

Wind Farm **Restricted Area** **Training**

If you need
help with this
training
contact your
Woolnorth
contact

Welcome to Woolnorth Renewables' Health, Safety
& Environment Induction

The objectives of this training are to provide an overview on...

Health & Safety
requirements

Expected risks
& hazards

Our
expectations of
you

Woolnorth's Health, Safety & Environmental System

Our HSE system consists of a Health and Safety Policy, an Environmental Policy, guidelines on risk management and a collection of specific procedures and documents for managing the HSE hazards associated with operating our wind farms, balance of plant, transmission lines and other assets.

To complete this Restricted Area Training you will need to access Woolnorth's HSE system. This can be done at the following website -

<https://www.woolnorthrenewables.com.au/health-safety-environment>

**Please open
this website
NOW!**



HSE Training Requirements for Working on Woolnorth Sites

When you first come to site you can enter as an
Escorted Visitor



We'll then get you set up with a
Contract (Purchase Order) and some other admin onboarding e.g. insurances, qualifications & work plans



All sites have a site induction to allow you to work as an
Accompanied Worker



Your specific training requirements may be tailored by your Woolnorth contact/manager depending on the activities and a risk assessment

To be an
Unaccompanied Worker

you'll need to complete our...

General Induction



Health, Safety & Environmental Induction



All HSE training is valid for
2 years

You may also need our...

Isolation Training



Permit To Work Training



Restricted Area Training

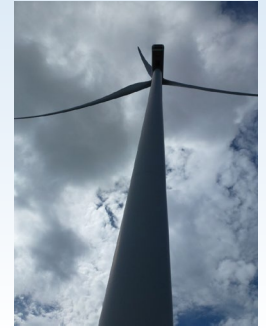


You Are Here

Wind Farm **Restricted Areas**

Woolnorth has a number of areas that are defined as Restricted Areas. These are,

- Within wind turbine generators, including the drop zone defined during work activities under wind turbines,
- Within areas containing high voltage equipment such as switch rooms and switch yards,
- Within the safe approach distance of transmission lines
- Temporary hazardous areas defined by the Site Supervisor or their delegate, such as Permitted work sites or excavated underground cable pits.



Delineation of Restricted Areas

Not all Restricted Areas will be delineated or signposted, however, when they are the signs below provide examples of those used.



These signs are for your awareness of the hazards and risks that can be encountered in restricted areas.



Working in Restricted Areas

For anyone to enter a Woolnorth Restricted Area they must be there for either of two reasons, to work on behalf of Woolnorth or as an escorted visitor.

Working in Restricted Areas

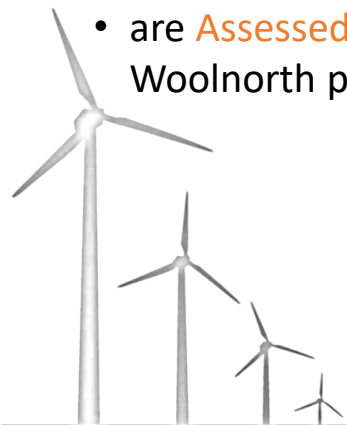
Particular care is taken when selecting personnel to work in any of Woolnorth's Restricted Areas. This process should include confirming they,

- are **Qualified** to a suitable industry-recognised standard
- have **Demonstrated Experience** in their area of expertise, and,
- are **Assessed as Competent** through supervision by authorised Woolnorth personnel.



Accessing Restricted Areas

Access to all Restricted Areas shall be via authorisation only.



Risks Management in Restricted Areas

As discussed in the HSE Induction, risk management is mandatory for any work in a Woolnorth work site. Woolnorth adopts the use of Take 5s, Job Hazard Analyses (JHAs) and Safe Work Method Statements (SWMS) for low, moderate and high-risk tasks respectively.

In Restricted Areas, however, legislation dictates (High risk construction work) that a SWMS (or equivalents) are used for **ALL** work regardless of the risk ranking. SWMS's are a written descriptions of how work is to be completed safely i.e. a set of instructions without the risk assessment. A JHA on the other hand focussing on core job steps, hazards and controls with risk assessments for each.

Documents that are equivalent to SWMS's may include Woolnorth procedures, work instructions, project plans or machinery maintenance instructions. You may need to discuss this topic with your Woolnorth contact. For simple tasks within a wind turbine, however, the details of your work are likely to be covered by the Access & Working in Wind Turbine Generators Procedure and the work instruction for the task. The appropriate approach to documenting risk management in this case would be to have a JHA that references and attaches this Procedure and the Work Instruction.

Whichever strategy you adopted for your risk management, the key focus of the document/s is that they reflect what you are doing on the day and the hazards you are faced with at your work site on that day...and in the case of a Restricted Area, it must be in sufficient detail to describe the work, hazards and controls.



Looking at Each Restricted Area

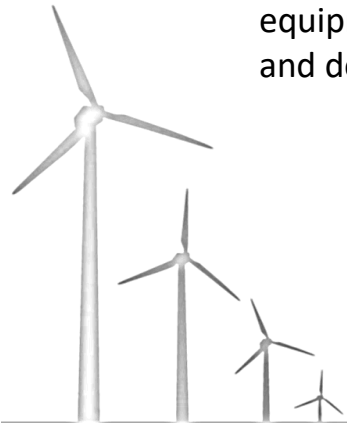
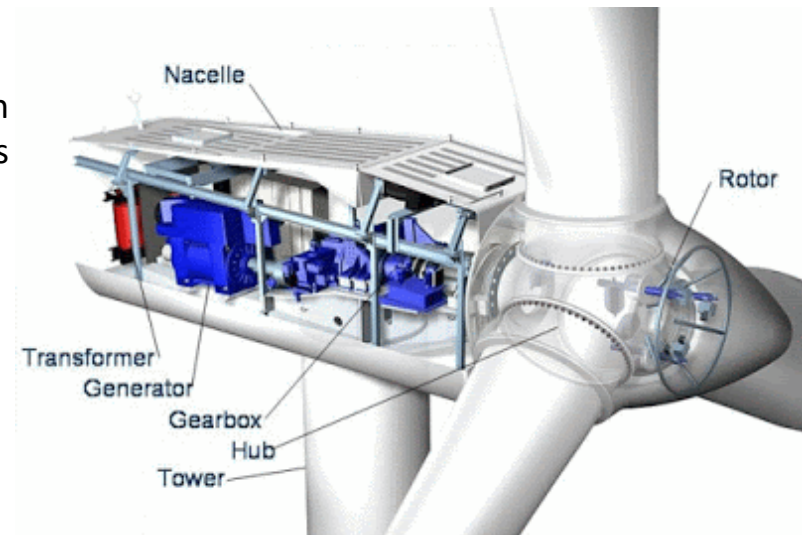
The following slides provide the details on working within each of our restricted areas, including their specific hazards, their controls and basic technical training to help prepare you for working in these areas.



Wind Turbines

All turbines found on Woolnorth's wind farms are either Vestas V66 or V90 models. The key attributes of the wind turbines are:

- V66 turbines have a rotor diameter of 66m, tower height approximately 60m.
- V90 turbines have a rotor diameter of 90m, tower height approximately 80m.
- Access is via a vertical access ladder or personnel lift.
- Main components are the tower, nacelle, rotor, hub, 3 blades. Within the nacelle is a gearbox, generator, transformers, electrical reticulation and control equipment and hydraulic reticulation and control equipment.
- Wind turbines are equipped with an internal chain hoist for bringing equipment into and out of the nacelle.
- Wind turbine are equipped with emergency evacuation equipment, fire extinguishers, various emergency stops and defined height safety anchor points.



Wind Turbine Access Requirements

The details on working within and around Woolnorth's wind turbines are provided in our Accessing & Working in Wind Turbine Generators Procedure. This procedure covers the general access requirements but also operational training requirements, use of the personnel lifts, internal hoist, specific areas of the nacelle, external activities such as roof and blade work, and emergency procedures. The details outlined in this procedure need to be thoroughly understood prior to work starting within our turbines.

General access requirements for wind turbines are as follows -

- Activities must be authorised and have specific documentation
- For vertical access, a minimum of 2 personnel are required, both must hold a current Work Safely at Heights competency and preferably a Wind Tower Rescue training. A member of the work party must be competent in the evacuation procedures.
- Personal climbing equipment required include helmet with chin-strap, fall arrest traveller, climbing harness (fitted with suspension trauma straps), twin tail access lanyard with scaffold hooks - spare karabiners.
- Consider carrying a battery powered head torch or hand held torch (with wrist strap).

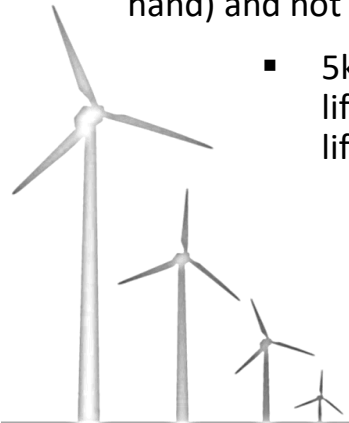


Access Requirements Cont.

- When entering a turbine check the SF6 gauge on the Ring Main Unit (RMU) to ensure it is in the normal operations range (In Green)
- If the indicator gauge is in the red section (or falls during access), all personnel shall immediately exit the area and notify the Woolnorth Site Supervisor
- Your site contact will arrange for, or train you in the process of, pausing the turbine you are about to ascend.
- To operate the lift you must be trained and authorised. A pre-start check of the lift is required as outlined in the Access procedure
- A pre-climb check must be conducted to ensure there are no loose items such as keys, phones, radios, pens, etc. that may fall or be dislodged during the climb
- Any equipment that is to be carried by a climber is to be secured in a closed tool bucket/bag (attached to the climber's harness not carried in hand) and not exceed:
 - 5kg in combined weight from the tower base to the top lift platform; and 10kg in combined weight from the top lift platform to the nacelle)



Normal (In Green) Abnormal (Do Not Enter)



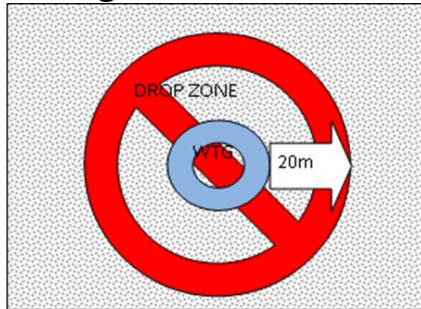
Wind Turbine Hazards – Drop Zone Management

One of the primary hazards associated with working in and around wind turbines is the potential for the dropping of tools, equipment and parts that then cause death or injury to personnel below.

This risk SHALL be managed, and in accordance with the Woolnorth Drop Zone Management protocols outlined in the Accessing & Working in Wind Turbine Generators Procedure.

Important – Your work party shall ensure your drop zone is adequately demarcated

Minimum Drop Zone Management area – 20m



Depending on the wind direction and strength, the drop zone may be extended from the minimum 20m to manage the risks



Exclusion Zone – No Entry without positive communication & stop work

Drop Zone Hazards Around Wind Turbines

[Link to Siemens drop zone movie](#)



Wind Turbine Hazards

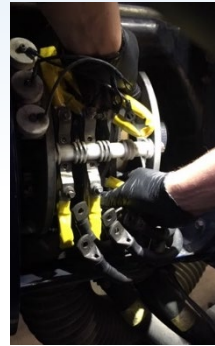
Working in Nacelle -

Greasy uneven footings leading to slips and falls, cramped and awkward conditions, heavy lifting leading to body strains, hot conditions



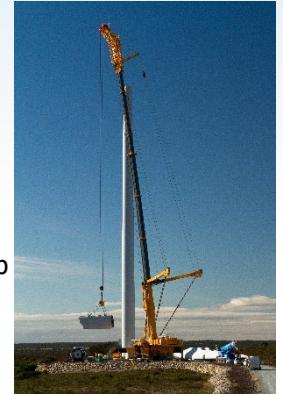
Working on & around electrical infrastructure (LV & HV)

Electric shock, fire, arc flash, restricted emergency egress



Working around heavy machinery

Crush injuries, difficult communication, drop zone, unusual lifts/loads



Weather conditions – High wind and lightening restricting tasks or access

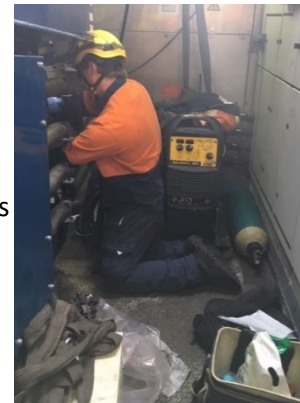
Working at Heights

Fall from heights, suspension trauma, drop zone hazards, restricted access



Other hazards

Multiple tasks
Job specific hazards
Mechanical and pressure energy
EMFs



NB. To climb a wind turbine you need to have Working at Heights training and Wind Turbine Rescue training – discuss this with your manager.

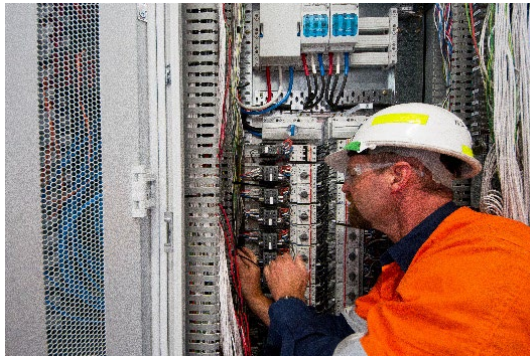
NB. The key Woolnorth procedure (SWMS) for managing the risks of working in a wind turbine is the Access & Working in Wind Turbine Generators Procedure – go to woolnorthrenewables.com.au/health-safety-environment for access to the document.

Switchroom Hazards

The switchrooms of our wind farms contain high voltage equipment. This equipment is typically enclosed within cabinetry (and further shielded and insulated), making the “walk-through” hazards for these areas minimal. Switchrooms are in secure parts of our control buildings and are normally kept in a door closed and locked state.

Hazards escalate considerably once work on this equipment begins, as these physical protections are typically removed. The key hazards typically associated with working in switchrooms are,

- Electrocution from contacting live high voltage equipment, causing death or serious injury.
- Arc-flash explosion, causing death or serious injury.



Electrocution Hazards in Switchrooms

Electrocution results from contact with live equipment providing an alternative path to earth i.e. via a persons body. The primary impacts on the body include stopping of the beating of the heart, burns and cellular damage. The primary control for managing the risk of electrocution and arc-flash while working in our switch rooms is isolation i.e. the nearest isolation point “up-stream” and “down-stream” from the point of work is put in place as well as operational and work earths utilised where necessary. Such isolations are coupled with a permit to work system and usually documented (SOPO). **Specific training is required for personnel to work under these control systems.**



Arc-Flash Hazards

Arc-flash is an explosion that results from electrical current passing through air and not its intended path. Arc-flash explosions produce extreme amounts of heat, light and debris and cause death or serious injury through severe trauma, burns and lacerations. The causes of arc-flash are complex and typically a result of equipment failure, human error or inadvertent access.

The WNH Q39 Arc Flash Procedure is an important document for restricted area workers to become familiar with to help reduce the likelihood of arc flash accruing and eliminate the risk of an injury resulting from arc flash should it occur. The procedure identifies the PPE requirements for different plant and associated activities being conducted on that plant.

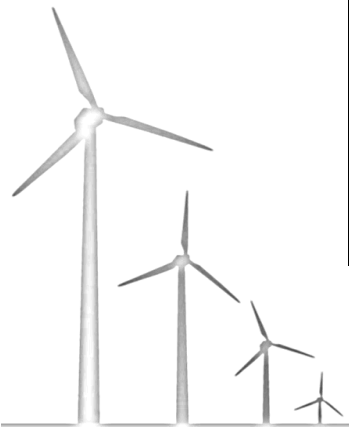
Arc flash labelling and warning signage is located at points of risk on Woolnorth Renewables sites. This labelling also identifies the PPE requirements for the specific plant.

 		
ARC FLASH AND SHOCK HAZARD		
22 kV RMU (Tower Base)		
Shock Hazard Exposure	22 kV	
Incident Energy @ 450 mm	2.9 cal/cm ²	
Arc Flash Boundary	0.8 m	
ACTIVITY	Minimum PPE Category	
	Normal	After fault
Operating HV Switchgear	CAT 2	CAT 2
Working in close proximity to switchboard	CAT 0	CAT 0

Example Arc Flash label.



Arc-Flash Hazards



Switchyard Hazards

The switchyards of our wind farms contain high voltage equipment. Switchyards are securely fenced with access gates normally in a locked state. A lot of the live HV components are enclosed within cabinets or suitably insulated, however in many cases there is no form of physical protection. The “walk-through” hazards of this work environment are therefore high. No one is to enter a switchyard for any purpose without the authorisation of the site supervisor.

The key hazards typically associated with working in switchyards are,

- Electrocution - from contacting live high voltage equipment, causing death or serious injury (the majority of deaths in switchyards have occurred from carrying long metallic objects such as lengths of steel, ladders, scaffold and retractable metal tape measures).
- Arc-flash explosion - causing death or serious injury.

In addition, the switchyards present a range of complex risk factors due to the fact that work is often done during major outages. In these cases, numerous jobs are raised for completion during a small amount of time, making the work site busy and complex. There is often working at height risks, heavy plant and equipment, bulk hydrocarbon and other job specific hazards.



Switchyards Hazards

Complex work sites

Switchyard work often involves multiple jobs being managed at one time – increased chances of incidents



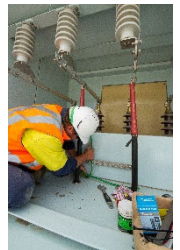
Working at Heights

Fall from heights, suspension trauma, drop zone hazards, dropping of objects causing damage



Working on & around HV electrical infrastructure

Electric shock, arc-flash explosion



Business Risks

Such work typically involves whole site outages – poor planning or incidents would increase financial losses of outage



Other hazards

Large quantities of hydrocarbons
Multi-stepped with loose surfaces
Mechanical and pressure energy



Switchyards Arc-Flash

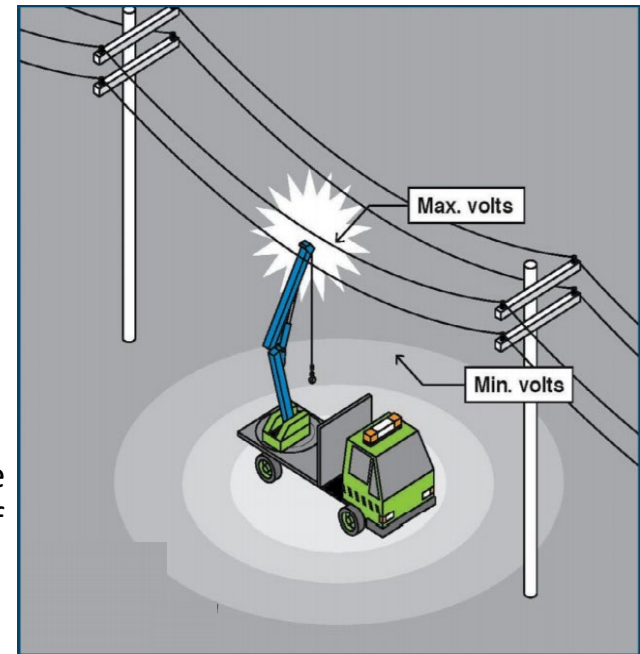


Transmission Line Hazards

All our wind farm transmission lines are 110kV monopole constructions owned by Woolnorth Renewables (not TasNetworks). The environments that they pass through are complex and varied. Access for work can be heavily restricted due to weather, driving conditions and farming operations. The primary hazard associated with transmission lines is electrocution from tall machinery coming close to or contacting the conductors. If you are in a machine that touches a transmission line, you **MUST NOT MOVE** unless necessary (i.e. it is on fire). A gradient is developed in electrical potential from the contact point of the machine down and through the ground. If part of this gradient is bridged by two different parts of your body such as by stepping down off the machine or walking across the ground, there is a high likelihood of electrocution.

- If you are in a machine that is in contact with a power supply, you **STAY** in the machine unless necessary to move. Contact with the owner of the power supply must be sort to ensure it is turned off.
- If it is necessary to evacuate the machine, you must jump free (not touching any part) and land with feet together.
- To move further away from the machine, you must shuffle your feet in a toe to heel manner for at least 10m.

All work that has the potential to contact or come close to transmission line conductors must reference minimum Safe Approach Distances specific to their task and the voltage of the relevant infrastructure - see Working On & Around Electrical Infrastructure (WNH Q32)



Example of Overheads Hazards



Other Transmission Line Hazards

Working in remote and variable conditions

Poor emergency response, bogging of vehicles, farm hazards, snakes, uneven terrain, working alone or in areas of poor communication



Working on & around HV electrical infrastructure

Electric shock, arc flash, induction, fire



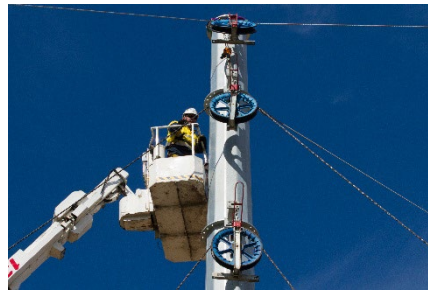
Working around heavy machinery

Crush injuries



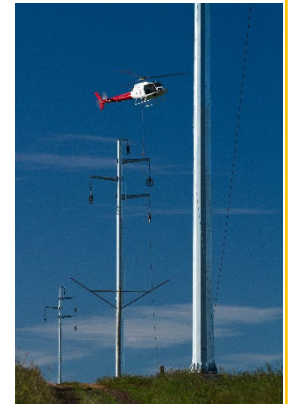
Working at Heights

Fall from heights, suspension trauma, drop zone hazards



Numerous different tasks being performed

Job specific hazards



Temporary Restricted Areas

Temporary Restricted Areas are defined by the site supervisor in response to high-risk work being conducted outside of the wind farms pre-defined Restricted Areas. These may include –

- Excavated pits for work on underground high voltage cables
- Asbestos removal from farm buildings
- Major civil projects
- Work sites being investigated following major incident

Unrecognised hazards due to unique or new circumstances

Increase likelihood of incident, less prepared for incident and emergency response



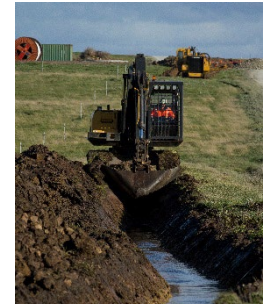
Temporary Restricted areas shall be suitably demarcated to prevent inadvertent or unwanted access

Working with new personnel at short notice

Poor coordination and emergency response



Job Specific Hazards



Final Notes

If you are in doubt about our expectations of you when working on any of our Hazardous Areas, ask your Woolnorth contact, the Site Supervisor or review the following procedures,

Accessing & Working in Wind Turbine Generators Procedure

Working On or Around Electrical Infrastructure

Working in Hazardous Environments Procedure

Well done, you have completed our Restricted Area Training. Once you have authorisation from the site supervisor you will be able to work unaccompanied for us in our Restricted Areas.

Remember, Woolnorth Renewables are committed to having a safe and healthy workplace. If you are working for us, or alongside us, you have a duty or care to support us achieving this.

We're looking forward to working with you.

