



# KITEMILL



## PERMISSION WORK AT LISTA RE-AWE-201001

REV.	DATE	DESCRIPTION	ORIGINATOR	CONTROL	APPROVED
1.0	29.9.2020	Issued for use	TH	LC, EO, SS	OdB
0.1	25.9.2020	Issued for review	TH	OdB, LC, EO, SS	

	NAME	INITIALS	TITLE
<b>AUTHOR</b>	Thomas Hårklau	TH	CEO
<b>CONTROLLER</b>	Lode Carnel	LC	CTO
<b>CONTROLLER</b>	Espen Oland	EO	Control System Manager
<b>CONTROLLER</b>	Sture Smidt	SS	Head of Kite Department
<b>APPROVER</b>	Otto de Besche	OdB	QHSE Manager



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 881193

This is an electronically generated document which has been reviewed and approved in accordance with Kitemill's Management System. Dissemination level: PU

**INDEX**

<b>1</b>	<b>INTENTION .....</b>	<b>2</b>
1.1	PURPOSE .....	2
1.2	SCOPE .....	2
1.3	DEFINITIONS .....	3
1.4	REFERENCES .....	3
<b>2</b>	<b>EXECUTIVE SUMMARY .....</b>	<b>3</b>
<b>3</b>	<b>OPERATIONAL PERMIT BY CIVIL AVIATION AUTHORITIES .....</b>	<b>4</b>
3.1	THE REGULATION OF DRONES .....	4
3.2	APPROVED OPERATIONS .....	5
3.3	APPROVED DANGER AREA .....	5
3.4	AIRWORTHINESS .....	6
3.5	AUDITED .....	6
3.6	FUTURE OPERATIONAL SCOPE .....	7
<b>4</b>	<b>TEMPORARY BUILD PERMIT BY THE LOCAL MUNICIPALITY .....</b>	<b>7</b>
4.1	GROUND RISK HANDLING .....	8
4.2	COORDINATION WITH OTHER ACTIVITIES .....	8

## 1 INTENTION

### 1.1 PURPOSE

This document is made to share the experience from the permitting process for Sør Energi, Kitemill's first customer. We hope that this document will be useful for other AWE companies and stakeholders in the Airborne Wind Energy sphere.

The process of filing a public available document has been initiated as a deliverables from the EU funded project AWE, according to Grant agreement no 881193.

### 1.2 SCOPE

In 2015 Kitemill signed a Letter of Intent with the owner of Sør Energi which state that Sør Energi will build and operate the first Airborne Wind Energy array for Kitemill AS. As the operation initially will need approval on organizational level and the product will be evolved during the operation it has been clarified that the operation will be conducted by Kitemill, hence the operational permit is

granted to Kitemill. As a result of the operational experience Kitemill will develop an operational manual and training program which makes it possible for customers like Sør Energi to take over the role as operator.

The accomplished permits presented is:

1. Operational permit by Civil Aviation Authorities, attachment 1

One permit was not valid when this report was issued:

2. Temporary Build Permit by the local municipality

### 1.3 DEFINITIONS

AWE – Airborne Wind Energy

CAA – Civil Aviation Authorities (here referenced to the Norwegian Civil Aviation Authorities)

NOTAM - notice to airmen

NC&I – Non Conformity and Incident report

UAV - Unmanned Aerial Vehicles

RPAS - Remotely Piloted Aircraft Systems

EASA – European Union Aviation Safety Agency

MTOM – Maximum Take-off Weight

### 1.4 REFERENCES

Grant agreement no 881193

Building Acts and Regulations

BSL A7.1 [Regulations of drones](#)

[Jarus SORA](#)

[Work Environment Act](#)

[Machine directive](#)

## 2 EXECUTIVE SUMMARY

As Airborne Wind Energy is a new energy technology, such a process has never been granted before. There are undefined implications concerning the technology and its surroundings which will only be revealed by executing this project. This is also why the permit needs to be temporary and issued in stages.

The targeted permits were as follows:

1. a permit to operate drones and tethered drones, this is a RO3 permit based on the 2020 rules for drones in Norway. The permit includes a provision for an approved airspace classified as “danger area” as a necessary barrier to other “nonparticipating air traffic”. This is relevant when operating close to an airport.

2. A temporary permit to build on the land

The permit work of a temporary permit suffered some unexpected implications:

Kitemill's test site at Lista is physically a large airport with the second longest runway in Norway. It has not been in commercial operation since 1996. The runway is on one of few non-commercial runways that can receive the largest passenger aircraft in operation today as the Airbus A380. The COVID-19 situation grounded a large part of the global passenger aircraft fleet, consequently 150 passenger planes are now planned landed and stored at the airport. In order to get the permit to do so, the airport owner applied for an extended operational status. The local municipality is responsible for issuing concession for the airport. The coordination between the airport related activity and Kitemill related activity has a high priority.

A project of building a large battery factory at Lista launched a new area plan for the airport area. The project involved the same area which is used by Kitemill and Sør Energi. The project periods is not in conflict as the battery factory will not be started until after the end of the kite operational period. A solution to this is predictable as the two projects have the same owners, the local land owner. In the local municipality perspective, this was not clear and the projects needed further coordination.

These projects came up during the application process and demanded special coordination between all parties and with the authorities. This caused delays in the permitting process and by 1<sup>st</sup> of October 2020 the permit process was still ongoing.

### **3 OPERATIONAL PERMIT BY CIVIL AVIATION AUTHORITIES**

There has been several stages of permit process since Kitemill got granted the first permit operating at Ørland Airport in Norway in 2009. The requirements has evolved leading to the present requirement to obtain a RO3 RPAS operating permit. From 2021 already new common rules issued by EASA will be implemented. This report focus on the present permit issued based on BSL A7-1.

#### **3.1 THE REGULATION OF DRONES**

From 1st of July 2019 the new EASA rules for operation of Unmanned Aerial Vehicles included "tethered drones" as a UAV for the first time. Consequently, the CAA's standing point that tethered kites is its own category was changed and Kitemill was asked to meet the requirements for BSL A7-1 -the regulation of drones.

This regulation was divided into four categories. The first was remotely operated aircrafts for recreational use. The three next ones are for commercial use whereas Kitemill and Sør Energi's

operation falls under the last and most demanding category; drones which has a maximum take-off mass (MTOM) of more than 25kg.

The regulation sets requirements for the following categories:

- Organization, quality system, operational manual, airworthiness, different types of operation, about test programs, maintenance, marking of aircraft, requirements for pilots and pilots in command, operation within and beyond visual line of sight, loss of control and lights/flying in the dark.

### 3.2 APPROVED OPERATIONS

We limit the presentation to the tethered aircraft specific part of the permit work. Based on the current technology status the operational scope is limited to:

- VLOS operation over controlled ground area
- in Airspace at an airport in class G airspace.

The VLOS operation requires an operator/pilot to be present watching the entire operation. Further the ground area needs to be controlled free of people. The ground area is currently defined as the area under the kites in operation and a buffer zone which equals the height of the operation, “the 1:1 rule”.

### 3.3 APPROVED DANGER AREA

The interaction with other air traffic at Lista is regulated by a NOTAM (notice to airmen) activated danger area. The danger area is a defined airspace which limits the operation of the kites including the buffer zone. The use of a “danger area” is a risk mitigation method to protect nonparticipating air traffic from the activity. Aircraft are not forbidden to fly into the area, but they are warned about the activity in the area by NOTAM activations which are routinely read by pilots before flights.

The “danger area” has been a requirement by the CAA since before tethered aircraft was included in the drone regulations. It would not be necessary in all situation to have such a measure to operate according to the BSL A7-1. But as Kitemill operates at an airport the measure is both necessary and beneficial.

As the risk of a traffic conflict with manned aircraft is more pronounced than elsewhere, additional strategical measures have been established to inform the nonparticipating air traffic by addressing the operation in Kitemill’s web, at the airport’s web page, handbook and operational manual as well as informing the local aircraft club directly when a NOTAM is activated.

### 3.4 AIRWORTHINESS

At the current operational level, Kitemill shall have documentation of the system design, control system, type of components, technical safety systems and completed test programs that show that the system can carry out the relevant type of operation. To fly, the system has to pass a test program approved by the CAA. An approved test program would not be necessary for a customer's permit to operate as the customer only would operate systems tested and qualified by Kitemill.

In order to comply with the requirements of airworthiness a maintenance program was established for the system.

### 3.5 AUDITED

In September 2020 Kitemill was audited by the CAA. The CAA had three findings:

- a. *Organisation – Kitemill had not informed CAA about a change in the organisation when engaging the new QHSE Manager. (This requirement was fulfilled shortly after the meeting).*
- b. *To many non-conformity and incident reports (NC&I) was open and Kitemill should have a better system to isolate operational related NC&I reports from NC&I reports about technology development. In general, the reports lack classification.*
- c. *Risk evaluation of operational conditions before operation was not adequately documented and it does not tell if the risk regarding non-participating air traffic is sufficiently analysed. It is not a clear separation between operational risk and risk in technology development.*

In its audit summary the CAA also gave comments, considered favourable to Kitemill. Here is a translation of the summary:

*The Civil Aviation Authority was well received for inspection at Kitemill AS at Lista Airport. The operator gave a good impression of an open and learning culture that has made several improvements in recent years. There are good conditions in the company to put in place a better follow-up of non-conformities and incidents and a general improvement of the quality system. Although the operator apparently has a good reporting culture, it is recommended to make an assessment regarding the closure of parts of the deviation system, which deals with operational incidents.*

*The Civil Aviation Authority has the impression of a forward-leaning operator who has also begun work on familiarizing themselves with the work on a new risk analysis method in connection with forthcoming common European regulations. The Norwegian Civil Aviation Authority encourages*

*maintaining a focus on safety in the organization and operations, especially with a view to future growth and an increase in the number of employees.*

### **3.6 FUTURE SCOPE OF OPERATION**

While the initial permit is sufficient for first stage operation of the Sør Energi plants. Further goal is to reduce the number of personnel necessary to operate. The current permit is not cost efficient for operation of 5 plants. To comply to the final financial targets for the Sør Energi project at Lista the scope of operation needs to include Beyond Visual Line of Sight (BVLOS) operation over sparsely populated area. This will be implemented when higher technology and organizational level has been reached, following risk assessment and approval from CAA.

## **4 TEMPORARY BUILD PERMIT BY THE LOCAL MUNICIPALITY**

The process with the local municipality has lasted since 2017. The following topics has been addressed either unmotivated by Kitemill or by question from the municipality:

1. Coordination with the land owner which has been the airport
2. Safety and compliance to work environment act and machine directive
3. Risk for the surroundings (air risk and ground risk)
4. Audible noise
5. Visual impact
6. Birdlife
7. Other animals

As none of these questions came up later Kitemill reckoned that the answers was sufficient.

During the process with the local municipality the following questions has been answered:

air risk and ground risk, the local municipality required a consequence analysis of the kite operation specifically for the local birdlife. This was raised already in 2017 when Kitemill got granted its first build permit. An office translation to English of the bird study is included as attachment 1.

Furthermore, the neighbours have been informed formally as a part of the process. In this process only those who has property which boarder to the property where the ground system is planned located has been involved.

Based on dialogue with technical manager of the local municipality Kitemill filed a simplified application which describe the actual plan of building.

#### 4.1 GROUND RISK HANDLING

Important clarification the local authorities brought up if the area under the operation should be regulated as “danger areas” (in an area plan) to prevent other conflicting activities. Further, Kitemill recommends the local authority not to do so, as the ground risk requirements will evolve with the technology and organizational level for Kitemill. Here it also occurred an opportunity to clarify the responsibility between the local municipality and the CAA and explain how we use Jarus SORA to mitigate ground risks and further how the CAA control these requirements in the future.

It is likely that the question arise as the local municipality assessed the risk for this activity to prevent other activities at the area.

#### 4.2 COORDINATION WITH OTHER ACTIVITIES

The question above was an indication of the underlying problem of coordination between activities at Lista. The local municipality already had conflicting applications. The first was about storage of a high number of aircrafts related to the COVID-19. The second was about a battery factory planned in the area.

Prior to responding on this, meetings were held with the landowners and their sub-organizations/advisors planning the parallel activities. It had already been a dialog however, rapid development on each project and there was a need to coordinate further. New agreements with the landowners ensures necessary freedom to operate and removes further risk of coordination issues.

The municipality expect to make a decision in a technical committee’s meeting during October 2020.