

Luchtverkeersleiding Nederland (LVNL) – Schiphol-Oost -
Netherlands
Noord-Holland, NL

Risk Engineering Report

Risk Engineering Services **Risk Engineering Report**

Client

Luchtverkeersleiding Nederland (LvnI)

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Location

Luchtverkeersleiding Nederland (LVNL) - Amsterdam - Netherlands
Schiphol-Oost, Noord-Holland 1117
NL

Coordinates

Latitude: 52.30737, Longitude: 4.80821

Date of visit

20/Feb/2018

Author

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This report has been carried out, on the basis of the information provided and/ or collected during our visit, as part of our underwriting process.

Any risk improvements identified and suggested herein are provided to you to assist with your risk prevention program only. The report makes no claim to completeness and does not purport to identify all the hazards and deficiencies that may exist. Risk recommendations are suggestions for risk improvement and for minimising potential losses, based on brief general observations and discussions at the site. They are not the result of detailed engineering studies. The Insured remains fully responsible for compliance with all applicable laws and regulations.

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General information

Assessment scope

This assessment based upon visit of the location and (verified) information provided originating from previous (insurers) visits.

After the initial visit at February 20, a follow-up meeting has taken place (March 6) to discuss the main recommendation of the location visited and the new construction project (Annex).

Executive summary

Location overview and risk assessment summary

This is the main location of Luchtverkeersleiding Nederland. It includes the main hardware and operations as well as head-quarters.

It is located in one interconnected building block: all combustible construction; partially fire resistive.

There are multiple internal fire separations, based upon the Dutch building codes, so 30 -60 minutes rated. There are no "absolute" fire separations though.

Fire protection has been provided by automatic sprinklers (70% - not the detached building) and partial automatic fire detection.

Hazards have been well taken care for, from a property point of view.

Related to business interruption, the current arrangement and fire protection of the critical hardware room is not adequate. A back-up location is present, with a capacity of around 60% max.

Direct exposures are regarded medium only. Note however the location just outside the airport.

NatCat exposure is an issue related to flood, but adequate protection has been provided on governmental behalf.



Special hazards

Hazards relate to the operations, so are largely determined by the offices, traffic control operation rooms and the hardware room for supporting equipment.

Related to the latter there are generators on site to provide power in case of break down of the public grid.

Next to the above, there are some special hazards:

- Storage of equipment (dedicated room);
- Workshops for development of equipment/ workspaces;
- Testing rooms for new equipment (servers-computer hardware).

Strengths

The site benefits from:

- Full coverage sprinkler protection, with exception of the atrium and the detached parking/office building;
- Automatic smoke detection (spot type -high sensitive), in all general areas, areas with increased fire hazards, rooms with critical equipment.
- All non-combustible building with largely concrete load bearing constructions.
- Many (light) fire resistive separations.
- Management well aware of the exposures, and willing to invest.
- Guards on site,

Weaknesses

Weak points are:

- Design and lay-out of the fire protection in the main hardware room.
- Workshops and storage in the same building as main operations (although sprinkler protected). Note that the workshops with hazardous processes (woodworking, welding, paint spraying) have been moved to a location elsewhere.

Site description

At the location visited, Stationsplein Zuid-West 1001, Schiphol-Oost, there are:

Large rooms occupied with traffic controllers, supported by EDP and communications equipment.

A central hardware room for information exchange, planning and communications equipment for all locations.

Training facilities including a (traffic control) simulator.

Headquarters with board, administration.

Furthermore a technical department with workshops, testing facilities and storage of spare parts.

Loss history

See overview:

- 2015, Location Eelde: fire , smoke soot: equipment lost. Some 72K, including costs.
- 2016, Schiphol - Oost: water damage. No values mentioned. Below deductible.

New projects

LVNL is developing a new building (Annex), which a.o. will result in a full back-up of all operations as present at this location. Including hardware.

Full completion is planned for 2023.

A project has been started which will result in a complete remote operation of the air traffic control of Eelde and Beek from the Schiphol-Oost location.

Service comments

Project review and support will be the main driver for our services. All relating to the new building (Annex).

Changes since last visit

First visit on behalf of Swiss RE Corporate Solutions.

Recently, military air traffic control has moved into this building. They share the operations room with their civil colleagues.

As a result access control has been tightened.

Values and loss estimates

Sum Insured (SI)

Sum Insured - Values in EUR

	Property Damage	Annual Business Interruption
Totals	247,600,000	167,500,000

Note: Property Damage (PD) is comprised of Building, Machinery, Stock, and Other.

General values taken from the 2017 SOV.

The Business Interruption figure shown is the *annual* amount, for all locations. The indemnity period being 104 weeks, the sum insured for business interruption is 335 million Euro.

The PD values are taken from valuation reports:

- Buildings: Troostwijk, December 17, 2015;

- Inventory: Troostwijk, September 7, 2015.

PD-Values include VAT which can not be "cleared" due to the nature of the entity.

Maximum Possible Loss (MPL)

MPL - Values in EUR

	Property Damage	Annual Business Interruption
Totals	203,380,000 82%	251,250,000 150%
Extra Expense		0
Interdependent Business Interruption		0
Total LE		454,630,000 110%

Under MPL conditions, this location is considered to be one fire area, due to the absence of "absolute" fire stops. With all fire protection impaired and no adequate response by either personnel or fire brigade, all buildings and equipment will be heavily effected by the fire. According to SwissRe guidelines equipment will be lost for almost 100%. Buildings will have some salvage potential due to their non-combustibility, structure (partially fire resistive), and generally low-medium fire load. Reconstruction costs will be needed to their full insured value.

Regarding business interruption: all operations will shut down in this scenario, as equipment supporting all critical systems are located in the centrally located hardware room.

Rebuilding that room will take over a year. Note that some of these systems are old and spares are not easily obtained. Strict requirements from authorities apply. Expect 1,5 year to rebuild and for commissioning, so MPL BI amounts 150% of the *annual* figure (2 years' amount insured - see insured value).

As per SwissRe definitions for MPL estimation, leeway to the back-up location at Rieker polder is not taken into account for this scenario. See definition of Maximum Possible Loss.

Note that under "normal conditions" the back-up at Riekerpolder is reported to be able to absorb some 50-60% of operations. There will be some extra costs involved.

Detailed risk assessment

Exposure elements

Assessment of Exposure Elements

External perils

The site is located directly outside of the Schiphol-airport fences.
Building C is connected to the Steigenberger Hotel by a parking garage.
Public roads at three sites of the building.
Ringvaart (Ring canal Haarlemmermeer polder) across the street. Vessels of all kinds.

Activity

Luchtverkeersleiding Nederland ("LVNL" Air Traffic Control, The Netherlands), handles all civil air traffic above the Dutch territory below 24.500 feet.
The largest location is at Schiphol-Oost, with the centrally located operations room (air traffic controllers) and hardware.
LVNL is furthermore located at four civil airfields in the Netherlands for "Approach", "Start/Landing" and "Platform" operations (all below 10.500 feet).
Supporting equipment (beacons, radar facilities, communications equipment etc.) is scattered all over the Netherlands.
Air traffic above 24.500 feet is handled by Eurocontrol.

The main locations of LVNL are:

- Airportplein 59, Rotterdam (Airport Rotterdam - the Hague);
- Vliegveldweg 17, Beek (Airport Maastricht-Aachen);
- Machlaan 16a, Eelde (Groningen Airport);
- Control towers at Schiphol (Airport Schiphol);
- Stationsplein Zuid-West 1001, Schiphol-Oost.

The survey concentrated on the latter. This location houses air traffic control activities: main operations room and related hardware and utilities.

Recently, the military air traffic control has been moved to this location also.

Furthermore: head-quarters, testing (computer equipment), workshops (no wood working/paint spraying) and storage rooms for equipment and consumables.

In total some 500 people are employed at Schiphol-Oost. The location is occupied 24/7.

Critical equipment

Key equipment of the main tools (Rad-Net, Garex, Triple A) is concentrated in the central hardware room. There is redundancy, however all located in the same room. Special requirements (ICAO) apply for approval and reliability.
These systems will be replaced over time. Presumably in collaboration with ATC operations outside the Netherlands, to enhance system integration and back-up.

Furthermore there is critical equipment at several airfields, however at a much smaller extend.

Utilities/service interruption

Utilities (power, cooling, data) are provided with sufficient redundancy and well spread over the building. Conditions are permanently monitored. Trips generate alarms that are transmitted to personnel (24/7).
There are three emergency power units: 2 "standard" and one "dynamic". The standard EPU's are tested on a weekly basis.

Interdependency and contingent BI

All LVNL operations depend from this locations' operations (personnel) and hardware room.
A back-up location (Riekerpolder) has been arranged, capable of taking over 50-60% of the capacity.

LVNL has a well established contingency and crisis management organisation.
Related to the strategic importance of the site for all air traffic in the territory of the Netherlands, full support is to be expected from the authorities at National level.

Protection elements

Assessment of Protection Elements

External Perils

External Perils

Office type activities and equipment: medium exposure to burglary and theft.
Political violence can not be excluded related to activities of LVNL.
LVNL maintains close contact with authorities and response agencies.

There is a porters lodge at the main entrance. Guards are on site 24/7.
Strict access control. Extensive electronic measures, such as cameras, intrusion detection.
The site is surrounded by water or fences.

Layout and construction

Within unit/building/structure layout and compartmentation

The location consists of the interconnected buildings A,B, Atrium (A') and detached building C (office/parking - 18 meters distance).
Buildings are four storeys in height.
Both blocks are interconnected by two overhead corridors, of non-combustible construction, and doors at both sides. The total built-up area amounts some 9.900 m². See aerial picture.

Within building block AB,A' there are multiple fire separations according to the Dutch Building legislations: 30-60' rated. Valuable in relation to (predominantly) low medium fire load and fire protection present.
Doors (in separations) are self-closing. Cable and other break troughs have been provided with adequate sealing and protection. All subject to a maintenance contract.
Utilities are located in dedicated rooms.

Construction materials of supporting structures and walls

All non-combustible construction and insulation materials.
The main load bearing constructions are made of concrete. The roof above the operations room is suspended from an external steel load bearing construction.
The atrium has a steel load bearing construction.
Floors all are concrete made.

Roof construction and materials

All non-combustible roofs: Largely concrete, partially steel. Rockwool insulation on top, covered with felt and pebbles.
Inherently, the atrium has a glass roof.

Fire protection

Fire water supply

Water for manual fire fighting can be obtained from hydrants in the public road and nearby open water.
The hydrants are connected to the water-supply of Schiphol airport.

The sprinkler system is fed by two pumps:
- Electrical 66m³/h
- Diesel 81 m³/h.
Water source: underground basin (365 m³).

Fire brigade and public fire department

Private - professional fire brigade of Schiphol airport ("land side"-team). Back-up by the professional public fire brigade of Haarlemmermeer.
LVNL has an emergency response team. In total (spread over the shifts) some 75 employees are member.
Twice per year there are exercises with the public fire brigade.

Sprinkler installations in production/process area

Buildings A,A' and B have been provided with a sprinkler system throughout, apart from the atrium. All according to the VAS (Dutch Sprinkler guidelines) as relevant at the time of construction.
Density is 5mm/m² over 214 m².
In the hardware room it is a pre-action system. Water supply triggered by spot type smoke detection at the ceiling and below the floor.
The system is subject to the Dutch certification scheme (CCV) and inspected twice per year by inspection body "Veritas".
Latest inspection report : July 2017. Certified.

Sprinkler installations in storage areas

See "sprinkler installations in production areas".

In the storage room, the racks have been provided with in-rack sprinklers.

Special protection measures

See sprinkler systems: the hardware room has been provided with a pre-action sprinkler system. The current set-up is regarded "disputable" as the room has been equipped with air treatment units which may interfere with the smoke detection (See recommendation).

Manual fire fighting measures

A sufficient amount of handheld extinguishers and hose reels.

Fire and smoke detection measures

All buildings have been equipped with automatic smoke detection (spot type - high sensitive). It covers:
- All main areas, corridors etc.
- All technical rooms and rooms with critical equipment.
- Also located below the floor of the main hardware room.
Aspiration type smoke detection has been provided in the test areas for equipment.
According to NEN 2535. Inspected twice per year. Certified.
No detection in the atrium.

Alarms are transmitted to the porters lodge and public fire brigade.

Operations, procedures and regulations

Permit to work

Strict procedures for work, including hot work apply.

Smoking regulation

Smoking is not allowed within the buildings.

Contractors management

Strict procedures apply. Especially in relation with any work that could influence the operations.

Risk management

Risk management philosophy

LVNL maintains a contingency and crisis management organisation aiming at non-disturbance of LVNL's operations.
Threats are investigated, evaluated and, when deemed necessary, mitigated.

A HSE-coordinator has been appointed.
 Regular self-audits and - inspections are carried out.

Commitment to safety

Housekeeping

Housekeeping is at a good level.

Process and equipment integrity

Maintenance

All equipment is subject to preventative maintenance.
 Electrical installations are subject to inspections compliant to NEN 3140, including thermographic imaging.

Inspection and maintenance of fire fighting equipment

All fire fighting equipment is tested, maintained and inspected according to applicable guidelines.
 Sprinkler and automatic fire detections systems are subject to third party auditing.

Business interruption

Business continuity management

See risk management philosophy.
 LVNL's income directly relates to the amount of "air movements" they handle. For Schiphol this adds up to some 500.000 per year.
 The location visited, especially the hardware and operations room, are critical for all operations.

Georedundancy

Three main (and critical) systems are run from equipment in the hardware room. Redundancy is available (A+B set-up), however A+B sets are located in the same undivided hardware room.

External power (public) and data are supplied from two sides in separated parts of the building.

At the "Riekerpolder"-location, a back-up facility has been set up, which is on "cold stand-by". It is capable of maximum 50%-60% of the capacity at Schiphol-Oost. Designed to be operational within 4 hours.

Natural hazard elements

Assessment of Natural Hazards

River Flood

Medium

According to SwissRe Geo Portal, the site is located in a (river) flood zone with a return period of 50 years.
 The region has been protected on behalf of the Dutch authorities. All water bodies in this area, as in the rest of the Netherlands, are controlled. The LVNL premises is located in the Haarlemmermeer polder. Directly adjacent to LVNL, there is the Ring dike, which defines the Ringvaart (canal) around the Haarlemmermeer polder. According to provincial data, this dike has been designed for 1/1000 year failure.

Storm Surge incl. Coastal Flooding

Medium

Geoportal: without protection, the area would be subject to (coastal) storm surge with a return period of 50 years.
 For this region, protection has been provided on governmental behalf, which has been designed for 1/10.000 years high water level (Dyke ring protection).

Earthquake

Low

GeoPortal: Seismic hazard is very low.

Wind Storm

Medium High

As per GeoPortal, the 50 year Peak Gust is 40-50 m/s, which defines wind storm as a significant hazard.

Hail Storm

Low

GeoPortal: low hazard

Lightning

Low

As per GeoPortal: Lighting hazard is rated "Low".

Risk improvement opportunities

The following Risk Improvements make no claim to completeness and they are not an identification of all the hazards and deficiencies that may exist. They are suggestions for risk improvement and for minimising potential losses that are based on brief general observations and discussions at the site. They are not the result of detailed engineering studies.

The insured remains fully responsible for compliance with all applicable laws and regulations. Please note all disclaimers and restrictions at the beginning of this report also apply to all Risk Improvements.

Should the insured, or its advisors, have alternative views on these Risk Improvements; Swiss Re Corporate Solutions will welcome the opportunity of further discussion.

Summary

Number		Status	Priority
2018-02-01	Fire protection main hardware room	New/Under Review	High
2018-02-02	New Building: "Annex".	New/Under Review	Medium

Recommendations

2018-02-01 Fire protection main hardware room

Status: New/Under Review

Priority: High

The main hardware room is the technical heart of all air traffic operations and therefore critical to LVNL, Schiphol and even the Netherlands. The chance of a major loss in that area therefore has to be minimized.

One of the main threats is fire. For this reason the hardware room has been equipped with a pre-action (dry) sprinkler installation, triggered by automatic smoke detection.

However, due to the air treatment systems in this room, smoke may (will) be detected with delay or even do not reach the detectors. This will cause a delayed alarm and the sprinkler system will not provide protection as intended. Manual fire fighting may be very difficult in that situation.

As a result the hardware in the room may be heavily damaged, and operations have to be stopped.

For this reason it is strongly advised to improve the fire protection of the hardware room. In the light of the developments regarding the Annex building, which will result in a full back-up for the operations as this site, a total re-design of the fire protection is deemed not to be feasible.

But, for the intermediate period, - still 6 years - , the situation could be highly improved by "simple" measures. In the past it has been advised to install aspiration type smoke detection at the air treatment units. In that way smoke will be detected in its very early stages and simple manual intervention will be facilitated.

We highly support that advise and ask you to reconsider this option.

At a follow-up meeting (March 6), this recommendation has been explained and discussed. The situation has been acknowledged by participants. LVNL will internally discuss this recommendation and decide re. steps to be taken.

2018-02-02

New Building: "Annex".

Status: New/Under Review

Priority: Medium

The construction of the new building "Annex" has been started.

When finished, this building will, apart from training facilities, provide full and independent back-up of LVNL's operations as present in the current building at Schiphol-Oost. This will be a big improvement related to business continuity preservation.

Some important features (high level):

- All non-combustible, partially fire restive building;
- Several internal fire separations, including a 2 hour rated wall;
- 53 meters distance to existing building;
- Connected to existing building by an overhead bridge (discussion topic);
- General fire protection by full coverage water mist protection and automatic smoke detection;
- Central hardware room protected by an extinguishing system based upon inertising gas (presumably Inergen) and high sensitive aspiration type smoke detection;
- Full geographical redundancy of all utilities such as power, data and cooling;
- Equipment located above (water) threat level related to dyke failure.

At the follow-up meeting March 6, the "Annex" has been discussed.

Regarding:

- *The "overhead bridge"*, SwissRe Corso has stated that the design as sketched will not result in a "MPL- type" of separation for insurers' loss estimation purposes, as per SwissRe Corso Guidelines. (*See definitions*). This however does not pose a problem to SwissRe (all non combustible bridge, one hour rated doors and independent automatic fire extinguishing systems both sides). Willis Towers Watson will investigate the position of other insurers on the contract.
- *General construction* features it has been emphasized and confirmed that these will all be non-combustible.
- *Fire protection systems* of the "Annex" building: these will be "certified" according to the Dutch certification scheme. The related UPD's are in their draft stage and will be provided to Insurer (SwissRe - Han Dieben) and broker (Peter Bakker - Willis) for review.
- *Cabling and wiring*: it has been discussed to utilize only "fire safe" and "halogen free" type. This has been confirmed.

Actions:

1. SwissRe CS to provide contact details regarding data room protection/commissioning;
2. Willis Towers Watson to confirm position of insurers regarding the "bridge" and insurers' market loss estimation.
3. LVNL to provide design specs (UPD) regarding fire protection.

Appendix: Risk improvement definitions

Risk improvement priority guide

Priority	Equivalent wording
High	These are high priority Risk Improvements that present a large property loss potential or major business interruption exposure in the event of a loss incident.
Medium	These are Risk Improvements that should be completed as they can result in a loss to property and/or business interruption.
Low	These are Risk Improvements identifying areas of sound loss prevention that can be completed on a programmed basis. Improvements are recognized as an enhancement to the overall quality of loss prevention at the facility.

Risk improvement status

Status	Equivalent wording
Completed	Action has been taken to address the Risk Improvement. Advice has been received on the outcome and completion date and this has been verified by the surveying engineer.
Completed - not confirmed	Action has been taken to address the Risk Improvement. Advice has been received on the outcome and completion date, yet this has not been verified.
Held in abeyance	Decision has been taken by the client to suspend Risk Improvement. Reasons for suspension have been provided.
Rejected	Decision has been taken by the client not to address the Risk Improvement. Reasons for rejection have been provided.
No Progress	No action has been taken on the Risk Improvement.
In progress	Action has been initiated to address the Risk Improvement. Update on the expected outcome has been provided.
Agree – progress pending	A plan to address the Risk Improvement has been agreed. Information concerning the expected outcome of the action have not yet been provided.
New/under review	Risk Improvement has been provided to the client and is currently under review.

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