

# ***AIR 5567 becoming a Pass/Fail Test & Implications for European Airports***

***EASA – Icing Conditions: on-ground and in flight  
Cologne, 15.-16. October 2013***

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# *Winter Operations - Goals*



*EASA - Icing Conditions*

## **Goals**

- 1. Securing runway availability for arrivals and departures**
- 2. Minimizing runway closure times ( $\leq 30$  minutes)**
- 3. Securing apron & aircraft handling position availability**

## ***Requirements for Runway De-icing Fluids***

- 1. Have the ability to provide safe operations,**
- 2. with the least environmental impact,**
- 3. at minimum cost.**

## ***Environmental Issues***



*EASA - Icing Conditions*

## ***European Law Making***

**Regulations** - For issues of general application these apply directly and ensure uniform application throughout the Union. Regulations are binding on member states and require no national measures for implementation.

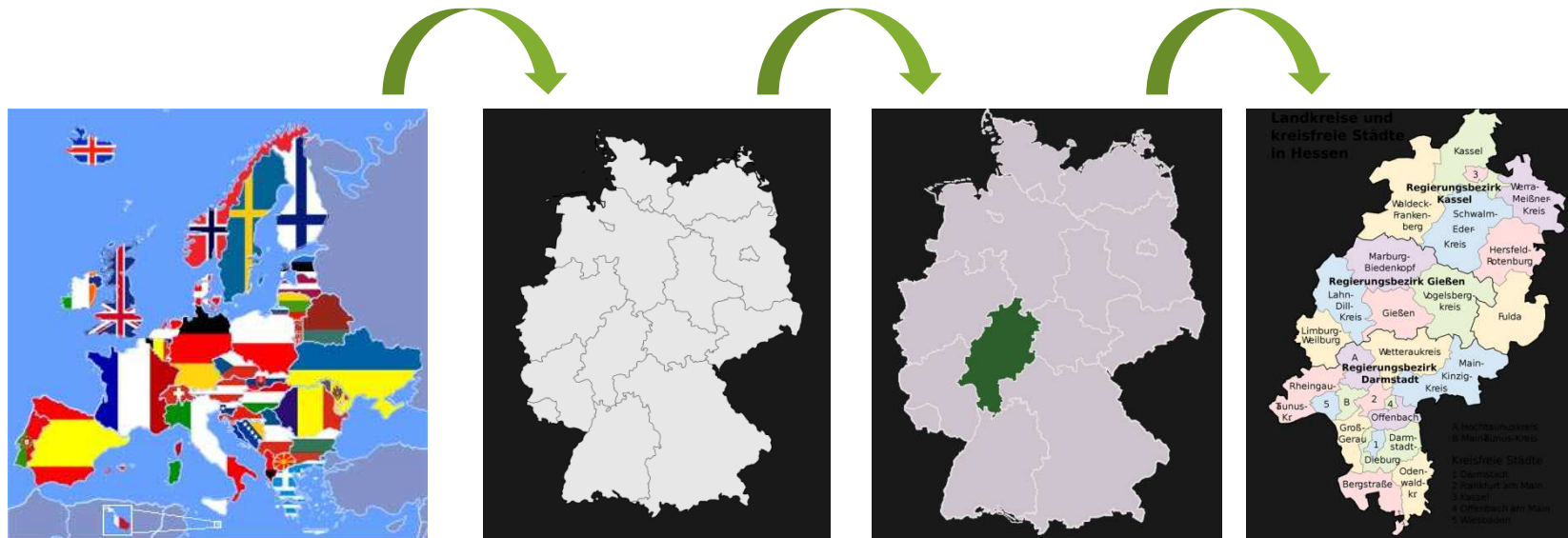
**Directives** - Indicate the required results to be achieved but leave the detail to the individual member states. These only take effect when they are embodied in the national legislation. Member states are given a transposition deadline by which date they must introduce their own legislation. This is usually between 18 months and 3 years. Differences in national interpretation can lead to uneven implementation of Directives.

**Decisions** - These may be applicable to a member state, an organization or an individual within the Union. These are only binding upon the individual or institution to which they are addressed.



# European Regulation

## The Principal of Subsidiarity



## ***European Regulation Covering Water***

### Regulation:

**EG Nr. 1137/2008** (treatment of waste water)

### Directives:

- **80/68/EEG & 2000/60/EEG** (protection of ground water)
- **91/271/EEG** (treatment of waste water)
- **2000/60/EEG & 2008/105/EEG** (framework for common water policy)
- **2004/35/EEG & 2006/21/EEG** (environmental liability for the prevention and remedial action of environmental damage)
- **2006/11/EEG** (contamination due to the discharge of hazardous material into water bodies)
- **2006/118/EEG** (protection of ground water against contamination and impairment)
- **2007/60/EEG** (assessment of the management of flooding)



## ***German Regulation***

- Subject to these EU regulations Germany passed the „Water Household Law“.
- Within this law the use of RDFs is considered equal to the use of water, defined as (i.a.):
  - the drawing/channeling of water or **substances** into/out of water bodies
  - actions, that are or **may be suitable**, to permanently or not just even an insignificant way harmfully alter the physical, chemical or biological composition of the water.
- Approval is needed for the use of water → for the use of RDFs
- Approval is given on the basis of the „Principle of Concern“ :

This states, that certain activities may only be permitted, if it is **unlikely** (based on the **human experience**) that these actions will have a negative effect on the quality of the water.

## ***Local Regulation***

### Requirements for the use of de-icing chemicals:

- Airports must show continuous effort to optimize their winter operations strategy with the goal to avoid and/or minimize the use of chemical de-icing agents. For this they must maintain a winter operations manual.
- All RDFs need periodic approval by the regional/local authority prior to their use.
- Airports & airport personnel are constrained under legal penalties to work to these regulations and their winter operations manual.
- Airports must show that the agents they want to use do not have a harmful effect on the environment.

## ***Local Regulation***

### Requirements for the use of de-icing chemicals:

- The application for the approval of a de-icing fluid requires certified survey reports from independent laboratories/institutes that cover the underlying data of the fluid
- For all examined parameters only validated and with regard to their performance characterized measurement methods may be used.
- The local authority will determine if the agent may be used and under which stipulations it can be used.

## ***Local Regulation***

Reports for the regulation authority (daily & seasonal summary):

- What did you do?
- What did you use (fluids, solids, sand)?
- How much did you use?
- Where did you use it?
- What were the circumstances (temperatures etc.)?
- What are you doing, what is your strategy to reduce the amount used?

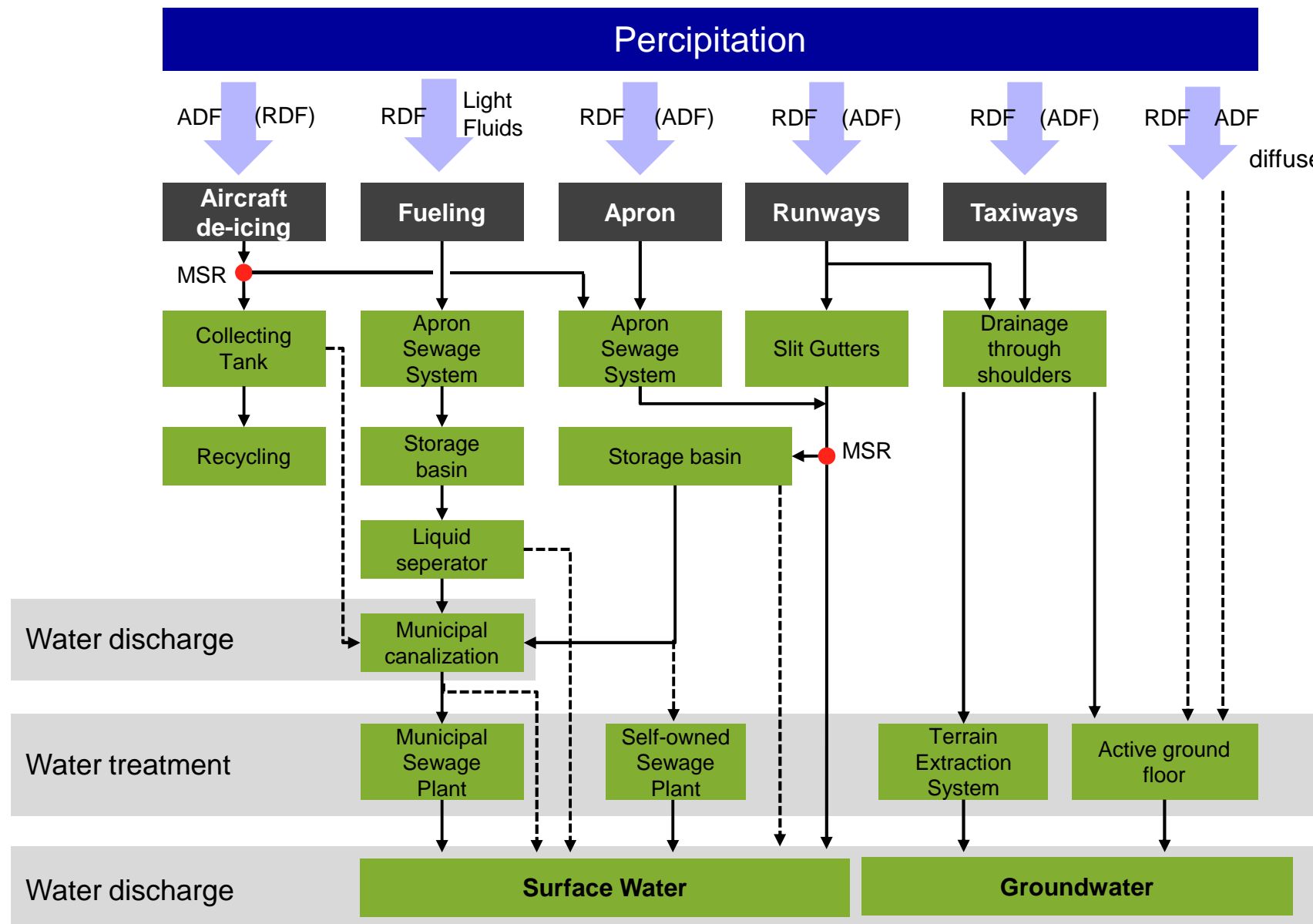
# ***Water Treatment Strategies***



## ***Water Treatment Strategies***

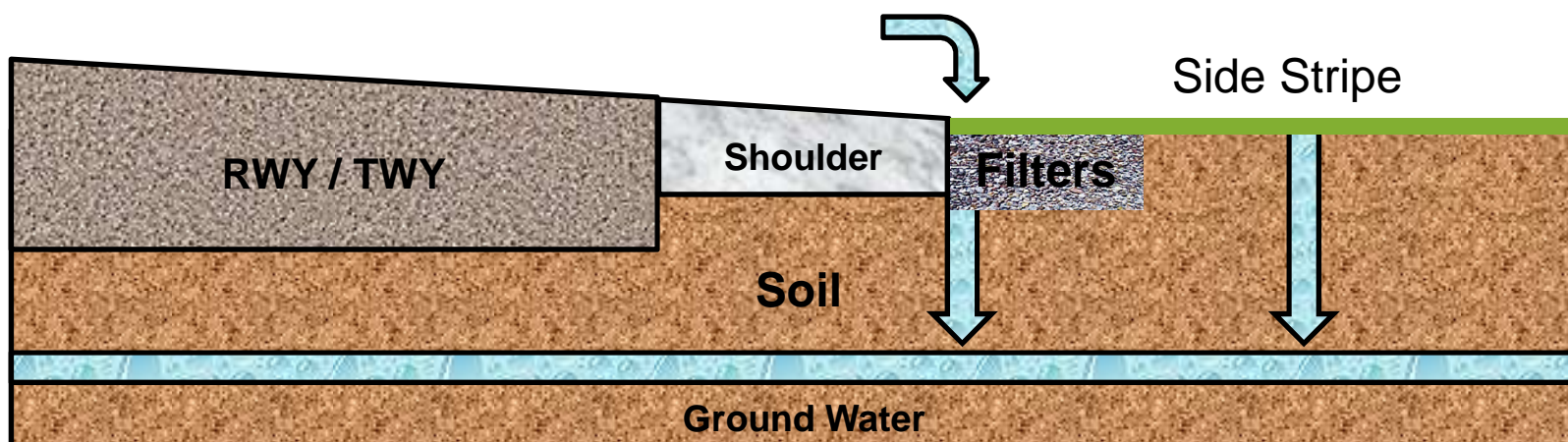
Many airports have long-standing programs to ensure that the local impacts on water quality are reduced or mitigated. The strategy and the handling of effluents will vary for every airport and is mainly influenced by:

- hydro-geological conditions
- degree and quantity of contamination
- discharge and treatment system





## ***Conventional Drainage TWY & RWY System***



## ***Dealing with Effluents in FRA***

### **Chemical Oxygen Demand**

- non-contaminated rainwater  $< 150$  respectively  $200$  mg COD/l,
- contaminated rainwater  $200 \text{ mg/l} < x < 1000 \text{ mg/l}$
- highly concentrated water  $> 1000 \text{ mg/l}$ .

## ***Dealing with Effluents in FRA***

Contaminated rainwater  $> 200$  mg COD/l is stored in rainwater tanks consisting of three basins and let either to the municipal wastewater-treatment-plants of Frankfurt/Main or to the airport owned wastewater-treatment-plant, where it is cleaned biologically in specially designed sequenced batch reactors.

In the case of soil filters the quality of the filtrated rainwater is controlled by online-COD-instruments which detect organic pollution. Non-contaminated rainwater  $< 200$  mg COD/l is led to the river Main or seeps into ground water

# ***Aerospace Informational Report (AIR) 5567***

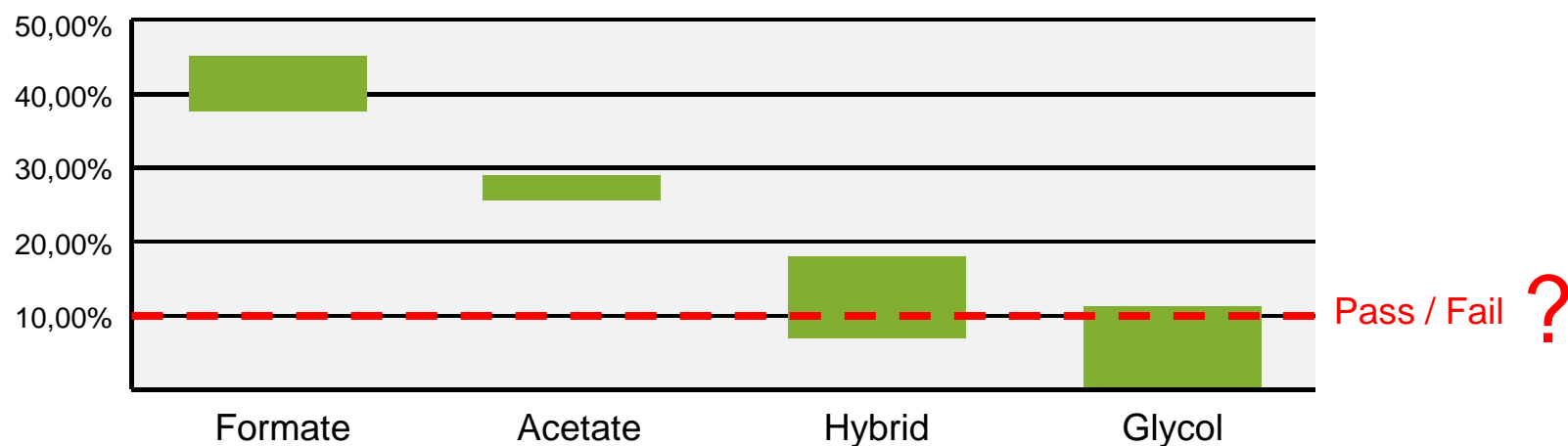


## ***Aerospace Informational Report (AIR) 5567***

- AIR5567 was developed to provide information that will allow users to compare products in regard to their effect on carbon brakes
- AIR5567 test results do have significant variability
- Currently SAE A-5A is reviewing AIR5567 for conversion to an Aerospace Recommended Practice (ARP) or possibly convert to an Aerospace Standard (AS) instead of an ARP

## Aerospace Informational Report (AIR) 5567

SAE AIR5567 Normalized Oxidation Weight Loss



Deicing Chemicals	overall mean	upper limit	lower limit
Formate (31 Runway Deicers)	44,10%	44,80%	37,40%
Acetate (36 Runway Deicers)	27,40%	29,10%	25,70%
Hybrid (14 Runway Deicers)	12,70%	18,40%	7,10%
Glycol (4 Runway Deicers)	2,60%	10,90%	0%

Source: SAE G12

# *Implications*



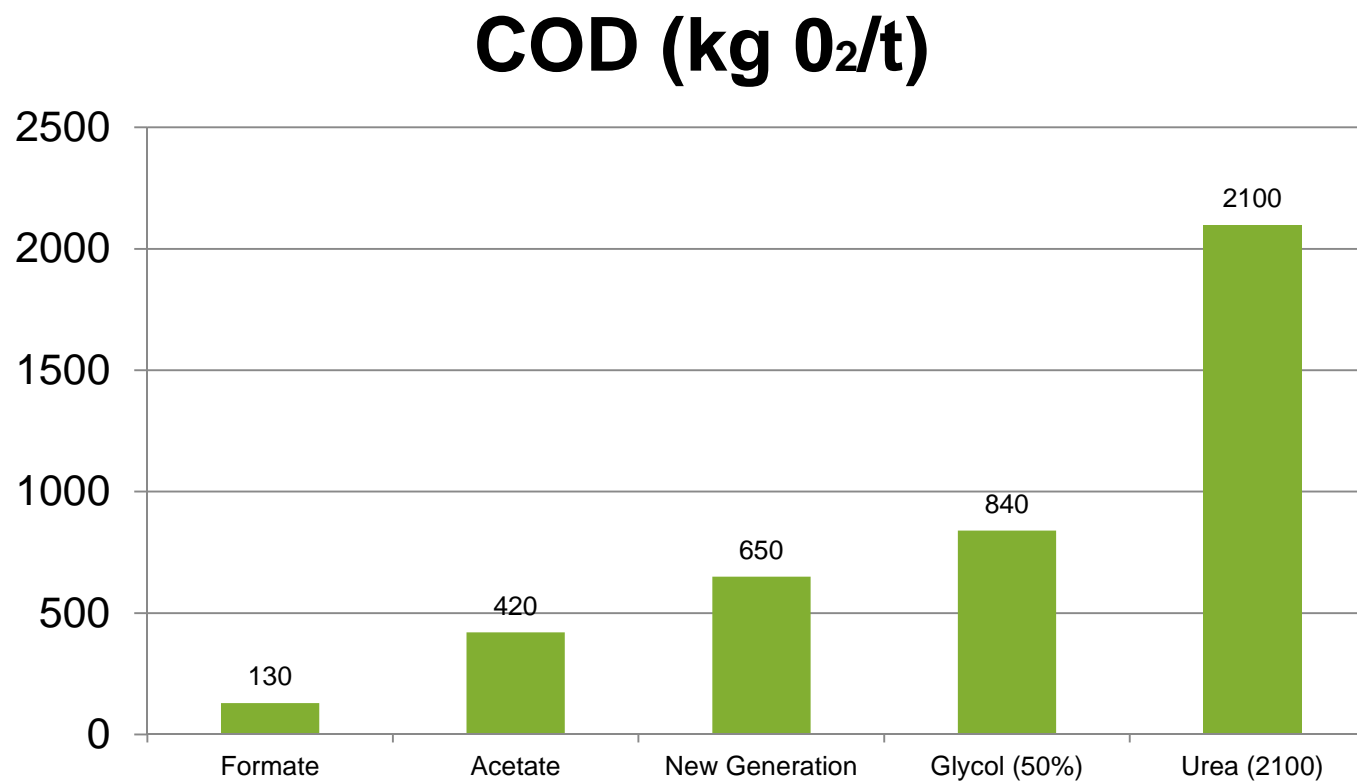


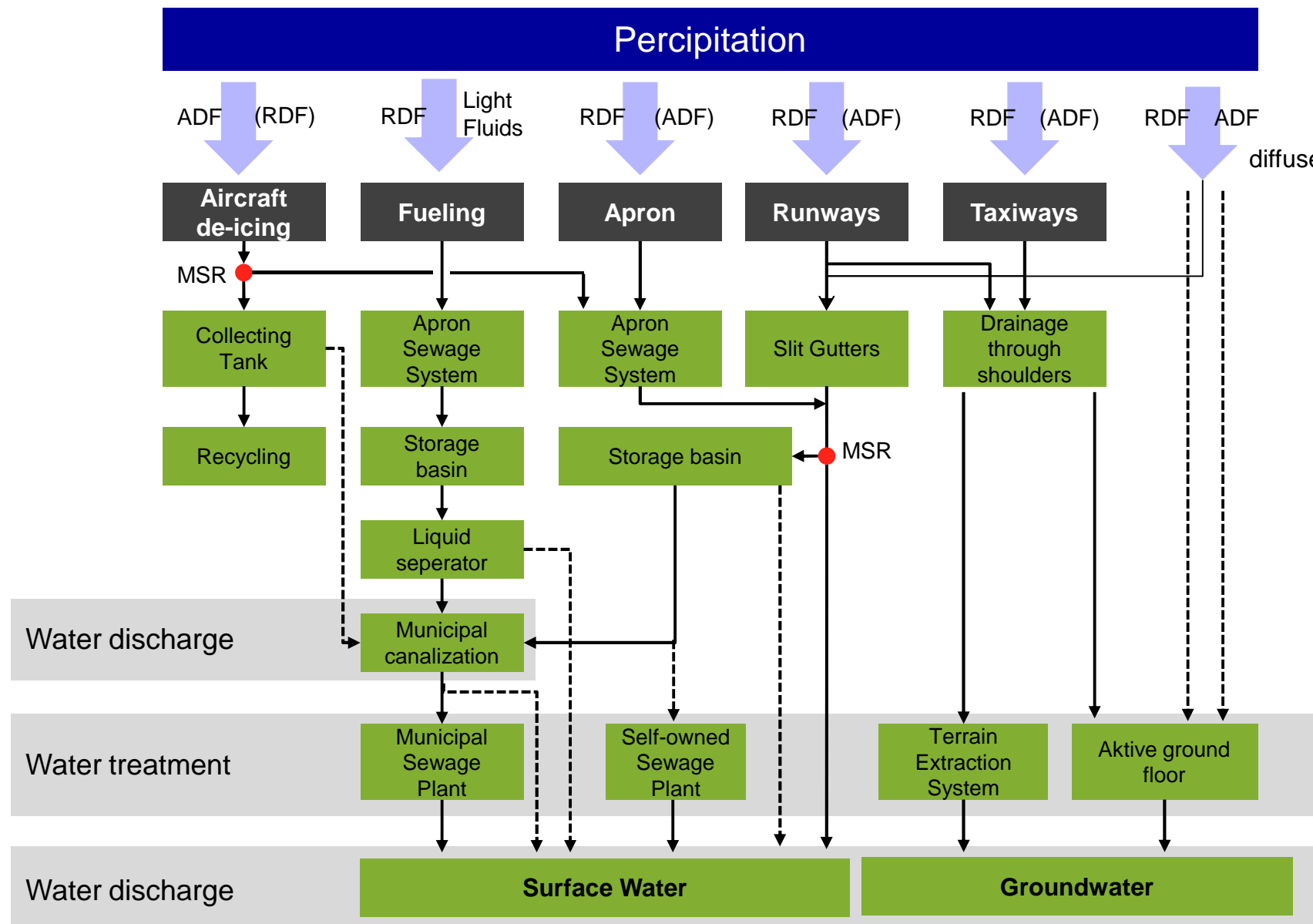
## ***Implications for Airports***

Implemented water treatment strategies, like the terrain extraction system or plain soil filters would for some airports no longer be an option to treat water.

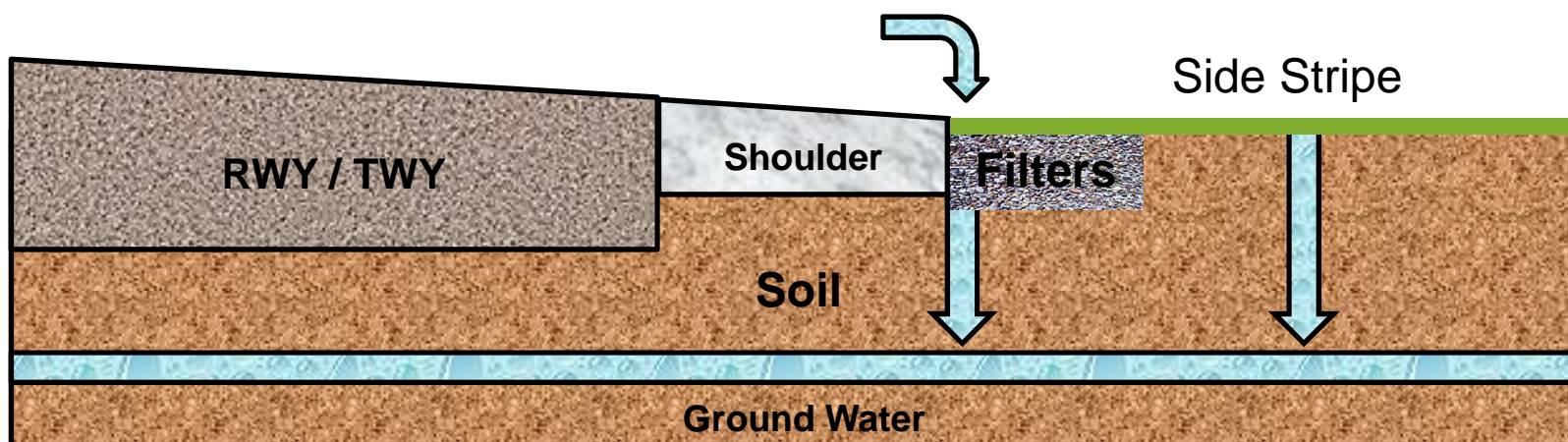
In order to comply with existing legislation these airports would have to conduct various water protection measures.

## ***COD Characteristics per Fluid Type***



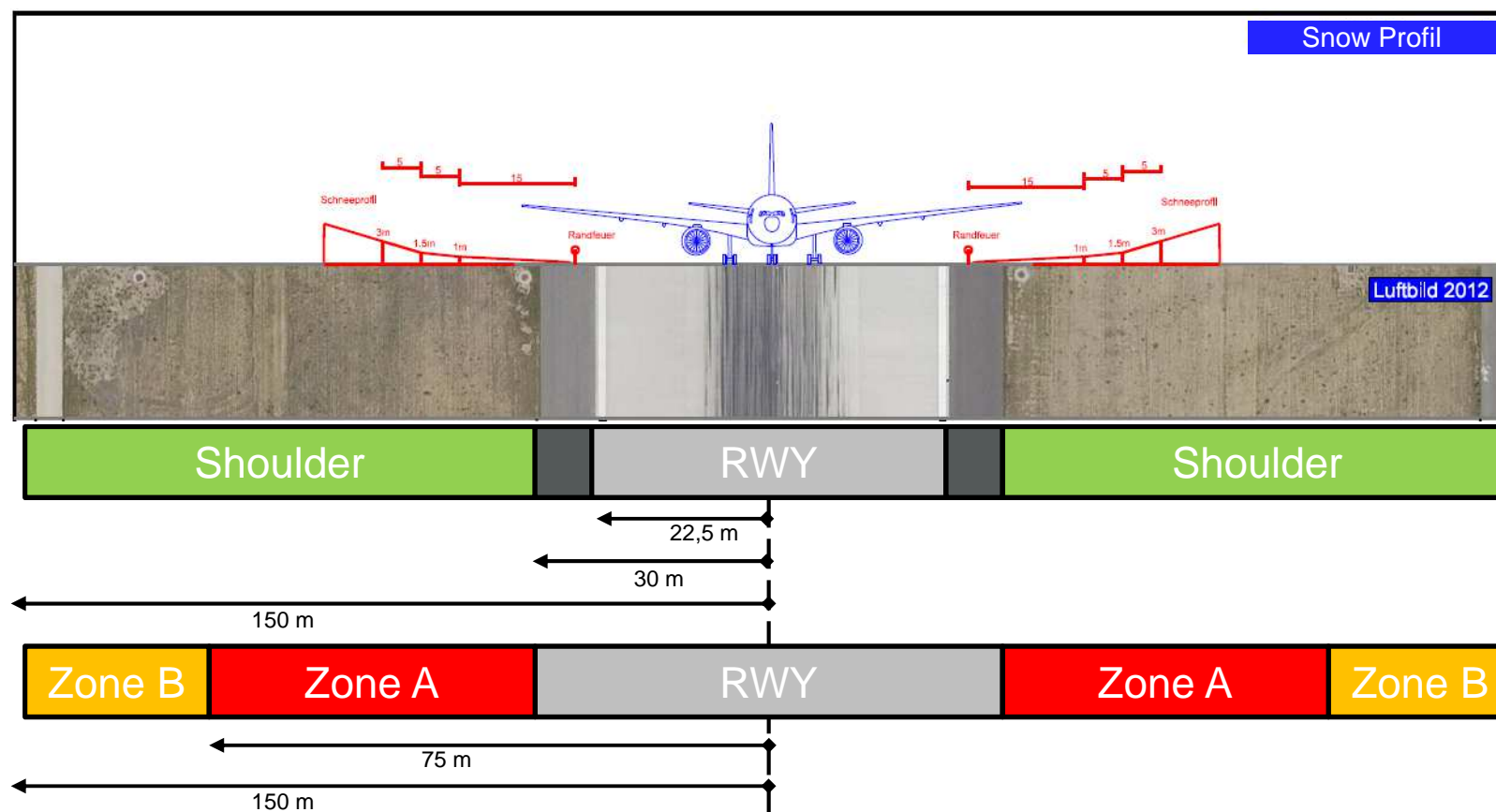


## Conventional Drainage TWY & RWY System



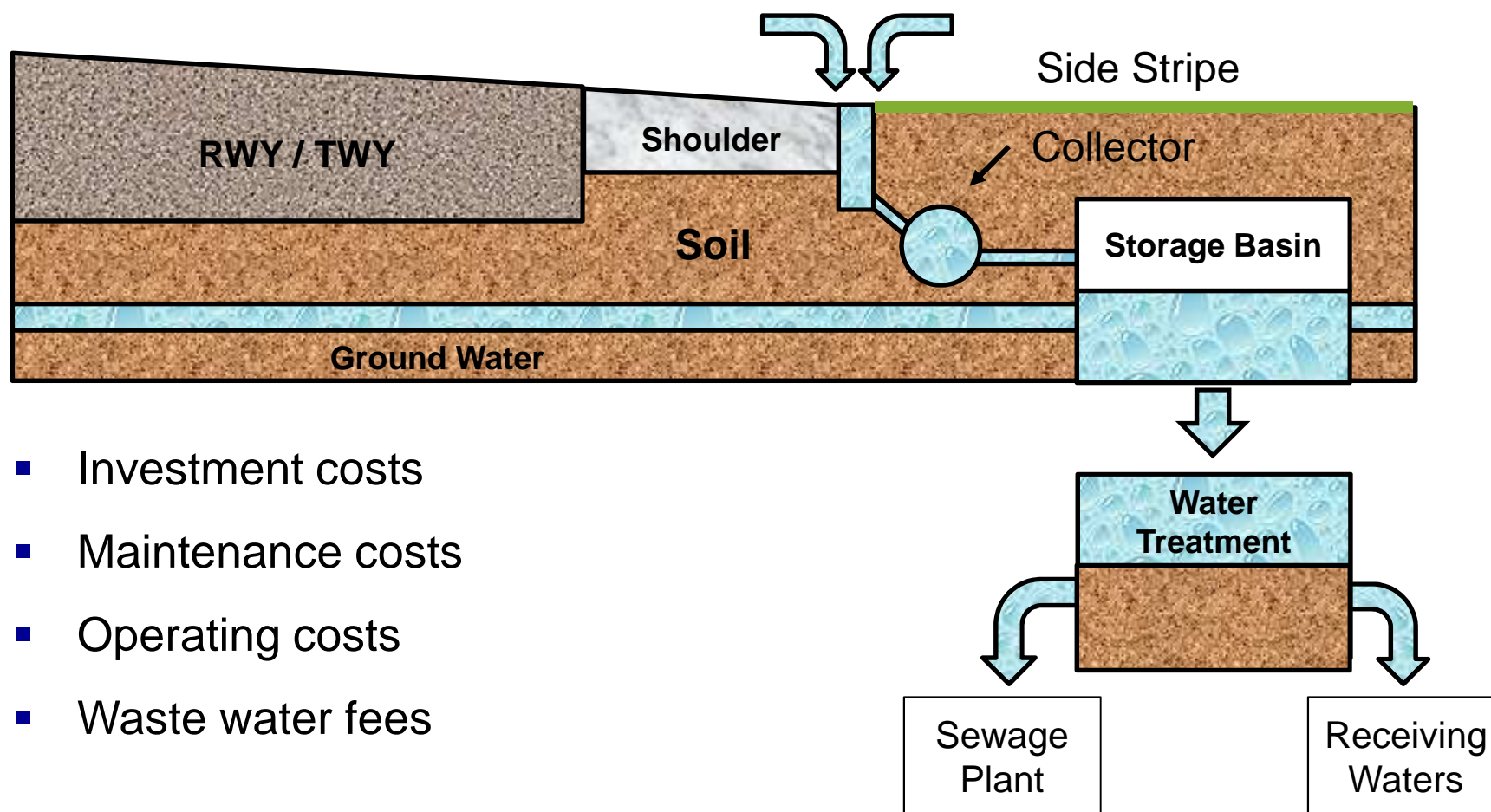
- large, mostly flat connected areas
- in certain areas the handling of light liquids and high impermeability
- due to ATC provisions, regulations and ongoing aircraft operations the construction within these areas is very complex, the closing of airports might become necessary

## Implications for Airports



EASA - Icing Conditions

## Implications



- Investment costs
- Maintenance costs
- Operating costs
- Waste water fees

## ***Cost Example for a 2800m RWY + TWYs***

Sealed surface ca. 29 ha.

To go from conventional drainage to centralized soil filter facility:

■ Slit gutters	3.800.000,00 €
■ Sewers	2.300.000,00 €
■ Storage basin	7.200.000,00 €
■ Soil filter	2.300.000,00 €
■ Pump station	600.000,00 €
■ Force Pipes	100.000,00 €
■ Seepage	200.000,00 €

**Total** **16.500.000,00 €**

Sealed Surface: ca. 29 ha → ca. 570.000,00 € / ha



## ***Implications for Airports***

- Construction of:
  - new water drainage systems
  - new water storage basins for the additionally drained water
  - additional water sewage treatment plants
- Compensation measures for the construction of the above
- Severe operational restrictions during construction phase
- Possible subsequent modification of the airport operating permit
- Estimated costs for the retrofitting of a larger airport are between 100.000.000 € and 300.000.000 €
- Additional operating costs for water treatment facilities
- Miscellaneous (airfield lighting, night time labor etc.)

*Thank you very much for  
your attention!*

