Implementation of PMS should define operational procedures to avoid PMS capacity overloading, and to establish a safety threshold of traffic at which the controllers (Exec/Plan) have to put in place properly defined coordination measures in order to avoid PMS saturation. |                             |                     |
| Title   | SR#  |   |                             |                     |
| Status  | <in f<="" td=""><td>Progress&gt;</td><td></td><td></td></in> | Progress>   |                             |                     |
| Rationale   | estal  | Controllers of feeding sectors have to be alerted, e.g. by a coordinator or by the establishment of proper operational procedures, when the maximum determined capacity for the PMS is going to be overtaken, in order to avoid the saturation of PMS                           |                             |                     |
| Category  | <saf< td=""><td colspan="3"><safety></safety></td></saf<>    | <safety></safety>   |                             |                     |
| Validation Method   | <real simulation="" time=""></real>                          |   |                             |                     |
| Verification Method   | N/A  | N/A   |                             |                     |
| Relationship  |  | Linked Element Type   | Identifier                  | Compliance          |
| <satisfies></satisfies>   | <satisfies></satisfies>                                      |   | REQ-05.07.04-OSED-SAF0-0010 | <partial></partial> |
| <applies_to></applies_to>   |  | <operational process=""> or<br/><operational service=""></operational></operational>  | Monitor Traffic             | N/A                 |
| <applies_to></applies_to>   |  | <operational area="" focus=""></operational>  | OFA 02.01.02                | N/A                 |
| <applied_in_environm< td=""><td>1ENT&gt;</td><td><environment class=""></environment></td><td>VHC TMA</td><td>N/A</td></applied_in_environm<> | 1ENT>  | <environment class=""></environment>  | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>   |  | <application service=""></application>  | Operational Procedure       | N/A                 |

## 3.2.3.2 Performance Requirements

No performance related Operational Procedure Requirements identified for this Operational Service.

## 3.2.4 # InfS2 – Information (Air-Ground & Ground-Ground) Requirements

## 3.2.4.1 Safety Requirements

| Identifier          | REQ-05.07.04-SPR-SAF0.0009   |  |  |
|---------------------|--|--|--|
| Requirement         | ATC shall be aware of Indicated Air Speed (IAS)  |  |  |
| Title               | SR#2.1g  |  |  |
| Status              | <in progress=""></in>  |  |  |
| Rationale           | Displaying the indicated air speed of aircraft under their control allows Controllers (Exec/Plan) to sequence traffic effectively and prevent catch-up situations occurring. |  |  |
| Category            | <safety><functional><performance></performance></functional></safety>  |  |  |
| Validation Method   | <real simulation="" time=""></real>  |  |  |
| Verification Method | N/A  |  |  |

| Relationship                                      | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
| <satisfies></satisfies>                           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0006 | <partial></partial> |
| <applies_to></applies_to>                         | <operational process=""> or</operational>    | Monitor Traffic             | N/A                 |
|   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied_in_environment></applied_in_environment> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>                     | <information service=""></information>       | Air-Ground SWIM             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0011  |
|---------------------|---|
|                     |   |
| Requirement         | ATC shall be aware of SFL (SFL)   |
| Title               | SR#2.1i   |
| Status              | <in progress=""></in>   |
| Rationale           | Displaying the aircraft Selected Flight Level to Controllers (Exec/Plan) provides additional awareness of what an aircraft is doing, whether a pilot is following an instruction correctly, and allows the Controller to provide corrective action as required. |
| Category            | <safety><functional><performance></performance></functional></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |
| [RFO Trace]         |   |

| [NEQ Hate]                        |  |                             |                     |
|-----------------------------------|--|-----------------------------|---------------------|
| Relationship                      | Linked Element Type  | Identifier                  | Compliance          |
| <satisfies></satisfies>           | <atms requirement=""></atms>   | REQ-05.07.04-OSED-SAF0-0006 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or<br/><operational service=""></operational></operational> | Monitor Traffic             | N/A                 |
| <applies to=""></applies>         | <operational area="" focus=""></operational>   | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>   | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>     | <information service=""></information>   | Air-Ground SWIM             | N/A                 |

| Identifier  | REQ-05.07.04-SPR-SAF0.0013                                  |  |
|-------------|---|--|
| Requirement | ATC should, if needed, be aware of aircraft rate of descent |  |
| Title       | SR#2.1k   |  |
| Status      | <in progress=""></in>                                       |  |



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| Rationale           | Where an aircraft is required to descend (e.g. from a sequencing leg to Merge Point), the rate of descent display will provide an indication of whether the aircraft will meet the required level/altitude. |
|---------------------|---|
|                     |   |
| Category            | <safety><functional><performance></performance></functional></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

#### [REQ Trace]

| Relationship                     | Linked Element Type                          | Identifier                  | Compliance          |
|----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>          | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0006 | <partial></partial> |
| <applies_to></applies_to>        | <operational process=""> or</operational>    | Monitor Traffic             | N/A                 |
|                                  | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>        | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>PPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>    | <information service=""></information>       | Air-Ground SWIM             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0029  |
|---------------------|---|
| Requirement         | ATC shall be aware of real-time Wx (e.g. radar overlay) in the Point Merge System   |
| Title               | SPR-SR#4c   |
| Status              | <in progress=""></in>   |
| Rationale           | Controllers (Exec/Plan) need to be aware where poor weather is situated in the PMS in order to manage the aircraft in the most appropriate way. |
| Category            | <safety><functional><performance></performance></functional></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0009 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Monitor Traffic             | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>     | <information service=""></information>       | Air-Ground SWIM             | N/A                 |

## **3.2.4.2 Performance Requirements**

No performance related Information Requirements identified for this Operational Service.

## 3.3 Operational Service #3 – Separate Traffic

## 3.3.1 #AppS7 - HMI Requirements (TMA ATCO)

#### 3.3.1.1 Safety Requirements

The following tables show the HMI related Safety Requirements for the service of 'Separate Traffic':

| Identifier          | REQ-05.07.04-SPR-SAF0.0010   |
|---------------------|--|
| Requirement         | Aircraft P-RNAV catch-up shall be alerted to the Executive controller  |
| Title               | SR#2.1h  |
| Status              | <in progress=""></in>  |
| Rationale           | Alerting the Controller to the potential for a loss of separation (due to catch up) between traffic on the same route (e.g. Point Merge sequencing Leg) enables preventative action to be taken. |
| Category            | <safety><functional><performance></performance></functional></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                     | Linked Element Type                          | Identifier                  | Compliance          |
|----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>          | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0006 | <partial></partial> |
| <applies_to></applies_to>        | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                  | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>        | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>PPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>    | <application service=""></application>       | HMI                         | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0018   |
|---------------------|--|
| Requirement         | P-RNAV route lateral non-conformance shall be alerted to the Executive controller.   |
| Title               | SR#2.3b  |
| Status              | <in progress=""></in>  |
| Rationale           | Where routes are closely spaced (e.g. PMS sequencing legs), it would be beneficial for the Executive Controllers to be alerted if an aircraft strays from its designated path in order to provide corrective actions as soon as possible to prevent a conflict from occurring. |
| Category            | <safety><functional><performance></performance></functional></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0004 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <application service=""></application>       | HMI                         | N/A                 |

#### 3.3.1.2 Performance Requirements

[REQ]

| Identifier  | REQ-05.07.04-SPR-PRF0.0002   |
|-------------|--|
| Requirement | The controller (Exec/Plan) HMI shall display every aircraft P-RNAV equipage status |
|             | that is entering, and under, their control.  |
| Title       | HMI RNP Equipage   |

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| Status              | <in progress=""></in>   |
|---------------------|---|
| Rationale           | It is essential for the controller to be fully aware of any non-equipped aircraft entering his/her airspace so that they can react accordingly, where necessary, due to the reduced navigational accuracy of such aircraft. |
| Category            | <operational></operational>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

#### [REQ Trace]

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0021 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>     | <application service=""></application>       | HMI                         | N/A                 |

#### [REQ]

| [1,1=04]            |  |
|---------------------|--|
| Identifier          | REQ-05.07.04-SPR-PRF0.0003   |
| Requirement         | The controller (Exec/Plan) HMI shall display every aircraft Indicated Air Speed (IAS)  |
| ·                   | that is entering, or is under, their control.  |
| Title               | HMI Aircraft speed   |
| Status              | <in progress=""></in>  |
| Rationale           | Adherence to speed is needed to ensure separation on the P-RNAV routes and Point Merge Systems. There is a greater reliance on speed control under this concept, compared to current day operations. |
| Category            | <operational></operational>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

#### [REQ Trace]

| Relationship                             | Linked Element Type                          | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
| <satisfies></satisfies>                  | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0019 | <partial></partial> |
| <applies_to></applies_to>                | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|  | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied environment="" in=""></applied> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>            | <application service=""></application>       | HMI                         | N/A                 |

## 3.3.2 #AppS8 - Airspace Design Requirements

## 3.3.2.1 Safety Requirements

The following tables show the Airspace Design Safety Requirements for the service of 'Separate Traffic':

| Identifier          | REQ-05.07.04-SPR-SAF0.0003   |
|---------------------|--|
| Requirement         | P-RNAV structures shall be completely segregated from restricted airspace (ECTL-SO#10)   |
| Title               | SR#2a  |
| Status              | <in progress=""></in>  |
| Rationale           | Reduces the conflict of a conflict between aircraft in restricted airspace and an aircraft on a PRNAV route (e.g. Point Merge sequencing leg). |
| Category            | <safety></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship              | Linked Element Type                       | Identifier                  | Compliance          |
|---------------------------|---|-----------------------------|---------------------|
| <satisfies></satisfies>   | <atms requirement=""></atms>              | REQ-05.07.04-OSED-SAF0-0005 | <partial></partial> |
| <applies to=""></applies> | <operational process=""> or</operational> | Separate Traffic            | N/A                 |



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|                                  | <operational service=""></operational>       |                 |     |
|----------------------------------|--|-----------------|-----|
| <applies to=""></applies>        | <operational area="" focus=""></operational> | OFA 02.01.02    | N/A |
| <a>PPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA         | N/A |
| <allocated to=""></allocated>    | <application service=""></application>       | Airspace Design | N/A |

| Identifier          | REQ-05.07.04-SPR-SAF0.0006   |
|---------------------|--|
| Requirement         | Multiple arrival P-RNAV structures sharing the same airspace shall be segregated so as to ensure lateral separation between the nearest points on the routes until, at least, longitudinal / vertical separation is necessarily applied as the routes converge (ECTL-SO#6)   |
| Title               | SR#2.1c  |
| Status              | <in progress=""></in>  |
| Rationale           | As the P-RNAV specification dictates a high route following accuracy for aircraft using their P-RNAV capability, Controller expectation that those aircraft are flying in accordance with the specification is high. Where P-RNAV structures are positioned close together there may be a reduced opportunity to provide corrective action where one or more aircraft drift off track. Ensuring P-RNAV routes are adequately spaced provides additional assurance that aircraft are not going to be in conflict when performing outside the P-RNAV specification and provides additional time for corrective action to be taken. |
| Category            | <safety></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0006 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>     | <application service=""></application>       | Airspace Design             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0022   |
|---------------------|--|
| Requirement         | Contingency holding capacity shall be available to manage up to the maximum number of aircraft that may be on the PMS at any one time in the event of unusual circumstances and emergencies. |
| Title               | SR#2.5c  |
| Status              | <in progress=""></in>  |
| Rationale           | In a systemised environment, the availability of contingency holding provides a degree of flexibility to manage traffic during unusual circumstances or emergencies.                         |
| Category            | <safety></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0014 | <partial></partial> |
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0015 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <application service=""></application>       | Airspace Design             | N/A                 |

| Identifier  | REQ-05.07.04-SPR-SAF0.0024  |
|-------------|---|
| Requirement | Waypoints shall be defined to direct emergencies straight to Final Approach fix/ILS |
|             | Intercept (i.e. potentially bypassing the Point Merge System)                       |



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| Title               | SR#3b  |
|---------------------|--|
| Status              | <safety><functional></functional></safety>   |
| Rationale           | To assist with the task of expediting emergency aircraft – providing a direct routing. |
| Category            | <safety><operational><performance></performance></operational></safety>                |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

#### [REQ Trace]

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0008 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <application service=""></application>       | Airspace Design             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0033   |
|---------------------|--|
| Requirement         | Parallel sequencing legs shall be at a sufficient lateral distance such as to avoid clutter and facilitate visualisation on radar screen (ECTL-SO#12)  |
| Title               | SR#5d  |
| Status              | <in progress=""></in>  |
| Rationale           | Where routes are closely spaced (e.g. PMS sequencing legs), a track data block for an aircraft on one route can be obscured by other track data blocks of aircraft on another route. Ensuring the routes are adequately spaced will minimise the likelihood of this occurring. |
| Category            | <safety></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                             | Linked Element Type                          | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
| <satisfies></satisfies>                  | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0014 | <partial></partial> |
| <applies_to></applies_to>                | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|  | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>                | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied environment="" in=""></applied> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>            | <application service=""></application>       | Airspace Design             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0034   |
|---------------------|--|
| Requirement         | Adjacent Sequencing Legs shall be vertically separated, along their entire length, by at least the separation minima (1000 ft) (ECTL-SO#2)   |
| Title               | SR#5e  |
| Status              | <in progress=""></in>  |
| Rationale           | In the event that an aircraft on a sequencing leg drifts off track toward an aircraft on the adjacent sequencing leg, vertical spacing of the legs will ensure the aircraft are not in conflict. |
| Category            | <safety></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                             | Linked Element Type                          | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
| <satisfies></satisfies>                  | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0010 | <partial></partial> |
| <applies_to></applies_to>                | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|  | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied environment="" in=""></applied> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>            | <application service=""></application>       | Airspace Design             | N/A                 |

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| Identifier          | REQ-05.07.04-SPR-SAF0.0037  |
|---------------------|---|
| Requirement         | Lateral/vertical holding (as applicable) shall be available between IAF and FAF.  |
| Title               | SR#5h   |
| Status              | <in progress=""></in>   |
| Rationale           | In a systemised environment, the availability of lateral/vertical holding between the IAF and FAF provides a degree of flexibility to manage high traffic levels/ |
| Category            | <safety></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                     | Linked Element Type                          | Identifier                  | Compliance          |
|----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>          | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0010 | <partial></partial> |
| <satisfies></satisfies>          | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0014 | <partial></partial> |
| <applies_to></applies_to>        | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                  | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>        | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>PPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>    | <application service=""></application>       | Airspace Design             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0038   |
|---------------------|--|
| Requirement         | Opposite direction P-RNAV routes (e.g. sequencing legs) shall be laterally offset  |
| Title               | SR#5i  |
| Status              | <in progress=""></in>  |
| Rationale           | Where P-RNAV routes are expected to carry traffic travelling in opposing directions, those routes should be laterally separated (including those that are already vertically separated) to minimise the risk of aircraft coming into conflict. |
| Category            | <safety></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship  | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
| <satisfies></satisfies>                             | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0010 | <partial></partial> |
| <applies_to></applies_to>                           | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                           | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <pre><applied environment="" in=""></applied></pre> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>                       | <application service=""></application>       | Airspace Design             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0050   |
|---------------------|--|
| Requirement         | Vertical separation at intersections of PMS routes with SIDs and pre-defined routes for other arrivals and MAP shall be provided strategically by means of published level restrictions (or tactically by upstream Planning) (ECTL-SO#8) |
| Title               | SR#6e  |
| Status              | <in progress=""></in>  |
| Rationale           | To prevent loss of separation  |
| Category            | <safety><operational></operational></safety>   |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

## [REQ Trace]

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0011 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>     | <application service=""></application>       | Airspace Design             | N/A                 |



| Identifier          | REQ-05.07.04-SPR-SAF0.0051  |
|---------------------|---|
| Requirement         | Multiple PMS structures sharing the same airspace shall be segregated so as to ensure lateral separation as required by the local regulatory authority (e.g. this could be dictated by the nearest points on the routes (ECTL-SO#6))  |
| Title               | SR#6f   |
| Status              | <in progress=""></in>   |
| Rationale           | As the P-RNAV specification dictates a high route following accuracy for aircraft using their P-RNAV capability, Controller (Exec/Plan) expectation that those aircraft are flying in accordance with the specification is high. Where PMS structures are positioned close together there may be a reduced opportunity to provide corrective action where one or more aircraft drift off track. Ensuring PMS structures are adequately spaced provides additional assurance that aircraft are not going to be in conflict when performing other than expected and provides additional time for corrective action to be taken. |
| Category            | <safety></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                             | Linked Element Type                          | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
| <satisfies></satisfies>                  | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0011 | <partial></partial> |
| <applies_to></applies_to>                | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|  | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied environment="" in=""></applied> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>            | <application service=""></application>       | Airspace Design             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0055  |
|---------------------|---|
| Requirement         | Ability to hold at the Merge Point shall be available in the event of runway failure or |
| •                   | contingency.  |
| Title               | SR#6j   |
| Status              | <in progress=""></in>   |
| Rationale           | In a systemised environment, the availability to hold at the Merge Point provides a     |
|                     | degree of flexibility to manage unusual circumstances or emergencies.                   |
| Category            | <safety></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0011 | <partial></partial> |
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0015 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <application service=""></application>       | Airspace Design             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0057   |
|---------------------|--|
| Requirement         | PMS Contingency holding shall be available for Missed Approaches   |
| Title               | SR#6l  |
| Status              | <in progress=""></in>  |
| Rationale           | The availability of contingency holding may ease the task of re-sequencing aircraft that have performed a missed approach. |
| Category            | <safety></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |



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| Relationship                     | Linked Element Type  | Identifier                  | Compliance          |
|----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>          | <atms requirement=""></atms>   | REQ-05.07.04-OSED-SAF0-0011 | <partial></partial> |
| <satisfies></satisfies>          | <atms requirement=""></atms>   | REQ-05.07.04-OSED-OPS0.0015 | <partial></partial> |
| <applies_to></applies_to>        | <operational process=""> or<br/><operational service=""></operational></operational> | Separate Traffic            | N/A                 |
| <applies to=""></applies>        | <operational area="" focus=""></operational>   | OFA 02.01.02                | N/A                 |
| <a>PPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>   | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>    | <application service=""></application>   | Airspace Design             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0058  |
|---------------------|---|
| Requirement         | Appropriate track mileage shall be available to enable aircraft to comfortably meet the vertical profile between sequencing leg and Merge Point   |
| Title               | SR#6m   |
| Status              | <in progress=""></in>   |
| Rationale           | Varying aircraft types will be required to fly the Point Merge System and for example descend from the sequencing legs to the Merge Point. The track mileage should be appropriate to allow all anticipated aircraft types to conform to the required descent profiles. |
| Category            | <safety></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                     | Linked Element Type                          | Identifier                  | Compliance          |
|----------------------------------|--|-----------------------------|---------------------|
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| Identifier          | REQ-05.07.04-SPR-SAF0.0063   |
|---------------------|--|
| Requirement         | The Merge Point shall be designed as a unique 5 letter naming code (ECTL SR-C5)  |
| Title               | SR#6r  |
| Status              | <in progress=""></in>  |
| Rationale           | On some occasions (e.g. when experiencing low traffic levels) it will be beneficial to route traffic directly to the Merge Point, rather than following the sequencing leg(s). 5 letter naming code according to the EUROCONTROL Terminal Design guidelines. |
| Category            | <safety><performance></performance></safety>   |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship  | Linked Element Type  | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
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| <allocated to=""></allocated>                       | <application service=""></application>   | Airspace Design             | N/A                 |

| Identifier  | REQ-05.07.04-SPR-SAF0.0064   |
|-------------|--|
| Requirement | The positioning and track miles of the next waypoint after the Merge Point shall be such that if an aircraft fails to route toward the Merge Point as required but instead routes toward the next waypoint (e.g. due to pilot incorrectly selecting the wrong waypoint in the FMS), the error can be readily detected by a clear lateral deviation of the aircraft and acted upon by the Executive Controller. |
| Title       | SR#6s  |
| Status      | <in progress=""></in>  |



## D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA Edition: 00.01.01

| Laition. 00.01.01   |  |
|---------------------|--|
| Rationale           | When an aircraft is instructed to route "direct to" the Merge Point it is possible for the pilot to select the wrong point (e.g. the next waypoint). Where the next waypoint is positioned close to the Merge Point, an aircraft routing to it instead of the Merge Point may not be noticed for a considerable period of time, increasing the risk of conflict. The next waypoint should therefore be positioned such that the risk of this occurring is minimised. |
| Category            | <safety></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                             | Linked Element Type  | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
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| <allocated to=""></allocated>            | <application service=""></application>   | Airspace Design             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0065   |
|---------------------|--|
| Requirement         | PMS routes shall be designed to satisfy the ICAO PANS-OPS 8168 obstacle clearance criteria (ECTL-SO#1) |
| Title               | SR#7a  |
| Status              | <in progress=""></in>  |
| Rationale           | Minimise the likelihood of CFIT  |
| Category            | <operational></operational>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship  | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
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|   | <operational service=""></operational>       |                             |                     |
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| <pre><applied environment="" in=""></applied></pre> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>                       | <application service=""></application>       | Airspace Design             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0066   |
|---------------------|--|
| Requirement         | The minimum altitude of a PMS route shall be sufficient to provide vertical clearance from terrain/obstacle along the entire length of the procedure, taking account of minimum obstacle clearance (MOC) in accordance with ICAO PANS-OPS 8168 |
| Title               | SR#7b  |
| Status              | <in progress=""></in>  |
| Rationale           | Minimise the likelihood of CFIT  |
| Category            | <safety></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                     | Linked Element Type                          | Identifier                  | Compliance          |
|----------------------------------|--|-----------------------------|---------------------|
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|                                  | <operational service=""></operational>       |                             |                     |
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| <allocated_to></allocated_to>    | <application service=""></application>       | Airspace Design             | N/A                 |

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| Identifier          | REQ-05.07.04-SPR-SAF0.0067   |
|---------------------|--|
| Requirement         | The minimum altitude of the Merge Point shall be set such that there is minimum obstacle clearance (MOC), in accordance with ICAO PANS-OPS 8168, above terrain/obstacles in the entire sector of the circle defined by the MP and its outermost Sequencing Leg |
| Title               | SR#7c  |
| Status              | <in progress=""></in>  |
| Rationale           | Minimise the likelihood of CFIT  |
| Category            | <safety></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                                      | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
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|   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
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| <allocated to=""></allocated>                     | <application service=""></application>       | Airspace Design             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0068   |
|---------------------|--|
| Requirement         | The minimum altitude of the Merge Point shall be set no lower than the Maximum |
|                     | Vectoring Altitude (MVA) for that area   |
| Title               | SR#7d  |
| Status              | <in progress=""></in>  |
| Rationale           | TBD  |
| Category            | <safety></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                                      | Linked Element Type  | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
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| <allocated to=""></allocated>                     | <application service=""></application>   | Airspace Design             | N/A                 |

## 3.3.2.2 Performance Requirements

No performance related Airspace Design Requirements identified for this Operational Service.

## 3.3.3 #AppS9 - Operational Procedure Requirements

## 3.3.3.1 Safety Requirements

The following tables show the Operational Procedure Safety Requirements for the service of 'Separate Traffic':

| Identifier  | REQ-05.07.04-SPR-SAF0.0004  |
|-------------|---|
| Requirement | Changes to sequencing and/or spacing shall be introduced as necessary to improve delivery of traffic into the TMA and then to the Merge Point System IAF through speed control, vectoring, conformance to route options and holding |

#### D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

| Title               | SR#2.1a   |
|---------------------|---|
| Status              | <in progress=""></in>   |
| Rationale           | To ensure that the traffic is sequenced and spaced in the most efficient way (e.g. according to wake vortex criteria) to avoid over loading the PMS and runway. |
| Category            | <safety><operational><performance></performance></operational></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                                      | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
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| <satisfies></satisfies>                           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0013 | <partial></partial> |
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|   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied_in_environment></applied_in_environment> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>                     | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0005   |
|---------------------|--|
| Requirement         | All arriving aircraft shall be cleared/vectored along P-RNAV routes to IAF, whilst providing sufficient obstacle/terrain clearance |
| Title               | SR#2.1b  |
| Status              | <in progress=""></in>  |
| Rationale           | To simplify the airspace design it is not considered necessary to provide separate routes for non-PRNAV capable aircraft.          |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
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|                                   | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0007   |
|---------------------|--|
| Requirement         | Spacing between aircraft within converged flows shall be maintained in accordance with longitudinal separation minima and landing constraints (ECTL-SO#23) |
| Title               | SR#2.1d  |
| Status              | <in progress=""></in>  |
| Rationale           | Aircraft should be longitudinally spaced such that when the flows merge they are not in conflict.  |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                             | Linked Element Type                          | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
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| <applies_to></applies_to>                | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|  | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>                | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied environment="" in=""></applied> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>            | <application service=""></application>       | Operational Procedure       | N/A                 |

#### D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

| Identifier          | REQ-05.07.04-SPR-SAF0.0008   |
|---------------------|--|
| Requirement         | Traffic shall be metered to Point Merge entry according to sequencing legs capacity, including sufficient operational margin to cater for unexpected situations (ECTL SR-I2) |
| Title               | SR#2.1e  |
| Status              | <in progress=""></in>  |
| Rationale           | Crontrollers (Exec/Plan) to cater for contingency when considering loading of the procedure.   |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
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|                                   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0012  |
|---------------------|---|
| Requirement         | If aircraft on the sequencing leg need to use more than half of its length, then aircraft upstream of the Point Merge System shall be placed in the sequencing leg contingency hold |
| Title               | SR#2.1j   |
| Status              | <in progress=""></in>   |
| Rationale           | This is to prevent Controllers (Exec/Plan) overloading the sequencing legs with aircraft causing aircraft to fly to the end of the leg.   |
| Category            | <safety><operational><performance></performance></operational></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                      | Linked Element Type  | Identifier                  | Compliance          |
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| <applies to=""></applies>         | <operational area="" focus=""></operational>                                     | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>   | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>     | <application service=""></application>   | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0017  |
|---------------------|---|
| Requirement         | Aircraft deviations shall be corrected, wherever possible, by means of timely, small corrections to course / altitude (ECTL-SO#11/ECTL-SO#24) |
| Title               | SR#2.3a   |
| Status              | <in progress=""></in>   |
| Rationale           | Providing timely corrective action allows for smaller adjustments to be made.   |
| Category            | <safety><operational><performance></performance></operational></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship              | Linked Element Type                          | Identifier                  | Compliance          |
|---------------------------|--|-----------------------------|---------------------|
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|                           | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies> | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |

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| Ī | <applied environment="" in=""></applied> | <environment class=""></environment>   | VHC TMA               | N/A |
|---|--|--|-----------------------|-----|
|   | <allocated to=""></allocated>            | <application service=""></application> | Operational Procedure | N/A |

| Identifier          | REQ-05.07.04-SPR-SAF0.0019  |
|---------------------|---|
| Requirement         | P-RNAV aircraft that have been transferred under radar vectors shall be reported to any receiving controller (Exec/Plan) (ECTL SR-H8)   |
| Title               | SR#2.4a   |
| Status              | <in progress=""></in>   |
| Rationale           | To ensure the receiving controller is aware that an aircraft is on vectors and does not assume it's flying using the P-RNAV capability. |
| Category            | <safety><operational><performance></performance></operational></safety>   |
| Validation Method   | N/A   |
| Verification Method | N/A   |

| Relationship                             | Linked Element Type  | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
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| <applied environment="" in=""></applied> | <environment class=""></environment>   | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>            | <application service=""></application>   | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0020   |  |  |
|---------------------|--|--|--|
|                     |  |  |  |
| Requirement         | Vectoring skills shall be maintained (ECTL SR-H1)  |  |  |
| Title               | SR#2.5a  |  |  |
| Status              | <in progress=""></in>  |  |  |
| Rationale           | <in progress=""> With the introduction of P-RNAV routes and a systemised environment, there may be fewer occasions (when compared to today) for an Executive controller to vector aircraft. This may lead to tactical skill fade in the long term and could have a negative impact on the controller's ability to manage non-standard situations (e.g. aircraft emergency).  These situations may be exacerbated in the future when new Controllers who were never routinely involved in tactical vectoring (and so don't have the same level of operational experience of vectoring) are required to manage the same situations. Adequate training will ensure all existing and future controllers are equipped to manage non-standard situations requiring vectoring of aircraft. Examples as follows:  <ul> <li>College training continuation in vectoring skills for contingency and emergencies</li> <li>Increased frequency of TRUCE (e.g. 3 times per year)</li> <li>Vectoring in lower capacity operations</li> </ul> <safety><operational><performance> <real simulation="" time=""></real></performance></operational></safety></in> |  |  |
| Category            | <safety><operational><performance></performance></operational></safety>  |  |  |
| Validation Method   | <real simulation="" time=""></real>  |  |  |
| Verification Method | N/A  |  |  |

| Relationship                             | Linked Element Type  | Identifier                  | Compliance          |
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| <applied environment="" in=""></applied> | <environment class=""></environment>   | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>            | <application service=""></application>   | Operational Procedure       | N/A                 |

| Identifier  | REQ-05.07.04-SPR-SAF0.0021  |
|-------------|---|
| Requirement | For aircraft re-joining a P-RNAV procedure after vectors, aircraft shall be prevented from capturing a path other than as expected (ECTL SR-H7) |
| Title       | SR#2.5b   |
| Status      | <in progress=""></in>   |

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| Rationale           | Transition from radar vectoring to P-RNAV requires a change in the navigation mode. Particular care has to be observed by ATCOs when redirecting aircraft to a P-RNAV route after a tactical management, in order to guarantee the interception of the P-RNAV route at the expected waypoint. |
|---------------------|---|
| Category            | <safety><operational><performance></performance></operational></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                     | Linked Element Type                          | Identifier                  | Compliance          |
|----------------------------------|--|-----------------------------|---------------------|
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|                                  | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>        | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>PPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>    | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0023  |
|---------------------|---|
| Requirement         | Emergency squawk aircraft shall be given priority on shorter routes or diverted to the airfield if required |
| Title               | SR#3a   |
| Status              | <in progress=""></in>   |
| Rationale           | To assist with the task of expediting emergency aircraft – providing shorter routes.                        |
| Category            | <safety><operational><performance></performance></operational></safety>                                     |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                     | Linked Element Type                          | Identifier                  | Compliance          |
|----------------------------------|--|-----------------------------|---------------------|
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| Identifier          | REQ-05.07.04-SPR-SAF0.0025   |
|---------------------|--|
| Requirement         | Aircraft shall be held upstream as necessary to alleviate pressure on the Point Merge arrivals during prioritised emergency aircraft operation |
| Title               | SR#3c  |
| Status              | <in progress=""></in>  |
| Rationale           | To alleviate pressure on the Point Merge during emergency situation  |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                     | Linked Element Type                          | Identifier                  | Compliance          |
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| Identifier  | REQ-05.07.04-SPR-SAF0.0026  |
|-------------|---|
| Requirement | Speed control shall be applied to inbound aircraft as necessary to alleviate pressure |
|             | on the Point Merge arrivals during prioritised emergency aircraft operation           |



#### D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

| Title               | SR#3d   |
|---------------------|---|
| Status              | <in progress=""></in>   |
| Rationale           | Supports time-based operations  |
| Category            | <safety><operational><performance></performance></operational></safety> |
| Validation Method   | <real simulation="" time=""></real>                                     |
| Verification Method | N/A   |

| Relationship                                      | Linked Element Type                          | Identifier                  | Compliance          |
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| Identifier          | REQ-05.07.04-SPR-SAF0.0027   |
|---------------------|--|
| Requirement         | Traffic shall be held as necessary (in holds for arriving aircraft to the PMS or on ground |
| •                   | for departures)  |
| Title               | SR#4a  |
| Status              | <in progress=""></in>  |
| Rationale           | To prevent overloading the PMS or runway.  |
| Category            | <safety><operational><performance></performance></operational></safety>                    |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                                      | Linked Element Type                          | Identifier                  | Compliance          |
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| Identifier          | REQ-05.07.04-SPR-SAF0.0028   |
|---------------------|--|
| Requirement         | Speed constraints shall be applied as necessary to maintain longitudinal spacing |
| Title               | SR#4b  |
| Status              | <in progress=""></in>  |
| Rationale           | To prevent catch up on a route or sequencing leg                                 |
| Category            | <safety><operational><performance></performance></operational></safety>          |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
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| Identifier  | REQ-05.07.04-SPR-SAF0.0030   |
|-------------|--|
| Requirement | Aircraft shall comply with any speed constraint at Sequencing Leg entry specified by |



#### D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

|                     | the controller and reported on the appropriate chart. (ECTL-SO#18)      |
|---------------------|---|
| Title               | SR#5a   |
| Status              | <in progress=""></in>   |
| Rationale           | To prevent catch-up with other aircraft on the leg                      |
| Category            | <safety><operational><performance></performance></operational></safety> |
| Validation Method   | <real simulation="" time=""></real>                                     |
| Verification Method | N/A   |

| Relationship                     | Linked Element Type                          | Identifier                  | Compliance          |
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| Identifier          | REQ-05.07.04-SPR-SAF0.0031   |
|---------------------|--|
| Requirement         | Where there is traffic on the sequencing legs, aircraft shall be stable at the defined level/altitude for the Sequencing leg prior to Leg entry (ECTL-SO#17) |
| Title               | SR#5b  |
| Status              | <in progress=""></in>  |
| Rationale           | To ensure that aircraft do not come into conflict with aircraft on the adjacent leg  |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                                      | Linked Element Type  | Identifier                  | Compliance          |
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| Identifier          | REQ-05.07.04-SPR-SAF0.0032   |
|---------------------|--|
| Requirement         | B-RNAV / P-RNAV aircraft shall follow the assigned Sequencing Leg (non-  |
|                     | RNAV aircraft vectored and follow assigned altitude) (ECTL-SO#3)   |
| Title               | SR#5c  |
| Status              | <in progress=""></in>  |
| Rationale           | B-RNAV aircraft can follow the P-RNAV routes but at reduced accuracy. Having all aircraft following the same procedure simplifies the airspace design and the procedure. |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                             | Linked Element Type                          | Identifier                  | Compliance          |
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| Identifier  | REQ-05.07.04-SPR-SAF0.0035   |
|-------------|--|
| Requirement | Aircraft on the same Sequencing Leg shall be spaced such that at least the minimum |
|             | required horizontal separation is maintained between them whilst on the Sequencing |
|             | Leg by means of appropriate speed instructions provided by the ATCO, taking into   |



|                     | account the variability in aircraft turn performance (ECTL-SO#20)   |
|---------------------|---|
| Title               | SR#5f   |
| Status              | <in progress=""></in>   |
| Rationale           | When an aircraft turns from the sequencing leg and travels toward the Merge Point (i.e. perpendicular to the leg), the following aircraft is still on the sequencing leg. The shortest distance between the two aircraft may now become less than the separation minima unless care is taken to allow sufficient spacing as to prevent this occurring. For example, spacing between aircraft on the leg may need to be increased (see REQ-05.07.04-SPR-SAF0.0039) |
| Category            | <safety><operational><performance></performance></operational></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship  | Linked Element Type                          | Identifier                  | Compliance          |
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| Identifier          | REQ-05.07.04-SPR-SAF0.0036   |
|---------------------|--|
| Requirement         | As each aircraft turns off the Sequencing Leg towards the Merge Point, vertical separation shall be maintained between it and all aircraft on any adjacent sequencing leg(s) until lateral separation is established (and can be maintained) between them (ECTL-SO#22)   |
| Title               | SR#5g  |
| Status              | <in progress=""></in>  |
| Rationale           | The sequencing legs are laterally separated and so an aircraft turning from the leg furthest from the Merge Point will pass over/under the leg closest to the Merge Point. To prevent conflicts with traffic on the closest leg, vertical separation must be maintained until lateral separation has been established. |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
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| Identifier          | REQ-05.07.04-SPR-SAF0.0039   |
|---------------------|--|
| Requirement         | An 'along–track' buffer shall be added on top of the required longitudinal separation between two successive aircraft on the same leg (ECTL SR-C8)   |
| Title               | SR#5j  |
| Status              | <in progress=""></in>  |
| Rationale           | When an aircraft turns from the sequencing leg and travels toward the Merge Point (i.e. perpendicular to the leg), the following aircraft which is still following the sequencing leg. The shortest distance between the two aircraft may now become less than the separation minima unless care is taken to allow sufficient spacing as to prevent this occurring. For example, spacing between aircraft on the leg may need to be increased using an along track buffer. |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |



## D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

| Relationship  | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
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| Identifier          | REQ-05.07.04-SPR-SAF0.0040   |
|---------------------|--|
| Requirement         | The along-track buffer shall be such that direct distance remains greater than the required separation, with leading aircraft remaining on leg or turning to Merge Point, taking into account (ECTL SR-C8):  (i) the Point Merge segment geometry; (ii) the aircraft turn performance variability; (iii) wind effects.   |
| Title               | SR#5k  |
| Status              | <in progress=""></in>  |
| Rationale           | When an aircraft turns from the sequencing leg and travels toward the Merge Point (i.e. perpendicular to the leg), the following aircraft which is still following the sequencing leg. The shortest distance between the two aircraft may now become less than the separation minima unless care is taken to allow sufficient spacing as to prevent this occurring. For example, spacing between aircraft on the leg may need to be increased (see REQ-05.07.04-SPR-SAF0.0039) |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                     | Linked Element Type                          | Identifier                  | Compliance          |
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| Identifier          | REQ-05.07.04-SPR-SAF0.0041   |
|---------------------|--|
| Requirement         | Speed instructions shall be appropriately issued for longitudinal separation within the same Point Merge System arrival flow (ECTL SR-A1)  |
| Title               | SR#5I  |
| Status              | <in progress=""></in>  |
| Rationale           | Speed control and traffic monitoring are the two tasks that ATCOs have to perform while aircraft are moving inside PMS in order to avoid the loss of prescribed horizontal separation. |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
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| Identifier  | REQ-05.07.04-SPR-SAF0.0046  |
|-------------|---|
| Requirement | An aircraft shall be turned off the Sequencing Leg (Direct-To or vectored) when it is |
|             | sufficiently spaced behind/ahead of other aircraft in the same sequence, and other    |



| Edition: 00.01.01   |   |
|---------------------|---|
|                     | aircraft on adjacent sequencing legs, to ensure that at least the minimum horizontal separation is maintained   |
| Title               | SR#6a   |
| Status              | <in progress=""></in>   |
| Rationale           | When an aircraft turns from the sequencing leg and travels toward the Merge Point (i.e. perpendicular to the leg), the following aircraft is still on the sequencing leg. The shortest distance between the two aircraft may now become less than the separation minima unless care is taken to allow sufficient spacing as to prevent this occurring. Similarly, horizontal separation with another flow may also be lost. |
| Category            | <safety><operational><performance></performance></operational></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship  | Linked Element Type                          | Identifier                  | Compliance          |
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| Identifier          | REQ-05.07.04-SPR-SAF0.0047   |
|---------------------|--|
| Requirement         | Between the Merge Point and the FAF (or until cleared for a precision Final Approach if earlier), P-RNAV aircraft shall follow the P-RNAV route and comply with associated altitude restrictions (ECTL-SO#7) |
| Title               | SR#6b  |
| Status              | <in progress=""></in>  |
| Rationale           | To ensure traffic consistency to FAF   |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                                      | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
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| <applied_in_environment></applied_in_environment> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
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| Identifier          | REQ-05.07.04-SPR-SAF0.0048  |
|---------------------|---|
| Requirement         | Between the Merge Point and the FAF (or until cleared for a precision Final Approach if earlier), non-P-RNAV aircraft shall be cleared along the appropriate P-RNAV route, and cleared to descend subject to any altitude restrictions published for that route (ECTL-SO#9) |
| Title               | SR#6c   |
| Status              | <in progress=""></in>   |
| Rationale           | To simplify the airspace design it has not been considered necessary to provide specific routes for non-PRNAV aircraft.   |
| Category            | <safety><operational><performance></performance></operational></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship              | Linked Element Type  | Identifier                  | Compliance          |
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| <applies to=""></applies> | <operational area="" focus=""></operational>   | OFA 02.01.02                | N/A                 |



## D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>   | VHC TMA               | N/A |
|-----------------------------------|--|-----------------------|-----|
| <allocated to=""></allocated>     | <application service=""></application> | Operational Procedure | N/A |

| Identifier          | REQ-05.07.04-SPR-SAF0.0049  |
|---------------------|---|
| Requirement         | Spacing between aircraft within converged PMS flows shall be maintained in accordance with lateral separation minima and landing constraints (ECTL-SO#23) |
| Title               | SR#6d   |
| Status              | <in progress=""></in>   |
| Rationale           | PMS structures must adhere to minimum separation standards, as regulated.   |
| Category            | <safety><operational><performance></performance></operational></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                      | Linked Element Type  | Identifier                  | Compliance          |
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| Identifier          | REQ-05.07.04-SPR-SAF0.0052  |
|---------------------|---|
| Requirement         | Aircraft that have followed a missed approach shall be re-inserted into the PMS landing sequence in such a way as to avoid as far as possible propagating the need for reversion to vectors for other aircraft in the landing sequence (ECTL-SO#27) |
| Title               | SR#6g   |
| Status              | <in progress=""></in>   |
| Rationale           | To prevent controller (Exec/Plan) workload increasing unnecessarily as a result of vectoring many aircraft to re-insert a single aircraft into the sequence.  |
| Category            | <safety><operational></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
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|                                   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>     | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0053  |
|---------------------|---|
| Requirement         | If an aircraft reaches the end of a sequencing leg, the aircraft shall turn to Merge Point. If no "descend to merge" instruction is received, then the aircraft shall maintain level flight towards the Merge Point without descending, until instructed otherwise by ATC. Holding capacity shall be available at the Merge Point for such flights, giving the controller (Exec/Plan) the opportunity to manage the traffic flow (hold) as necessary. |
| Title               | SR#6h   |
| Status              | <in progress=""></in>   |
| Rationale           | To provide a degree of predictability to the scenario of an aircraft reaching the end of the sequencing leg. Particularly important when traffic is heavy or during unusual circumstances or emergencies.   |
| Category            | <safety><operational></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship Linked Element Type | Identifier | Compl | liance |
|----------------------------------|------------|-------|--------|
|----------------------------------|------------|-------|--------|



## D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0011 | <partial></partial> |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0014 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0054   |
|---------------------|--|
| Requirement         | An aircraft that is transitioned from the end of a sequencing leg for re-insertion into the                  |
|                     | landing sequence shall not impinge departing aircraft  |
| Title               | SR#6i  |
| Status              | <in progress=""></in>  |
| Rationale           | It is possible in some situations that departures are routed such that a conflict with arrivals is possible. |
| Category            | <safety><operational><performance></performance></operational></safety>                                      |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0011 | <partial></partial> |
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|                                   | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0056  |
|---------------------|---|
| Requirement         | The Direct To instruction shall be issued with enough spacing to enable efficient spacing adjustment solely relying on speed control (ECTL SR-C7) |
| Title               | SR#6k   |
| Status              | <in progress=""></in>   |
| Rationale           | To moderate the volume of traffic routing direct to the Merge Point and to allow flexibility in adjusting the spacing if required.                |
| Category            | <safety><operational><performance></performance></operational></safety>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                             | Linked Element Type                          | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
| <satisfies></satisfies>                  | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0011 | <partial></partial> |
| <applies_to></applies_to>                | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|  | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied environment="" in=""></applied> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated_to></allocated_to>            | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0059   |
|---------------------|--|
| Requirement         | During runway direction change, aircraft cleared onto the P-RNAV transition to final approach shall be vectored for the new runway |
| Title               | SR#6n  |
| Status              | <in progress=""></in>  |
| Rationale           | To ensure aircraft do not route to the old runway  |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

|  | Relationship | Linked Element Type | Identifier | Compliance |
|--|--------------|---------------------|------------|------------|
|--|--------------|---------------------|------------|------------|



## D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

| <satisfies></satisfies>          | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0011 | <partial></partial> |
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| <applies_to></applies_to>        | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                  | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>        | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>PPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>    | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0060   |
|---------------------|--|
| Requirement         | During runway direction change, aircraft prior to the MP shall be instructed to follow the P-RNAV transition to the new runway |
| Title               | SR#60  |
| Status              | <in progress=""></in>  |
| Rationale           | To ensure aircraft do not route to the old runway  |
| Category            | <safety><operational><performance></performance></operational></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                     | Linked Element Type                          | Identifier                  | Compliance          |
|----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>          | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0011 | <partial></partial> |
| <applies_to></applies_to>        | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                  | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>        | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>PPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>    | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0061   |
|---------------------|--|
| Requirement         | The "descent" clearance shall be systematically dissociated from the "direct to"   |
|                     | clearance (ECTL REC-C11) for aircraft turning from a sequencing leg in the PMS     |
| Title               | SR#6p  |
| Status              | <in progress=""></in>  |
| Rationale           | To mitigate against aircraft descending and turning at the same time, resulting in |
|                     | conflict with aircraft on the adjacent leg or aircraft routing to Merge Point.     |
| Category            | <safety><operational><performance></performance></operational></safety>            |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship  | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
| <satisfies></satisfies>                             | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0011 | <partial></partial> |
| <applies_to></applies_to>                           | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|   | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>                           | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <pre><applied environment="" in=""></applied></pre> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>                       | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier        | REQ-05.07.04-SPR-SAF0.0062  |
|-------------------|---|
| Requirement       | Descent shall only be instructed once lateral separation with aircraft on the adjacent sequencing leg is achieved (ECTL REC-C11)                            |
| Title             | SR#6q   |
| Status            | <in progress=""></in>   |
| Rationale         | To ensure that the aircraft routing from one sequencing leg to the Merge Point does not come into conflict with an aircraft on the adjacent sequencing leg. |
| Category          | <safety><operational><performance></performance></operational></safety>   |
| Validation Method | <real simulation="" time=""></real>   |

## D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

Edition: 00.01.01

| Verification Method      | N/A    |
|--------------------------|--------|
| I V CITIOGUOTI IVICUITOG | 1 1471 |

| Relationship                                      | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
| <satisfies></satisfies>                           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0011 | <partial></partial> |
| <applies_to></applies_to>                         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>                         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied_in_environment></applied_in_environment> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>                     | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0069  |
|---------------------|---|
| Requirement         | In the event of severe weather traffic shall be vectored around the affected area |
| Title               | SR#8a   |
| Status              | <in progress=""></in>   |
| Rationale           | To prevent aircraft flying through severe weather                                 |
| Category            | <safety><operational><performance></performance></operational></safety>           |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0013 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0070   |
|---------------------|--|
| Requirement         | In the event of severe weather upstream traffic shall be held as necessary (flow |
| -                   | control)   |
| Title               | SR#8b  |
| Status              | <in progress=""></in>  |
| Rationale           | To maintain manageable controller (Exec/Plan) workload and prevent the PMS       |
|                     | becoming overloaded for the conditions.  |
| Category            | <safety><operational><performance></performance></operational></safety>          |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0013 | <partial></partial> |
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0014 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies to=""></applies>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <application service=""></application>       | Operational Procedure       | N/A                 |

## 3.3.3.2 Performance Requirements

No performance related Operational Procedure Requirements identified for this Operational Service.

# 3.3.4 # InfS3 – Information (Air-Ground & Ground-Ground) Requirements

## 3.3.4.1 Safety Requirements

| Identifier          | REQ-05.07.04-SPR-SAF0.0010   |
|---------------------|--|
| Requirement         | Aircraft P-RNAV catch-up shall be alerted  |
| Title               | SR#2.1h  |
| Status              | <in progress=""></in>  |
| Rationale           | Alerting the Executive Controller to the potential for a loss of separation (due to catch up) between traffic on the same route (e.g. Point Merge sequencing Leg) enables preventative action to be taken. |
| Category            | <safety><functional><performance></performance></functional></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                                      | Linked Element Type                          | Identifier                  | Compliance          |
|---|--|-----------------------------|---------------------|
| <satisfies></satisfies>                           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0006 | <partial></partial> |
| <applies_to></applies_to>                         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|   | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>                         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied_in_environment></applied_in_environment> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>                     | <information service=""></information>       | Air-Ground SWIM             | N/A                 |

| Identifier          | REQ-05.07.04-SPR-SAF0.0018   |
|---------------------|--|
| Requirement         | P-RNAV route lateral non-conformance shall be alerted.   |
| Title               | SR#2.3b  |
| Status              | <in progress=""></in>  |
| Rationale           | Where routes are closely spaced (e.g. PMS sequencing legs), it would be beneficial for the Controllers (Exec/Plan) to be alerted if an aircraft strays from its designated path in order to provide corrective actions as soon as possible to prevent a conflict from occurring. |
| Category            | <safety><functional><performance></performance></functional></safety>  |
| Validation Method   | <real simulation="" time=""></real>  |
| Verification Method | N/A  |

| Relationship                      | Linked Element Type  | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>   | REQ-05.07.04-OSED-SAF0-0004 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or<br/><operational service=""></operational></operational> | Separate Traffic            | N/A                 |
| <applies to=""></applies>         | <operational area="" focus=""></operational>   | OFA 02.01.02                | N/A                 |
| <a>APPLIED_IN_ENVIRONMENT&gt;</a> | <environment class=""></environment>   | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <information service=""></information>   | Air-Ground SWIM             | N/A                 |

## 3.3.4.2 Performance Requirements

## [REQ]

| [· '- ~]    |  |
|-------------|--|
| Identifier  | REQ-05.07.04-SPR-PRF0.0004   |
| Requirement | Aircraft RNAV1 capability shall be indicated with the Flight Plan / Flight Object. |
| Title       | Information RNAV1 Capability   |
| Status      | <in progress=""></in>  |
| Rationale   | The concept is expected to operate in a mixed-equipage environment. Aircraft       |



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#### Edition: 00.01.01

| Edition: Colonic    |   |
|---------------------|---|
|                     | conformance accuracy to the P-RNAV routes depends on whether or not they comply with the RNAV1 ICAO navigation specification. |
| Category            | <operational></operational>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

## [REQ Trace]

| Relationship                      | Linked Element Type                          | Identifier                  | Compliance          |
|-----------------------------------|--|-----------------------------|---------------------|
| <satisfies></satisfies>           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0021 | <partial></partial> |
| <applies_to></applies_to>         | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|                                   | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>         | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <a>APPLIED IN ENVIRONMENT&gt;</a> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>     | <information service=""></information>       | Air-Ground SWIM             | N/A                 |

#### [REQ]

| [1,1=04]            |   |  |  |  |
|---------------------|---|--|--|--|
| Identifier          | REQ-05.07.04-SPR-PRF0.0005  |  |  |  |
| Requirement         | Aircraft Indicated Air Speed (IAS) shall be passed from air to ground.  |  |  |  |
| Title               | HMI Aircraft IAS  |  |  |  |
| Status              | <in progress=""></in>   |  |  |  |
| Rationale           | Knowledge of Indicated Air Speed allows the controller (Exec/Plan) to clearly see whether the pilot is correctly following instructions. There is a greater reliance on speed control under this concept, compared to current day operations. |  |  |  |
| Category            | <operational></operational>   |  |  |  |
| Validation Method   | <real simulation="" time=""></real>   |  |  |  |
| Verification Method | N/A   |  |  |  |

## [REQ Trace]

| Relationship                             | Linked Element Type                          | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
| <satisfies></satisfies>                  | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0019 | <partial></partial> |
| <applies_to></applies_to>                | <operational process=""> or</operational>    | Separate Traffic            | N/A                 |
|  | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>                | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied environment="" in=""></applied> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>            | <information service=""></information>       | Air-Ground SWIM             | N/A                 |

## 3.4 Operational Service #4 – Synchronise Traffic

## 3.4.1 #AppS10 - HMI Requirements (TMA ATCO)

#### 3.4.1.1 Safety Requirements

No safety related HMI Requirements identified for this Operational Service.

### 3.4.1.2 Performance Requirements

[REQ]

| [[\[\]              |   |
|---------------------|---|
| Identifier          | REQ-05.07.04-SPR-PRF0.0006  |
| Requirement         | The Executive controller HMI shall display regularly-spaced range rings for each active Point Merge System, where the ring spacing is commensurate with the required delivery of traffic spacing. |
| Title               | HMI Range Rings   |
| Status              | <in progress=""></in>   |
| Rationale           | The ATCO needs visual cues to deliver optimum spacing and sequencing out of the Point Merge System.   |
| Category            | <operational></operational>   |
| Validation Method   | <real simulation="" time=""></real>   |
| Verification Method | N/A   |

| Relationship                                      | Linked Element Type                          | Identifier                 | Compliance          |
|---|--|----------------------------|---------------------|
| <satisfies></satisfies>                           | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-KPA.0001 | <partial></partial> |
| <applies_to></applies_to>                         | <operational process=""> or</operational>    | Synchronise Traffic        | N/A                 |
|   | <operational service=""></operational>       |                            |                     |
| <applies to=""></applies>                         | <operational area="" focus=""></operational> | OFA 02.01.02               | N/A                 |
| <applied_in_environment></applied_in_environment> | <environment class=""></environment>         | VHC TMA                    | N/A                 |
| <allocated to=""></allocated>                     | <application service=""></application>       | HMI                        | N/A                 |

## 3.4.2 #AppS11 - Airspace Design Requirements

## 3.4.2.1 Safety Requirements

No safety related Airspace Design Requirements identified for this Operational Service.

## **3.4.2.2 Performance Requirements**

No performance related Airspace Design Requirements identified for this Operational Service.

## 3.4.3 #AppS12 - Operational Procedure Requirements

## 3.4.3.1 Safety Requirements

The following tables show the Operational Procedure Safety Requirements for the service of 'Synchronise Traffic':

| Identifier  | REQ-05.07.04-SPR-SAF0.0004  |
|-------------|---|
| Requirement | Changes to sequencing and spacing shall be introduced as necessary to improve delivery of traffic into the TMA and then to the PMS IAF through speed control, vectoring, conformance to route options and holding |
| Title       | SR#2.1a   |
| Status      | <in progress=""></in>   |



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| Rationale           | To improve traffic delivery   |  |  |
|---------------------|---|--|--|
| Category            | <safety><operational><performance></performance></operational></safety> |  |  |
| Validation Method   | <real simulation="" time=""></real>                                     |  |  |
| Verification Method | N/A   |  |  |

| Relationship                             | Linked Element Type                          | Identifier                  | Compliance          |
|--|--|-----------------------------|---------------------|
| <satisfies></satisfies>                  | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-SAF0-0006 | <partial></partial> |
| <satisfies></satisfies>                  | <atms requirement=""></atms>                 | REQ-05.07.04-OSED-OPS0.0013 | <partial></partial> |
| <applies_to></applies_to>                | <operational process=""> or</operational>    | Synchronise Traffic         | N/A                 |
|  | <operational service=""></operational>       |                             |                     |
| <applies_to></applies_to>                | <operational area="" focus=""></operational> | OFA 02.01.02                | N/A                 |
| <applied environment="" in=""></applied> | <environment class=""></environment>         | VHC TMA                     | N/A                 |
| <allocated to=""></allocated>            | <application service=""></application>       | Operational Procedure       | N/A                 |

| Identifier   | REC  | REQ-05.07.04-SPR-SAF0.0001   |   |                     |  |
|--|--|--|---|---------------------|--|
| Requirement  | Impl   | ementation of PMS should   | provide a standardisation of MAP tactic | al management       |  |
| Title  | SR#  | 1.1d   |   |                     |  |
| Status   | <in f<="" td=""><td>Progress&gt;</td><td></td><td></td></in>         | Progress>  |   |                     |  |
| Rationale  |  | The standardisation of MAP tactical management could allow for a safer and easier way to manage traffic with reference to whole PMS behaviour. |   |                     |  |
| Category   | <saf< td=""><td>ety&gt;</td><td></td><td></td></saf<>                | ety>   |   |                     |  |
| Validation Method  | <rea< td=""><td>al Time Simulation&gt;</td><td></td><td></td></rea<> | al Time Simulation>  |   |                     |  |
| Verification Method  | N/A  |  |   |                     |  |
| Relationship   |  | Linked Element Type  | Identifier                              | Compliance          |  |
| <satisfies></satisfies>  |  |  | REQ-05.07.04-OSED-SAF0-0002             | <partial></partial> |  |
| <applies_to></applies_to>  |  | <operational process=""> or<br/><operational service=""></operational></operational>   | Synchronise Traffic                     | N/A                 |  |
| <applies to=""></applies>  |  |  |   |                     |  |
| <applied environm<="" in="" td=""><td>IENT&gt;</td><td><environment class=""></environment></td><td>VHC TMA</td><td>N/A</td></applied> | IENT>  | <environment class=""></environment>   | VHC TMA                                 | N/A                 |  |

## 3.4.3.2 Performance Requirements

No performance related Operational Procedure Requirements identified for this Operational Service.

# 3.4.4 # InfS4 – Information (Air-Ground & Ground-Ground) Requirements

## 3.4.4.1 Safety Requirements

No safety related Information Requirements identified for this Operational Service.

## **3.4.4.2 Performance Requirements**

No performance related Information Requirements identified for this Operational Service.



## 4 Traceability matrix

Note: There is no counterpart Technical development required in support of this concept so there are no links to System Functions identified

| Requirement Identification     | Requirement title | Requirement<br>Short summary   | Functional block Id | System Function | Information Service or Application |
|--------------------------------|-------------------|--|---------------------|-----------------|------------------------------------|
| identification                 | uue               | Short summary  | < XXXXX >           | Identifier      | Service Identifier                 |
| REQ-05.07.04-<br>SPR-SAF0.0001 | SR#1.1d           | Standardization of MAP tactical management                                     | N/A                 | N/A             | Operational Procedure              |
| REQ-05.07.04-<br>SPR-SAF0.0002 | SR#1.1e           | Holding capacity at MPs  | N/A                 | N/A             | Airspace Design                    |
| REQ-05.07.04-<br>SPR-SAF0.0003 | SR#2a             | Airspace design –<br>Segregate PRNAV<br>structures from<br>restricted airspace | N/A                 | N/A             | Airspace Design                    |
| REQ-05.07.04-<br>SPR-SAF0.0004 | SR#2.1a           | Sequencing and Spacing   | N/A                 | N/A             | Operational Procedure              |
| REQ-05.07.04-<br>SPR-SAF0.0005 | SR#2.1b           | Management of non-<br>PRNAV aircraft on<br>PNAV routes to IAF                  | N/A                 | N/A             | Operational Procedure              |
| REQ-05.07.04-<br>SPR-SAF0.0006 | SR#2.1c           | Airspace design – segregation of multiple PRNAV structures.                    | N/A                 | N/A             | Airspace Design                    |
| REQ-05.07.04-<br>SPR-SAF0.0007 | SR#2.1d           | Separation of aircraft on converging flows                                     | N/A                 | N/A             | Operational Procedure              |
| REQ-05.07.04-<br>SPR-SAF0.0008 | SR#2.1e           | Sequencing Leg capacity  | N/A                 | N/A             | Operational Procedure              |
| REQ-05.07.04-<br>SPR-SAF0.0009 | SR#2.1g           | Indicated Air Speed<br>Display   | N/A                 | N/A             | HMI<br>Air-Ground SWIM             |
| REQ-05.07.04-<br>SPR-SAF0.0010 | SR#2.1h           | Aircraft Catch-up alert  | N/A                 | N/A             | HMI<br>Air-Ground SWIM             |
| REQ-05.07.04-<br>SPR-SAF0.0011 | SR#2.1i           | Selected Flight Level<br>Display   | N/A                 | N/A             | HMI<br>Air-Ground SWIM             |
| REQ-05.07.04-<br>SPR-SAF0.0012 | SR#2.1j           | Sequencing leg holding   | N/A                 | N/A             | Operational Procedure              |
| REQ-05.07.04-<br>SPR-SAF0.0013 | SR#2.1k           | Rate of descent Display  | N/A                 | N/A             | HMI<br>Air-Ground SWIM             |
| REQ-05.07.04-<br>SPR-SAF0.0015 | SR#2.1m           | Segregation from standard departures   | N/A                 | N/A             | Airspace Design                    |
| REQ-05.07.04-<br>SPR-SAF0.0016 | SR#2.2a           | P-RNAV Status Display  | N/A                 | N/A             | Plan and Implement<br>ATC Sectors  |
| REQ-05.07.04-<br>SPR-SAF0.0017 | SR#2.3a           | Aircraft deviations – timely corrective action                                 | N/A                 | N/A             | Operational Procedure              |
| REQ-05.07.04-<br>SPR-SAF0.0018 | SR#2.3b           | P-RNAV Route non-<br>conformance alert   | N/A                 | N/A             | HMI<br>Air-Ground SWIM             |
| REQ-05.07.04-<br>SPR-SAF0.0019 | SR#2.4a           | Report vectored aircraft to receiving controller                               | N/A                 | N/A             | Operational Procedure              |
| REQ-05.07.04-<br>SPR-SAF0.0020 | SR#2.5a           | Maintenance of vectoring skills  | N/A                 | N/A             | Operational Procedure              |



| Edition: 00.01.01              |                   |   |                               |                                  |   |
|--------------------------------|-------------------|---|-------------------------------|----------------------------------|---|
| Requirement<br>Identification  | Requirement title | Requirement<br>Short summary  | Functional block ld < xxxxx > | System<br>Function<br>Identifier | Information Service or Application Service Identifier |
| REQ-05.07.04-<br>SPR-SAF0.0021 | SR#2.5b           | Vectored aircraft rejoining a PRNAV procedure.                              | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0022 | SR#2.5c           | Contingency holding   | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0023 | SR#3a             | Emergency aircraft – aircraft priority                                      | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0024 | SR#3b             | Final Approach Fix –<br>Emergency waypoint                                  | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0025 | SR#3c             | Emergency aircraft - upstream holding                                       | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0026 | SR#3d             | Emergency Aircraft situation – management of other aircraft (speed control) | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0027 | SR#4a             | Holding traffic held as necessary   | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0028 | SR#4b             | Longitudinal spacing  | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0029 | SR#4c             | Real Time Weather –<br>Radar overlay  | N/A                           | N/A                              | HMI<br>Air-Ground SWIM                                |
| REQ-05.07.04-<br>SPR-SAF0.0030 | SR#5a             | Sequencing leg entry - speed constraint                                     | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0031 | SR#5b             | Sequencing leg entry – stable aircraft                                      | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0032 | SR#5c             | Sequencing legs –<br>Management of<br>BRNAV/PRNAV aircraft                  | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0033 | SR#5d             | Label clutter between sequencing legs                                       | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0034 | SR#5e             | Sequencing legs – vertical spacing  | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0035 | SR#5f             | Sequencing legs – maintain horizontal separation                            | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0036 | SR#5g             | Sequencing legs – maintain vertical separation                              | N/A                           | N/A                              | Operational Procedure                                 |



| Edition: 00.01.01              |                   |  |                               |                                  |   |
|--------------------------------|-------------------|--|-------------------------------|----------------------------------|---|
| Requirement Identification     | Requirement title | Requirement<br>Short summary                                 | Functional block ld < xxxxx > | System<br>Function<br>Identifier | Information Service or Application Service Identifier |
| REQ-05.07.04-<br>SPR-SAF0.0037 | SR#5h             | Holding between IAF and FAF                                  | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0038 | SR#5i             | Separation of opposing P-RNAV routes                         | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0039 | SR#5j             | Sequencing legs – maintain longitudinal separation           | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0040 | SR#5k             | Sequencing legs – maintain separation (along track buffer)   | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0041 | SR#5I             | Longitudinal separation of arrival flow – speed instructions | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0042 | SR#5n             | Evaluation of maximum entry level                            | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0043 | SR#5o             | Capacity of PMS  | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0044 | SR#5p             | Label clutter with proximate airports                        | N/A                           | N/A                              | НМІ   |
| REQ-05.07.04-<br>SPR-SAF0.0045 | SR#5q             | Overcoming of PMS capacity                                   | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0046 | SR#6a             | Sequencing leg – maintain horizontal separation              | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0047 | SR#6b             | Merge Point to FAF –<br>Management of PRNAV<br>aircraft      | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0048 | SR#6c             | Merge Point to FAF –<br>Management of non-<br>PRNAV aircraft | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0049 | SR#6d             | Separation in converged flows                                | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0050 | SR#6e             | Published level restrictions                                 | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0051 | SR#6f             | Segregation of PMS<br>Structures                             | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0052 | SR#6g             | Missed Approaches  | N/A                           | N/A                              | Operational Procedure                                 |



| <b>Edition: 00.01.01</b>       |                   |  |                               |                                  |   |
|--------------------------------|-------------------|--|-------------------------------|----------------------------------|---|
| Requirement Identification     | Requirement title | Requirement<br>Short summary   | Functional block Id < xxxxx > | System<br>Function<br>Identifier | Information Service or Application Service Identifier |
| REQ-05.07.04-<br>SPR-SAF0.0053 | SR#6h             | Sequencing leg - Run-<br>off Procedure                                   | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0054 | SR#6i             | Sequencing leg – reinsertion into landing sequence                       | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0055 | SR#6j             | Holding at the Merge<br>Point  | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0056 | SR#6k             | "Direct To" instruction - spacing  | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0057 | SR#6I             | Contingency holding for MAP  | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0058 | SR#6m             | Adequate track mileage for vertical profiles                             | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0059 | SR#6n             | Runway direction<br>change – PRNAV<br>aircraft on final<br>transition    | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0060 | SR#60             | Runway direction change – aircraft routing to Merge Point                | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0061 | SR#6p             | "Direct To" instruction – disassociate from "descend" instruction        | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0062 | SR#6q             | Descent instruction  | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0063 | SR#6r             | Merge Point – Strategic<br>Waypoint                                      | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0064 | SR#6s             | Merge Point – next waypoint position                                     | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0065 | SR#7a             | PMS Route design –<br>PANS-OPS 8168                                      | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0066 | SR#7b             | Minimum PMS route<br>altitude – PANS-OPS<br>8168                         | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0067 | SR#7c             | Minimum obstacle<br>clearance across entire<br>sector – PANS-OPS<br>8168 | N/A                           | N/A                              | Airspace Design                                       |

| Requirement Identification     | Requirement title                   | Requirement<br>Short summary                | Functional block Id < xxxxx > | System<br>Function<br>Identifier | Information Service or Application Service Identifier |
|--------------------------------|-------------------------------------|---|-------------------------------|----------------------------------|---|
| REQ-05.07.04-<br>SPR-SAF0.0068 | SR#7d                               | Merge Point – Minimum<br>Vectoring Altitude | N/A                           | N/A                              | Airspace Design                                       |
| REQ-05.07.04-<br>SPR-SAF0.0069 | SR#8a                               | Severe weather - avoidance                  | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-SAF0.0070 | SR#8b                               | Severe weather – holding                    | N/A                           | N/A                              | Operational Procedure                                 |
| REQ-05.07.04-<br>SPR-PRF0.0001 | HMI Silent<br>Handover              | HMI Silent Handover                         | N/A                           | N/A                              | НМІ   |
| REQ-05.07.04-<br>SPR-PRF0.0002 | HMI P-RNAV<br>Equipage              | HMI P-RNAV Equipage                         | N/A                           | N/A                              | НМІ   |
| REQ-05.07.04-<br>SPR-PRF0.0003 | HMI Aircraft speed                  | HMI Aircraft speed                          | N/A                           | N/A                              | НМІ   |
| REQ-05.07.04-<br>SPR-PRF0.0004 | Information<br>RNAV1<br>Capability  | Information RNAV1<br>Capability             | N/A                           | N/A                              | Air-Ground SWIM                                       |
| REQ-05.07.04-<br>SPR-PRF0.0005 | Information<br>Aircraft IAS         | Information Aircraft IAS                    | N/A                           | N/A                              | Air-Ground SWIM                                       |
| REQ-05.07.04-<br>SPR-PRF0.0006 | HMI Range<br>Rings                  | HMI Range Rings                             | N/A                           | N/A                              | НМІ   |
| REQ-05.07.04-<br>SPR-PRF0.0007 | Descent<br>management<br>inside PMS | Descent managing along PMS structure        | N/A                           | N/A                              | Operational, Airspace<br>Design                       |

Table 1: Requirement traceability matrix

## **References and Applicable Documents**

## **5.1 Applicable Documents**

This SPR complies with the requirements set out in the following documents:

- [1] SESAR SEMP 2.0
- [2] Template Toolbox 02.00.00
- [3] Requirements and V&V Guidelines 02.00.00
- [4] Toolbox User Manual 02.00.00

#### 5.2 Reference Documents

The following documents were used to provide input / guidance / further information / other:

- [5] ED-78A GUIDELINES FOR APPROVAL OF THE PROVISION AND USE OF AIR TRAFFIC SERVICES SUPPORTED BY DATA COMMUNICATIONS.
- [6] B.4.1 Performance Framework (validation targets, influence diagrams)
- [7] B.4.3 Architecture Description Document
- [8] 16.6.1 Safety Reference Material
- [9] 16.6.2 Security Reference Material
- [10]16.6.3 Environment Reference Material
- [11]16.6.5 Human Performance Reference Material
- [12]AIR NAVIGATION SYSTEM SAFETY ASSESSMENT METHODOLOGY, Ed. 2.0, ref. AF.ET1.ST03.1000-MAN-01, 30 April 2004
- [13]Operational Service and Environment Definition (OSED) for Point Merge in Complex TMA, Edition 00.01.00, 6<sup>th</sup> July 2012
- [14] Point Merge Integration of Arrival Flows Enabling Extensive RNAV Application and Continuous Descent - Operational Services and Environment Definition, EUROCONTROL CND/COE/AT/AO, Version 2.0, 19<sup>th</sup> July 2010
- [15]SESAR European ATM Master Plan, Draft Edition 2, March 2012

D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

Edition: 00.01.01

#### **Appendix A Safety Assessment Report**

The following embedded object is the full Safety Assessment Report completed for Work Stream 2 of P5.7.4:



P5.7.4 WS2 Safety Assessment Report v

Note: the Performance Requirements are a sub-set of the Safety Requirements.

D07 & D08 - Safety and Performance Requirements (SPR) for Point Merge in Complex TMA

Edition: 00.01.01

END OF DOCUMENT -