**Table 2-2 Typical Project Activities**

| Site Preparation and Construction | |
|---|---|
| Surveying | Activities include staking the boundaries of the construction area, temporary workspace, substation site, and trenches for the underground collector lines, as well as marking the location of any existing underground pipelines and cables. |
| Development of access roads and parking lot | Access roads will be surveyed and staked/flagged. Roads on the wind farm site will be a maximum of 12 m wide during construction to accommodate maintenance vehicles and equipment for repairs/replacements. In special cases if difficult turns are required, roads may be made wider than 12 m. Construction roads will be designed to accommodate the crane types that will be required to erect the wind turbine generators and towers. Roads will be constructed by placing a layer of geogrid on the native soil, followed by layers of compacted shale or sandstone with a screened stone topping. The thickness of the layers will be in accordance with the geotechnical report's recommendations for Project road construction. The roads will generally follow the routing of the existing sod farm roads, with new roads added as required.<br><br>There may be a requirement for a parking lot associated with the maintenance building. It is anticipated that the parking lot will be near turbines 19 and 20 in the northwest corner of the site. Preliminary design indicates the parking lot would be approximately 380 $m^2$. |
| Ditching and culverts | Existing ditching will be improved and new ditches and culverts installed as required to provide proper drainage of roads and farm fields. The river crossing to the turbines on the western side of the LaPlanche River will be by a land bridge constructed in a similar fashion as the old existing aboiteau that is approximately 1 km upstream and the new aboiteau, approximately 1 km downstream. |
| Clearing | Almost all of the land has been cleared previously and is presently in use for agricultural purposes. The primary crop is sod, which will be harvested as much as possible, immediately prior to road construction and turbine pad construction at the discretion of the landowner. All roads will be built on top of the topsoil. A layer of geogrid will be rolled out on the surface and the rock or gravel road material would be placed in layers on the geogrid to make the road. Crane pads at turbines will be approximately 60 m by 60 m, located no closer than 30 m to a watercourse. A much smaller pad for service and maintenance vehicles will remain. |
| Sod harvesting, soil removal and stockpiling | The marsh soils are typically poorly developed, fine textured soils with an organically enriched surface layer. As such, there will not be any "topsoil" stripping. Rather the crop (sod) will be harvested and roads and pads will be constructed of rock fill on the underlying soil (as discussed above). Geotextile fabrics will be used as per geotechnical report findings and recommendations. |
| Grading | Existing grades will be maintained in most areas except for the additional material necessary for road and pad construction. |

**Table 2-2 Typical Project Activities**

| Site Preparation and Construction | |
|---|---|
| Ploughing and trenching for underground distribution lines | Underground 12 kV electrical collection cables will be installed from each turbine, following the access roadway locations to the substation. A combination of ploughing and/or trenching may be used, depending on terrain. Typically, trenching is only done over short distances and where manoeuvrability of the ploughing equipment is difficult.<br><br>A cat-mounted plough mechanism, which essentially cuts a narrow furrow behind the cat, may be used to install the underground collection cables. Cables will be buried at a minimum of 1 m with the final design being confirmed as the project proceeds. The distribution lines will be lowered-in and the plough seam will be backfilled immediately to prevent soil loss and erosion. It is anticipated that this may be the predominant method used, due to the favourable characteristics of the soft marsh soils to this type of installation methodology. This type of operation minimizes disturbance, due to the one-pass operation and absence of open trenches.<br><br>In cases where trenching is appropriate, trenching will be performed using backhoes or excavators with narrow buckets. Basically an open trench is excavated, the cables laid, and the trench backfilled. The fine-grained marsh soils will be very suitable for this.<br><br>Where the underground cable must be spliced (*e.g.,* at the end of a reel or to pass underneath another utility cable) a splice pit will be required. At these locations, the soil will be excavated and placed in a pile immediately adjacent to the excavation. After the procedure is complete, the soil is placed back in the trench and the surface is smoothed. |
| Piling and foundation excavation | The turbine foundations will be determined by the final geotechnical report and structural engineering at each turbine site, as is necessary to properly support the loads. Based on preliminary geotechnical investigations at the site, the foundations will likely be a combination of gravity base spread footing foundations, steel pipe or H-piles (this remains to be determined) driven to suitable bearing strata, and/or expanded base concrete piles. The foundation footprint would be approximately 15 m in diameter and 2 to 3 m deep, located no closer than 30 m to a watercourse. Some of the excavated soil material will be stockpiled near the excavation for backfill and restoration purposes. The surplus material will be turned over to the farmer for his sod farming operation. Arrangements will be made for the future use of some of this material for site restoration during decommissioning. The substation area will consist of a raised pad approximately 6000 $m^2$ as described above, some excavation will be necessary. |
| Pouring turbine foundation | For excavated foundations, after excavation and piling installation, foundation forms and rebar will be installed. Approximately 235 $m^3$ of concrete will be poured into the pile cap forms continuously. Forms will be removed after the concrete is cured and the excavated area is back-filled and compacted such that only the tower base portion of the foundation is above ground. |
| Equipment lay-down and turbine assembly | To create a safe and level work area for storing and assembling the wind turbine generators and towers, an area of approximately 100 m x 250 m may have to have the sod harvested and the surface levelled, depending on the local conditions. Each of the turbines and generators will be trucked on a flat-deck trailer to the site and assembled within an area of approximately 60 m x 50 m. |
| Tower, generator, and rotor assembly | The tower will be transported in three or four sections that will be assembled on site. The blade system, consisting of 3 blades and a hub, will also be assembled on site, attached to the generator and lifted into place at the top of the tower by a crane. |
| Transmission lines/connection to grid, etc | It is anticipated that the 12 kV electrical collection system will consist of approximately 18.5 km of electrical cables buried underground between turbines, distributing power from each turbine to the substation. Approximately 200 m of pole-mounted 138 kV distribution line will be installed to link the substation to the existing transmission line. It is possible that this section will be underground; it is also possible that other areas will be above ground. |
| Installation of substation equipment and maintenance building | Substation equipment will be installed within a 100 m x 50 m fenced yard that will be surfaced with gravel. There will be a maintenance building constructed near turbines 19 and 20 in the northwest corner of the site. It is estimated that the maintenance building would be approximately 2100 $m^2$. |

**Table 2-2 Typical Project Activities**

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| **Site Preparation and Construction** | |
| Clean-up and reclamation | Garbage and debris will be removed and disposed of at an approved location. All equipment and vehicles will be removed from the construction area. The temporary lay-down areas and disturbed areas around the foundation of each turbine and at the substation will be replaced with the previously excavated and stockpiled topsoil. The disturbed areas (including trenches/plough seams) will be re-seeded. High voltage signage will be installed at the substation and elsewhere, as necessary. |
| Turbine commissioning | Turbine commissioning can occur once the wind turbines have been fully installed and when the Transmission Administrator is ready to accept grid interconnection. Commissioning involves testing and inspection of electrical, mechanical, and communications operability. A detailed set of operating instructions must be followed in order to connect with the electrical grid. |
| **Operations and Maintenance** | |
| Access and inspection | Maintenance inspections will be required approximately every 3 months for routine servicing. Light 4 x 4 trucks, vehicles, and ATVs may be used to access the towers. Larger trucks and cranes may be required periodically for larger repairs, but this is expected to occur infrequently.<br><br>In addition, throughout the course of the year, access to the turbines as part of regular non-scheduled maintenance activities will be required for resetting faults, minor component replacement and related activities.<br><br>New and used lubricants, cleaning supplies and other controlled substances will be delivered, stored, handled and disposed of according to local regulations. |
| **Decommissioning and Abandonment** | |
| Rotor, generator and tower disassembly | The rotor, generator and towers would be disassembled using a crane and removed from the site for re-use, reconditioning or disposal using a flatbed truck. |
| Access roads | Since the access roads improve the farmers' operations, and, moreover, road removal can actually impair farm operations, it is anticipated the farmers will want the roads left in place. |
| Removal of concrete foundation | The foundations will be removed to a depth of approximately 1 m below original ground level and filled with subsoil to rebuild the grade. Piling and most of the concrete foundation can remain in place. Stockpiled topsoil will be placed over the area to approximate depth of adjacent ground and the area seeded and left for cultivation or grazing, depending on the land use at the time and the preference of the landowner**.** |
| Decommissioning of distribution lines | The distribution lines will be terminated and capped off but will remain buried in the ground. |

The turbine nacelles (which house the gearbox and the generator) and hubs will likely follow one of the following routes:

*Option A* - From Bilbao, Spain: the parts will be delivered via ship to port in St. John, NB and then trucked to Amherst, NS; or

*Option B* – From West Branch, Iowa, USA: the parts will be delivered via St. Lawrence Seaway to port in St. John, NB and then trucked to Amherst, NS.

It is planned that the parts will then be trucked along Provincial Route 1E and TransCanada Highway E to Amherst, NS (approximately 217 km).

The turbine blades will likely be trucked from Gaspe, Quebec along Provincial secondary Route 132, Provincial Route 11, and TransCanada Highway 104 E to Amherst, NS.

It is anticipated that the turbine towers will likely be trucked from Ft. Erie, Ontario to Amherst, NS, via one of the following routes:

*Option A* – Truck within Canada (approximately 1,749 km)

1. QEW
2. 427 N
3. 401 E / AutoRoute 20 E
4. Provincial Secondary Route 185 S / TransCanada Highway 104 E; or

*Option B* – Truck in both Canada and United States (approximately 1,661 km)

1. QEW through Peace Bridge to United States
2. I-90 E
3. I-495 N / I-95 N
4. I-295 N / I-95 N / I-95 E (Cross into Canada)
5. TransCanada Highway 104 E

Approvals for transporting these materials will be sought from the provincial transportation departments. As the turbine components are oversized, a Special Move Permit and any associated approvals will be obtained through the Department of Transportation and Infrastructure Renewal for heavy load transport.

While not a phase of Project development, potential accidents and malfunctions have also been described in this section, as they could occur during any Project phase. Accidents and malfunctions could include:

- ice throw;
- tower failure (*i.e.,* resulting from extreme wind conditions or faulty equipment);
- lightning strike;
- hazardous material spill (*e.g.,* resulting during construction when there are vehicles on the site);
- fire (*e.g.,* during construction when most activity involving people occurs).

### 2.6.1 Construction Phase

Construction will be scheduled around the critical life-cycle periods for wildlife and will be located away from sensitive features. In addition, silt fencing will be erected if required to help prevent erosion of bare lands caused by construction activities.

For construction near watercourses, sediment control measures will be put in place for the duration of construction in that area. These control measures include the installation of silt fences and straw bales, and the storage of construction materials and equipment at least 30 m away from a watercourse, with the exception of the culvert installation and upgrades to the access road over the old aboiteau structure.

The culvert installation across LaPlanche River will be conducted in the dry. Further details of culvert installation are included in Appendix B. Flow monitoring was attempted in the river, however due to unsafe conditions in the river for field personnel (*i.e.,* very soft unconsolidated bottom sediments),

attempts to access the river were abandoned. Flow modelling is being undertaken to confirm assumptions regarding the river and watershed characteristics utilized in the design of the culvert. Should the model determine that larger flows than assumed are possible; the culvert size will be modified to ensure it can handle maximum predicted flows in the river.

Existing agricultural activities will continue during the operation of the wind farm. Information and warning signs will be erected adjacent to the wind farm at the start of construction, to provide public information about the facility and to discourage trespassing on private lands. This signage will be maintained and updated as necessary.

Equipment on site during construction could include hydraulic fluid, brake fluid, transmission fluid, and oil from the wind turbine generator. Any refilling activities will take place in designated areas.

### 2.6.2 Operation and Maintenance Activities

Activities associated with the operation and maintenance of the Amherst Wind Energy Project will not be as extensive as during the construction phase. Maintenance inspections are required approximately every three months for routine servicing and lubricant replacement. Light-duty 4x4 trucks, vehicles, and ATVs may be used to access the wind turbines. Larger trucks and cranes may be required infrequently for larger repairs.

The water source for the Project will come from the existing ditching on the site that is currently used for the drainage of roads and farm fields. This ditching will be improved and new ditches and culverts installed as required.

Wind energy facilities do not use or produce harmful waste products. There is no need for concern about residual toxic chemicals or exhaust products. Aside from normal recovery of lubricants from the gearbox and yaw mechanism, operation activities are not required for waste. Lubricants will not contain any PCBs. New and used lubricants, cleaning supplies and other controlled substances will be delivered, stored, handled and disposed of according to local regulations.

Throughout the course of any year, access to the turbines as part of regular non-scheduled maintenance activities will be required for resetting faults, minor component replacement and related activities.

### 2.6.3 Decommissioning

Decommissioning and abandonment activities associated with the Amherst Wind Energy Project include:

- rotor, generator and tower disassembly;
- removal of access roadways;
- removal of concrete foundation; and
- removal of distribution lines.

Well-designed and constructed wind energy facilities may be operated for decades. Individual wind turbines are expected to perform for up to 35 years without significant repair or replacement. Transformer facilities, underground wiring and substation facilities are designed for at least a 50 year life span. Individual wind turbines may be replaced or repaired as their useful life comes to an end, or if more efficient and cost-effective technology becomes available.

Upon a decision to decommission a single wind turbine or the entire wind farm, all equipment above ground, including towers, nacelles, transformers and controllers will be removed. Wind turbines that are

operational and have market value would be carefully removed using a crane, essentially in a reverse process to assembly and installation. The resale value of such equipment would cover the cost of removal in such a case. A market for good, used wind turbines has developed in North America, and a number of wind turbines installed in Alberta in the early 1990s originated from the U.S. used wind turbine market.

Wind turbines that are no longer operational may also be removed by crane, but with less attention to preserving individual components, labelling them and storing them. Inoperative wind turbines have high salvage value. Steel and copper components are easily recycled, and there is a ready market for such materials. The remaining materials are primarily fibreglass and plastic. These may be sold to recycling facilities, or crushed and deposited in landfill sites. Experience in the U.S. with decommissioning of wind turbines has shown that the salvage value of wind turbines typically exceeds the costs of decommissioning (Gipe 1995).

Other above-ground equipment in the wind farm, including transformers and wiring, has a ready market in either used equipment sales or in salvage. Transformers will be simply removed and sold. Wiring will be removed and sold to metal salvage companies.

Wind turbine foundations are composed of ferro-concrete. Where foundations must be removed, standard demolition practices will be employed to remove the foundations to a depth that is well below active agricultural activity or depths with potential for future erosion and exposure. Resulting material will be removed for appropriate disposal. Similarly, underground cabling will be removed to suitable depths.

As discussed above, wind energy facilities do not use or produce harmful waste products and therefore aside from normal recovery of lubricants from the gearbox and yaw mechanism, there are no requirements for harmful waste handling during decommissioning.

Wind energy facilities removed from agricultural lands usually require minimal remediation, as planting of the next crop or re-seeding of pasture will remove any sign of the facility. Where necessary, topsoil and re-grading of access roads in the fields will occur as per the landowner's preference.

All decommissioning activities will be conducted in accordance with applicable regulations at that time.

### 2.6.4 Future Phases of Project

At the present time Acciona does not intend to expand the Amherst Wind Energy Project.