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# Wind Turbine Inspection Report

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## End of Warranty

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**Report Number:** MECHV\_REP-100-854

**Report Date:** 23/09/2020


**Client:** Oriel Wind Farm Ltd.  
**Location:** Oriel Wind Farm, Creggan, Co. Tyrone  
**Asset:** Turbine T12 - Nordex N90 2500 HS Gamma  
**Serial #:** 84752

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LOCATION:	Creggan, Co. Tyrone	REPORT NUMBER:	MECHV_REP-100-854	REV:	1.0	 MECH-V
ASSET:	TURBINE T12	PREPARED BY:	S. O'KEEFFE			
ASSET DESCRIPTION:	NORDEX N90 2500 HS GAMMA	REVIEWED BY:	R. FOLEY			
SERIAL NUMBER:	84752	CLIENT NAME:	Oriel Wind Farm Ltd.			
ASSET DESIGNATION:	#ORL =G012	INSPECTION DATE:	22/09/2020			

## 1.0 - Inspection Details

### 1.1 - Client

Name	Oriel Wind Farm Ltd.
Address	Unit 5a, Blackstaff Rd, Belfast
Contact Person	John McNulty

### 1.2 - Inspection Scope

Objective	WTG End of Warranty inspection for condition assessment, detection of defects, damages or safety concerns.
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### 1.3 - Inspection Details

Inspection Date	22/09/2020
Time of Inspection	10:00 – 12:00
Environment	12 °C Dry overcast. Wind Speed: 9ms-1 AVG
Inspector	Stephen O'Keeffe
Report Author	Stephen O'Keeffe
Report Checked	Robert Foley
Report Number	MECHV_REP-100-854
Support	Tony Lawson (Technician)

### 1.4 - Asset Details

Asset	Turbine T12
Model	Nordex N90 2500 HS Gamma
Rated Power	2500 kW
Asset Serial #	84752
Commission Year	2018
Production/Run Hrs	14052 hrs 17520 MWh
Tower Type	Steel Tubular
Hub Height	65m
Location	Creggan, Co. Tyrone (54.71602, -6.85780)



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## 2.0 - Classification

### 2.1 - Defect Classification

Defect Severity	P#	Description	Recommended Action
Critical	P1	Extreme Danger - Immediate risk to life or asset if not remedied	Stop WTG right away. Immediate action required
High	P2	Danger - Potential risk to life or asset if not remedied	Significant defect. Immediate action
Medium	P3	Caution - Recommend attention	Take action / monitor
Low	P4	Minor Non-Conformance or information only	Monitor

### 2.2 - Further Classification

Defect Class	C#	Description
Operational	O	Defect or observation primarily affects operation or performance
Safety	S	Defect or observation primarily affects safety of persons
Environmental	E	Defect or observation primarily affects the environment


## 3.0 - Summary

### 3.1 - Report Summary

With the exception of the defects noted in the table below the WTG appears to be well maintained and in good working order. The primary finding of note is the failed blade bolt on Blade A. There are also some items which require maintenance attention therefore it is recommended that these be discussed with the O&M service provider.


### 3.2 - Defect Summary

P1	• None to report
P2	• Failed blade bolt. Recommend immediate follow up with O&M service provider to investigate (ID#11).
P3	<ul style="list-style-type: none"> <li>• Missing record of lift certification (ID#3)</li> <li>• Gear oil particle counter not operational (ID#7)</li> <li>• Slow gear oil leak from gearbox (ID#8)</li> <li>• Grease escaping from blade bearings (ID#9)</li> </ul>
P4	• See individual entries.

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## 4.0 - Observations / Findings

ID#	Severity	P#	C#	Description	Location
1	Low	P4	O	Minor surface corrosion on bolts at external stairs. Foundation anchor bolts also require additional anti-corrosion measures to be applied.	Tower Exterior
2	Low	P4	O	Converter cooling system pressure low. Maintenance attention required or WTG may potentially fault.	Control Deck
3	Medium	P3	S	There is no record of lift certification. Previous record is out of date. All other WTG's inspected at this site had valid lift certification records from Mar-2020. Confirm with service provider that this has also been inspected.	Lift
4	Low	P4	O	Power cables are rubbing at the cable loop and the insulation is being rubbed into a powder. This is generally to be expected. Observation only. Monitor any further wear.	Tower Interior
5	Low	P4	O	One of the yaw brake calipers appears to be sticking. Screeching noise could be observed from the exterior of the WTG. Unknown which exact caliper is not releasing fully. Does not affect yaw function but is an audible nuisance.	Yaw Deck
6	Low	P4	S	Damaged safety signage at yaw deck. Recommend replacement.	Yaw Deck
7	Medium	P3	O	Gear oil particle counter not commissioned. No active data recording. This device provides a protective condition monitoring function for the gearbox and should be active at all times.	Nacelle
8	Medium	P3	E	Oil leaking from gearbox seal on planetary stage 1 rotor side housing cover. Leak is slow and long-term.	Nacelle
9	Medium	P3	E	All blade bearings are losing excessive grease through their outer seals. This has been observed on other WTG's inspected at this site.	Blade
10	Low	P4	S	Missing certification tag on hub fall arrest anchor point. Note all other anchor points have tags attached and are in date. This must have just fallen off due to weathering.	Hub
11	High	P2	O	Failed blade bolt on Blade A. Recommend follow up with the O&M service provider to determine root cause and if there are any other cases. All other visible blade bolts were checked and they are present. Drone survey can be used to check other WTG blade bolts if desired.	Blade
12	Low	P4	O	Cup anemometer is missing one of its cups. This may affect data logging and WTG operation if this anemometer is being used. The default should be the ultrasonic anemometer which appears to be in good order.	Nacelle Roof

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ID#:	1	
Defect Severity:	Low	P4
Defect Class:	Operational	O

Discipline:	Mechanical
Defect Type:	Corrosion
Area:	Tower Exterior
Action:	Fix at next service

**Comments**

Minor surface corrosion on bolts at external stairs. Foundation anchor bolts also require additional anti-corrosion measures to be applied.

Object Designation:

#ORL =G012 UMD10



ID#:	2	
Defect Severity:	Low	P4
Defect Class:	Operational	O

Discipline:	Mechanical
Defect Type:	Maintenance
Area:	Control Deck
Action:	Fix promptly


**Comments**

Converter cooling system pressure low. Maintenance attention required or WTG may potentially fault.

Object Designation:

#ORL =G012 MSE40



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ID#:	3	
Defect Severity:	Medium	P3
Defect Class:	Safety	S

Discipline:	HSSE
Defect Type:	No Certification
Area:	Lift
Action:	Fix immediately

**Comments**

There is no record of lift certification. Previous record is out of date. All other WTG's inspected at this site had valid lift certification records from Mar-2020. Confirm with service provider that this has also been inspected.

Object Designation:



#ORL =G012 XMM21

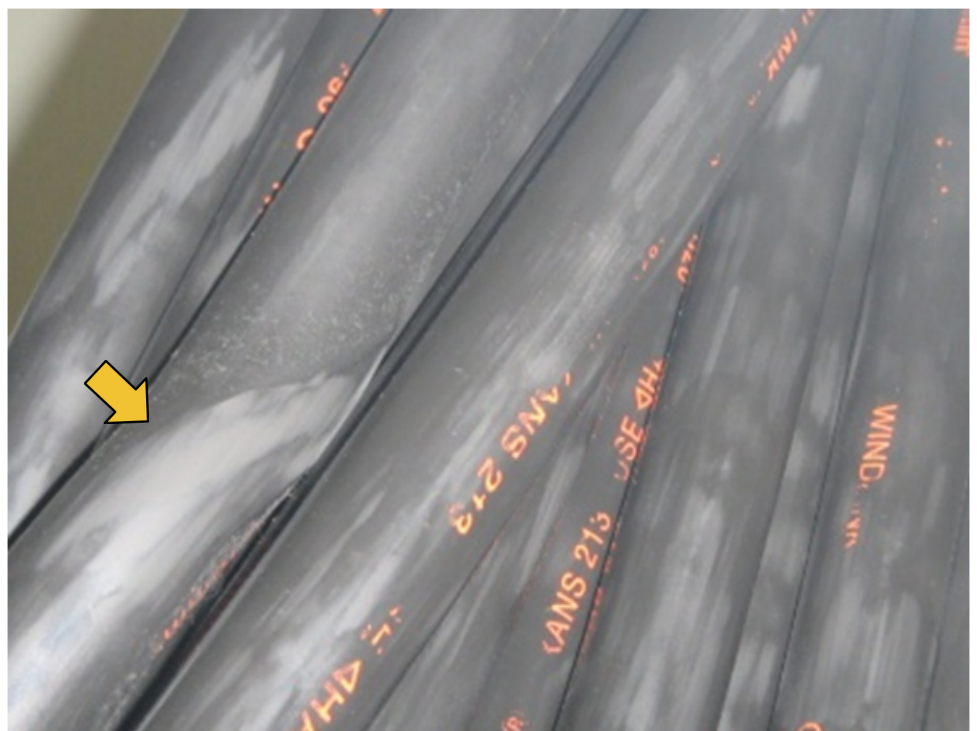
ID#:	4	
Defect Severity:	Low	P4
Defect Class:	Operational	O

Discipline:	Electrical
Defect Type:	Normal Wear
Area:	Tower Interior
Action:	Monitor

**Comments**


Power cables are rubbing at the cable loop and the insulation is being rubbed into a powder. This is generally to be expected. Observation only. Monitor any further wear.

Object Designation:



#ORL =G012 MKA11 GA001 -WB\_\_



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ASSET DESIGNATION:	#ORL =G012	INSPECTION DATE:	22/09/2020			

ID#:	5	
Defect Severity:	Low	P4
Defect Class:	Operational	O

Discipline:	Mechanical
Defect Type:	Out of Adjustment
Area:	Yaw Deck
Action:	Fix promptly

**Comments**

One of the yaw brake calipers appears to be sticking. Screeching noise could be observed from the exterior of the WTG. Unknown which exact caliper is not releasing fully. Does not affect yaw function but is an audible nuisance.

Object Designation:



#ORL =G012 MDL20 QL0\_\_ -MM001

ID#:	6	
Defect Severity:	Low	P4
Defect Class:	Safety	S

Discipline:	HSSE
Defect Type:	Damaged
Area:	Yaw Deck
Action:	Fix at next service


**Comments**

Damaged safety signage at yaw deck. Recommend replacement.

Object Designation:



#ORL =G012 UMD10 PH\_\_

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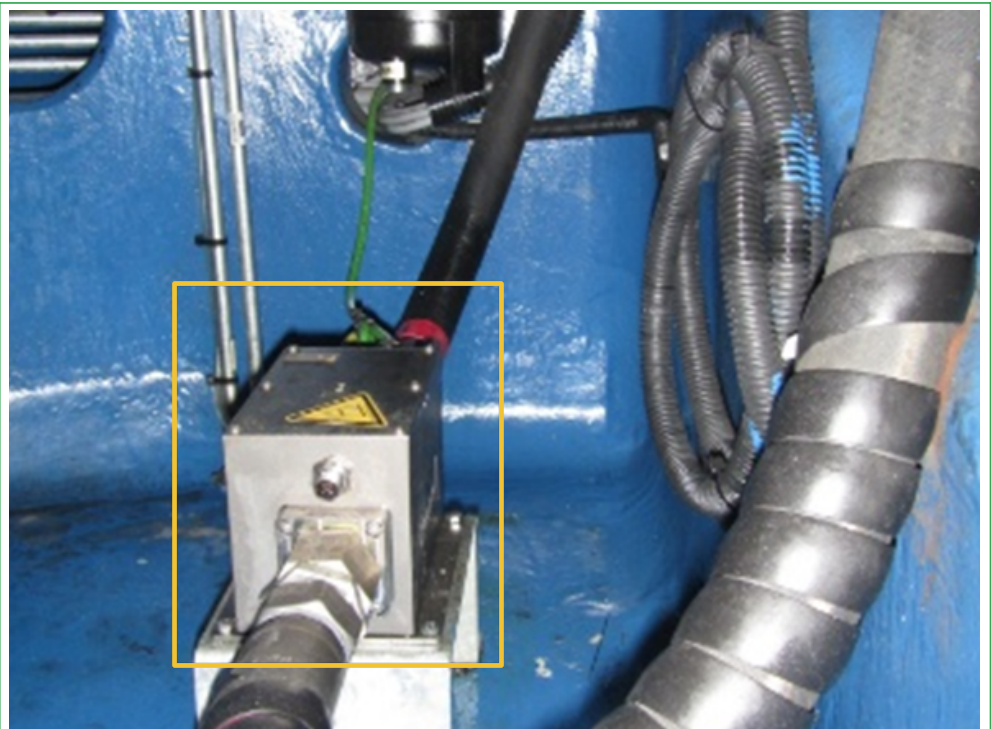
ID#:	7	
Defect Severity:	Medium	P3
Defect Class:	Operational	O

Discipline:	Mechanical
Defect Type:	Unfinished
Area:	Nacelle
Action:	Fix promptly

**Comments**

Gear oil particle counter not commissioned. No active data recording. This device provides a protective condition monitoring function for the gearbox and should be active at all times.

Object Designation:



#ORL =G012 MDK52 BQ001

ID#:	8	
Defect Severity:	Medium	P3
Defect Class:	Environmental	E

Discipline:	Environmental
Defect Type:	Leaking
Area:	Nacelle
Action:	Fix at next service

**Comments**


Oil leaking from gearbox seal on planetary stage 1 rotor side housing cover. Leak is slow and long-term.

Object Designation:



#ORL =G012 MDK20 TL001 -QQ101



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ID#:	9	
Defect Severity:	Medium	P3
Defect Class:	Environmental	E

Discipline:	Environmental
Defect Type:	Leaking
Area:	Blade
Action:	Consult OEM

**Comments**

All blade bearings are losing excessive grease through their outer seals. This has been observed on other WTG's inspected at this site.

Object Designation:

#ORL =G012 MDA1\_UP001



ID#:	10	
Defect Severity:	Low	P4
Defect Class:	Safety	S

Discipline:	HSSE
Defect Type:	Missing
Area:	Hub
Action:	Fix at next service


**Comments**

Missing certification tag on hub fall arrest anchor point. Note all other anchor points have tags attached and are in date. This must have just fallen off due to weathering.

Object Designation:

#ORL =G012 MDA20 FQ001



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ID#:	11	
Defect Severity:	High	P2
Defect Class:	Operational	O

Discipline:	Mechanical
Defect Type:	Failed
Area:	Blade
Action:	Fix immediately

**Comments**

Failed blade bolt on Blade A. Recommend follow up with the O&M service provider to determine root cause and if there are any other cases. All other visible blade bolts were checked and they are present. Drone survey can be used to check other WTG blade bolts if desired.

Object Designation:



#ORL =G012 MDA11 UP001 - XN\_\_

ID#:	12	
Defect Severity:	Low	P4
Defect Class:	Operational	O

Discipline:	Mechanical
Defect Type:	Damaged
Area:	Nacelle Roof
Action:	Fix promptly

**Comments**

Cup anemometer is missing one of its cups. This may affect data logging and WTG operation if this anemometer is being used. The default should be the ultrasonic anemometer which appears to be in good order.

Object Designation:

