

Workshop Smart Inspectors

October 25th, 2013

Wageningen



Operational Aspects of Flying with RPAS

Rob van Heeswijk – RPAS pilot

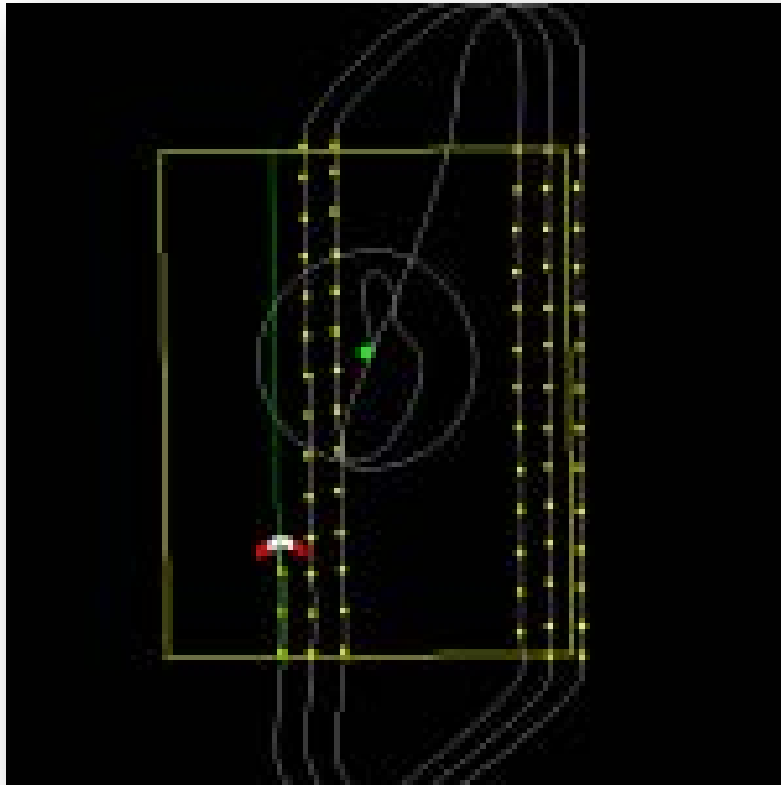


ECOFLIGHT

Outline

- **Flight planning**
 - desk phase
 - field phase
- **Flight execution**
- **Rules and regulations**

Flight planning



field phase



desk phase

Ground Control Station (GCS)

PAMS Groundstation SmartOne C

Project License image

Flight Control Photo Mission

Open Save Center Upload

Block

altitude	200.0
centerX	313439.34
centerY	5713630.19
height	420
pattern	Zamboni
rotation	0.0
width	480

Camera

Model	S95
Overlap_across	80
Overlap_along	80

Park

parkAlt	100
parkX	313439.34
parkY	5713630.19

ZDerived Values

CamInterval	3.7
EstFlight Time	14.5
Lines	13
Resolution	6.5
Spacing	35.6

altitude

Legend

Replay

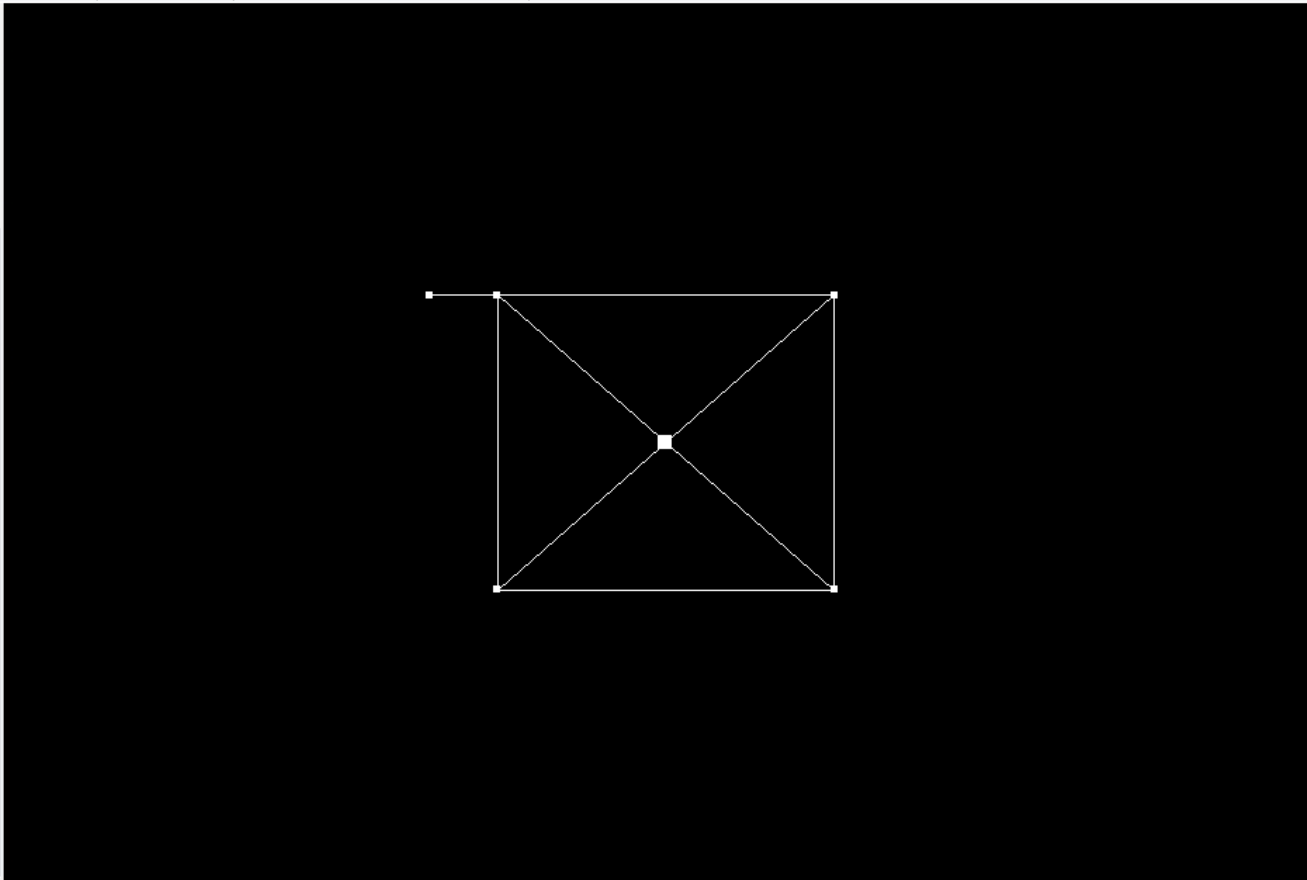
Track Layers

- AirCRAFT
- Photo positions
- Flight Track
- Safety bounds
- Block extents
- Park position

Map Layers

- contour.shp
- Geldem noord - UTM

[Projection] (X:312510.96 Y:5714231.09)



Port COM81

GeoSkyHawk's software tool for flight planning: GCS.

Block	
altitude	200.0
centerX	313439.34
centerY	5713630.19
height	420
pattern	Zamboni
rotation	0.0
width	480
Camera	
Model	S95
Overlap_across	80
Overlap_along	80
Park	
parkAlt	100
parkX	313439.34
parkY	5713630.19
ZDerived Values	
CamInterval	3.7
EstFlight Time	14.5
Lines	13
Resolution	6.5
Spacing	35.6

altitude

Legend

Track Layers

- AirCraft
- Photo positions
- Flight Track
- Safety bounds
- Block extents
- Park position

Map Layers

- contour.shp
- Geldem noord - UTM

[Projection] (X:312500.95 Y:5713383.83)



Background map containing the area of interest imported in GCS.

PAMS Groundstation SmartOne C

Project License image

Flight Control Photo Mission

Open Save Center Upload

Block

altitude	200.0
centerX	313439.34
centerY	5713630.19
height	420
pattern	Zamboni
rotation	0.0
width	480

Camera

Model	S95
Overlap_across	80
Overlap_along	80

Park

parkAlt	100
parkX	313439.34
parkY	5713630.19

ZDerived Values

CamInterval	3.7
EstFlight Time	14.5
Lines	13
Resolution	6.5
Spacing	35.6

altitude

Legend

Replay

Track Layers


- AirCRAFT
- Photo positions
- Flight Track
- Safety bounds
- Block extents
- Park position

Map Layers

- contour.shp
- Geldem noord - UTM

[Projection] (X:312496.94 Y:5713626.19)

(Lat=57.80964390192, Lng=6.3521161013916)



scale: 100m | 1Km

Port COM81

Explicit designation of the area of interest: clearness for all...

PAMS Groundstation SmartOne C

Project License image

Flight Control Photo Mission

Open Save Center Upload

Block

altitude	200.0
centerX	313538.49
centerY	5713563.09
height	641
pattern	Zamboni
rotation	25.8
width	492

Camera

Model	S95
Overlap_across	80
Overlap_along	80

Park

parkAlt	100
parkX	313439.34
parkY	5713630.19

ZDerived Values

CamInterval	3.7
EstFlight Time	22.8
Lines	19
Resolution	6.5
Spacing	35.6

altitude

Legend

Replay

Track Layers

- AirCraft
- Photo positions
- Flight Track
- Safety bounds
- Block extents
- Park position

Map Layers

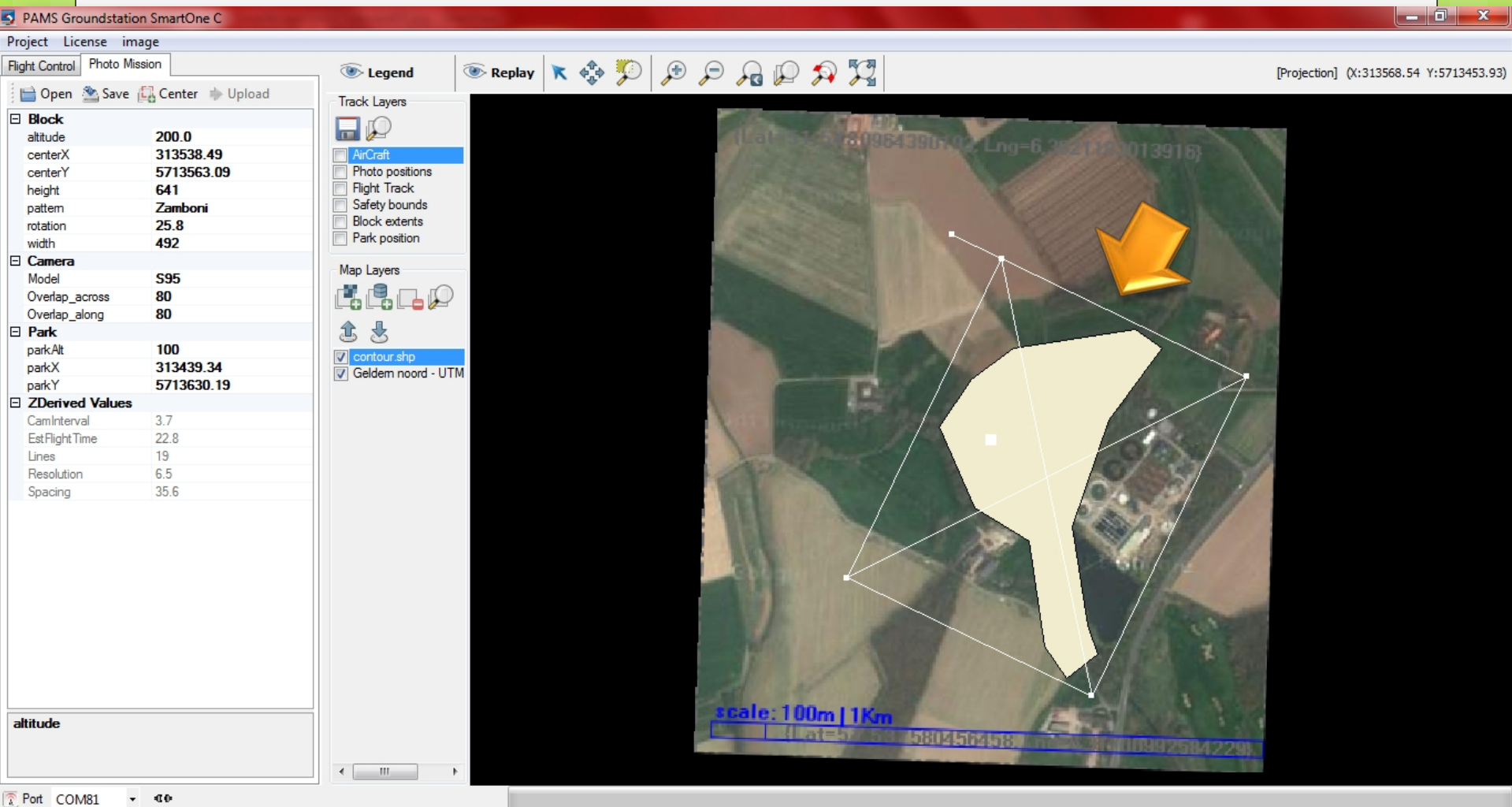
- contour shp
- Geldem noord - UTM

[Projection] (X:313568.54 Y:5713453.93)

(Lat=57.80964390192, Lng=6.3521161013916)

scale: 100m | 1Km

Port COM81



Prepare a flight plan for the predominant wind direction

PAMS Groundstation SmartOne C

Project License image

Flight Control Photo Mission

Open Save Center Upload

Block

altitude	200.0
centerX	313507.72
centerY	5713544.35
height	399
pattern	Zamboni
rotation	-77.0
width	669

Camera

Model	S95
Overlap_across	80
Overlap_along	80

Park

parkAlt	100
parkX	313439.34
parkY	5713630.19

ZDerived Values

CamInterval	3.7
EstFlight Time	17.5
Lines	13
Resolution	6.5
Spacing	35.6

altitude

Legend

Replay

Track Layers

- AirCraft
- Photo positions
- Flight Track
- Safety bounds
- Block extents
- Park position

Map Layers

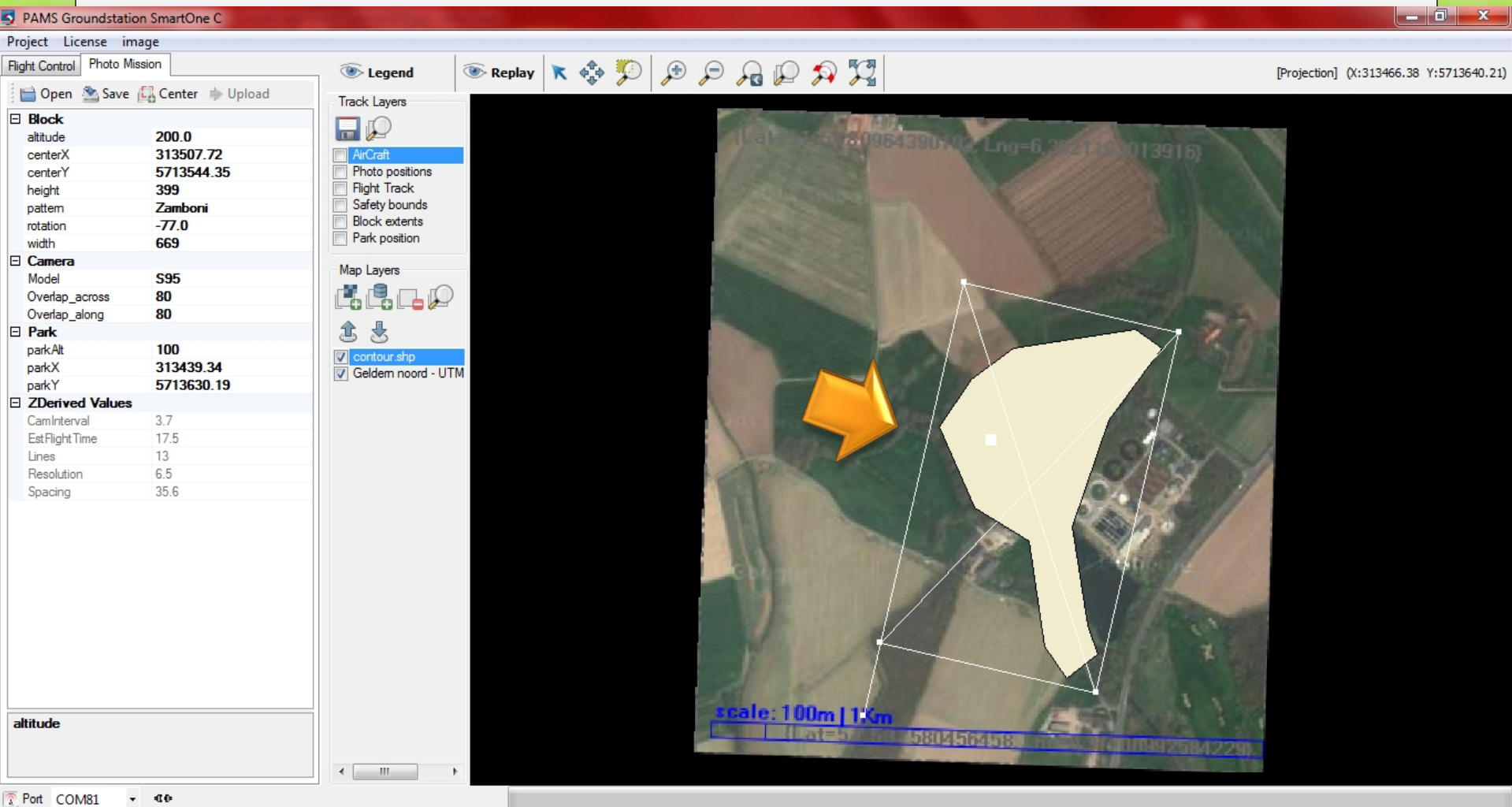
- contour shp
- Geldem noord - UTM

[Projection] (X:313466.38 Y:5713640.21)

(Lat=57.80964390192, Lng=6.3521161013916)

scale: 100m | 1Km

Port COM81



And make a backup plan for other wind directions...

Block	
altitude	200.0
centerX	313538.49
centerY	5713563.09
height	641
pattern	Zamboni
rotation	25.8
width	492
Camera	
Model	S95
Overlap_across	80
Overlap_along	80
Park	
parkAlt	100
parkX	313189.85
parkY	5713558.09
ZDerived Values	
CamInterval	3.7
EstFlight Time	22.8
Lines	19
Resolution	6.5
Spacing	35.6

altitude

Legend

Track Layers

- AirCraft
- Photo positions
- Flight Track
- Safety bounds
- Block extents
- Park position

Map Layers

- contour shp
- Geldem noord - UTM



[Projection] (X:313117.75 Y:5713976.31)

Select a preferred set-up location.

PAMS Groundstation SmartOne C

Project License image

Flight Control Photo Mission

Open Save Center Upload

Block

altitude	200.0
centerX	313538.49
centerY	5713563.09
height	641
pattern	Zamboni
rotation	25.8
width	492

Camera

Model	S95
Overlap_across	80
Overlap_along	80

Park

parkAlt	100
parkX	313844.59
parkY	5713385.03

ZDerived Values

CamInterval	3.7
EstFlight Time	22.8
Lines	19
Resolution	6.5
Spacing	35.6

altitude

Legend

Replay


Track Layers

- AirCRAFT
- Photo positions
- Flight Track
- Safety bounds
- Block extents
- Park position

Map Layers

- contour shp
- Geldem noord - UTM

[Projection] (X:313406.17 Y:5713578.28)



Port COM81

And designate a number of alternatives..

PAMS Groundstation SmartOne C

Project License image

Flight Control Photo Mission

Open Save Center Upload

Block	
altitude	200.0
centerX	313538.49
centerY	5713563.09
height	641
pattern	Zamboni
rotation	25.8
width	492
Camera	
Model	S95
Overlap_across	80
Overlap_along	80
Park	
parkAlt	100
parkX	313844.59
parkY	5713385.03
ZDerived Values	
CamInterval	3.7
EstFlight Time	22.8
Lines	19
Resolution	6.5
Spacing	35.6

Legend


Replay

Track Layers

- AirCRAFT
- Photo positions
- Flight Track
- Safety bounds
- Block extents
- Park position

Map Layers

- contour shp
- Geldem noord - UTM



[Projection] (X:313406.17 Y:5713578.28)

altitude

Port COM81

Optimize flight parameters.

PAMS Groundstation SmartOne C

Project License image

Flight Control Photo Mission

Open Save Center Upload

Legend

Replay

[Projection] (X:312082.29 Y:5713379.26)


Block	
altitude	100.0
centerX	313538.49
centerY	5713563.09
height	641
pattern	Zamboni
rotation	25.8
width	492
Camera	
Model	S95
Overlap_across	80
Overlap_along	80
Park	
parkAlt	100
parkX	313844.59
parkY	5713385.03
ZDerived Values	
CamInterval	1.8
EstFlight Time	41.5
Lines	37
Resolution	3.3
Spacing	17.8

Track Layers

- AirCRAFT
- Photo positions
- Flight Track
- Safety bounds
- Block extents
- Park position

Map Layers

- contour shp
- Geldem noord - UTM



altitude

Port COM81

Optimize flight parameters.

Special objects

- Windmills
- Pylons
- Transmission towers





ECOFLIGHT



height up to 125 meters



ECOFLIGHT



height from 50 till 180 meters

high voltage network





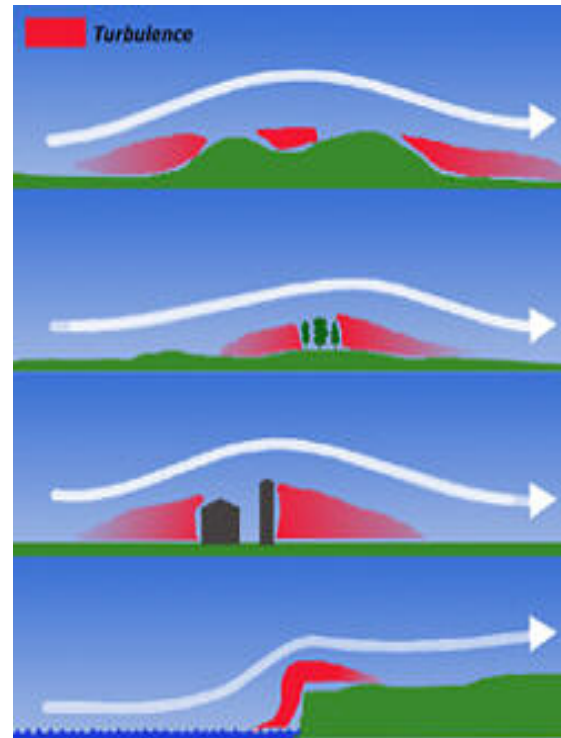
ECOFLIGHT

Transmission towers



Turbulence

- Windmills
- Trees
- Buildings
- Transmission masts
- Pylons



the affected length is up to 7 times the height of the obstacle

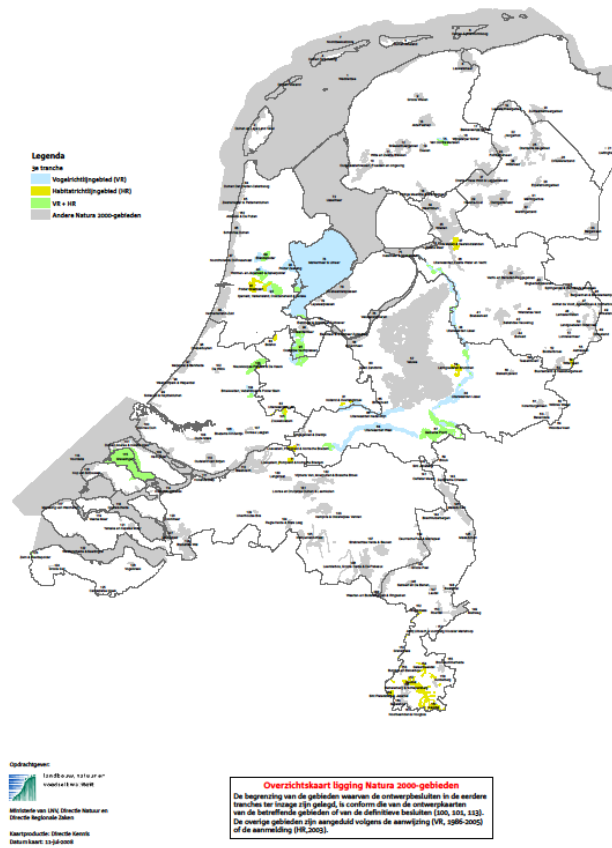


ECOFLIGHT



Special interest areas

Natura 2000 areas



Special interest areas



Gas Pipeline Network



TAF

- **Terminal Aerodrome Forecast**
- ZCZC FT220555 EHEH EINDHOVEN/EINDHOVEN
NLD 22 m. TAF EHEH 220545Z 2206/2312 15005KT
CAVOK BECMG 2208/2211 17012KT TEMPO
2219/2222 22020G35KT SCT060CB PROB40
TEMPO 2219/2222 VRB30G45KT 3000 TSRA
SCT012 BKN040CB BECMG 2309/2312 22015KT=

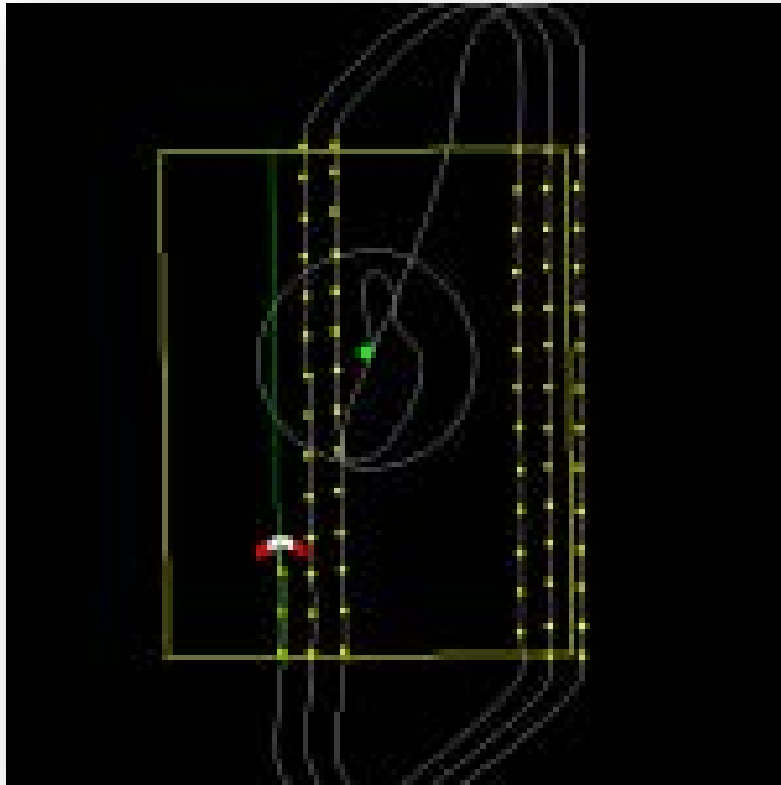
METAR

- **MET**eorological **Aerodrome Report**
- ZCZC SA221055 EHDL ARNHEM/DEELEN NLD
48 m. METAR EHDL 221055Z AUTO 16012KT 9999
NCD 20/15 Q1005 BLU=

NOTAM

- **NOT**ice to **AirMen**
- M1462/13 -
PJE WILL TAKE PLACE AT TEXEL PSN 5306N00450E.
GND - FL160, 26 OCT 07:00 2013 UNTIL 26 OCT
16:45 2013. CREATED: 16 SEP 10:52 2013

Flight planning



field phase

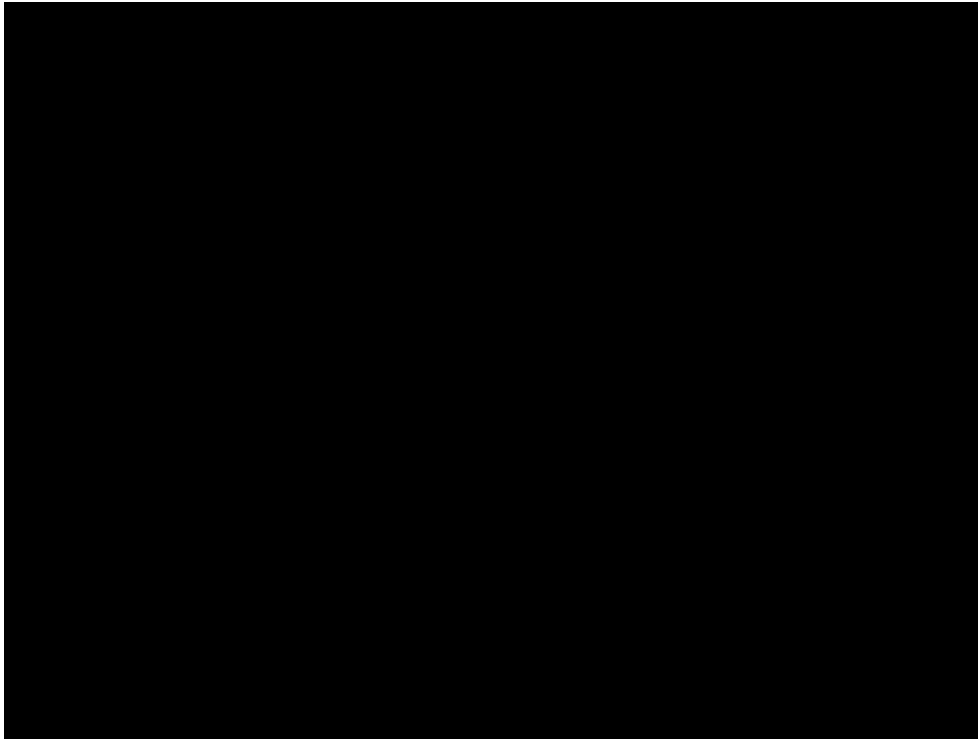


desk phase

Field phase planning

- Survey area of interest
- Verify desk phase preparations
- Select final set-up point
- Assemble plane (pilot)
- Assemble GCS (observer)
- Pre-flight checks


Launch



During the flight

- Pilot tracks the airplane and keeps the manual control unit stand-by at all times
- Observer monitors GCS + airspace and keeps the emergency flight abort button stand-by at all times
- Intensive information exchange between pilot and observer

Information exchange

- ❖ Pilot  Observer
- ❖ Information:
 - ❖ Battery voltage airplane
 - ❖ Battery voltage control unit
 - ❖ Flight plan execution (complete flight plan, pictures, RPAS speed, wind speed)
 - ❖ Flight level
 - ❖ Tracks and turns
 - ❖ Number of tracks
 - ❖ Observations of airspace

Special events

- Helicopter Emergency Medical Service (HEMS)
- Pipeline Monitoring Flights
- Police Flights
- Military Flights
- Hot Air Balloons
- Parachutes
- Gliders / Deltawings
- **Other RPAS operations**



Landing



Rules and regulations

- Starting July 1st, 2013 all RPAS flights in Dutch airspace are prohibited...
- unless...
- the pilot successfully completes a certified “How to safely operate RPAS” course and
- the organisation has and acts according to an “Operational RPAS handbook”



Class 1 operations

Class 1 operations (1)

- Uncontrolled airspace only
- Flight performance by two persons (pilot and observer)
- Work with checklist for flight planning and aircraft preparation
- Maximum start weight: 150 kg
- Max altitude: 120 meters

Class 1 operations (2)

- Within Visual Line of Sight (VLOS): operations within 500 meters from Ground Control Station
- In daylight period (Visual Flight Rules; VFR)
- Visual Meteorological Conditions (VMC)
- At least 150 meters away from crowd and buildings

Class 1 operations (3)

- Maximum speed: 129 km/h
- Knowledge level: PPL (Private Pilot License)
- Logbook required for every flight
- The basic principle is uncontrolled airspace, but arrangements are possible for flights within controlled airspace (around airfields)

Additional requirements



Class 2 operations (1)

Designed for using RPAS

- directly above people and buildings
- higher than 120 meters
- in the dark (Instrument Flight Rules; IFR) or
- beyond Visual Line of Sight

Additional requirements



Class 2 operations (2)

- The type RPAS is equipped with a type certificate (based on internationally accepted airworthiness requirements),
- The RPAS designer is qualified
- The RPAS system is built by a qualified builder
- The RPAS system is maintained by a qualified organization

Additional requirements



Class 2 operations (3)

- Incidental Class 2 permission is only possible with great social importance in combination with acceptable risks.

Successful RPAS
operations impossible?

NO!



ECOFLIGHT

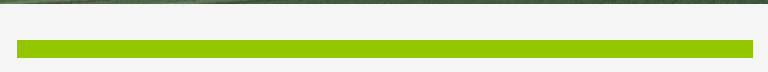


170.000 m³



grader

N



www.vb-ecoflight.nl
info@vb-ecoflight.nl



Thank you for
your attention



ECOFLIGHT



ECOFLIGHT

What do you need to fly with an light UAS in Amsterdam FIR (Flight Information Region)

- Flight crew license (per type)
- Medical Certificate
- Certificate of registration
- The certificate of airworthiness
- A permit from the owner of the place
- A permission of the “Provincie” (TUG)