# Kyoto energypark

## 3. Project Development Phases

# 3.0 PROJECT DEVELOPMENT PHASES

## 3.1 Construction

### 3.1.1 Stages of Construction

The construction phase of the proposed development would be undertaken in a single stage for all works over an estimated 20 months duration. The sequence of construction activities can be described as follows:

**Mountain Station Works**

In general works proposed for the Mountain Station site shall constitute the following activities:

- site establishment;
- transport of personnel and materials to the site by road;
- access track construction, turbine hardstand pads and trenching for underground cables;
- installation of underground power and control cabling;
- turbine foundation construction;
- delivery and erection of 31 turbine structures on Mountain Station;
- construction of a Solar Photovoltaic (PV) Plant of up to 10MW capacity on Mt Moobi Plateau;
- site substation construction and installation;
- construction of the overhead 66kV(Option1) or 132kV (Option2) external transmission line connection to the local electricity grid;
- connection of the site substation to the external grid connection;
- installation of a temporary site depot and laydown area, including restoration and removal on completion of construction;
- delivery and installation of a concrete batching plant for concrete production and removal on completion;
- construction of the 1MW Mini Hydro Plant (Closed-loop);
- construction of a 10m x 40m (approximate) Maintenance building
- construction of a Manager's residence
- construction of a Visitor's and Education Centre on Mt Moobi
- Commissioning of the wind farm
- Decommissioning and restoration of the site

**Middlebrook Station works**

In general works proposed for the Middlebrook Station site shall constitute the following activities:

- Site earthworks including access track construction, turbine hardstand pads and trenching for underground cables;
- installation of underground power and control cabling;
- turbine foundation construction;
- delivery and erection of the turbine structures;
- 33kV overhead transmission line connection of the Middlebrook site to Mountain site substation via Bunnan Road;
- Construction of overhead communications lines for connection of Middlebrook Station turbines to Mountain station site substation.
- commissioning and testing of wind turbines
- Decommissioning, restoration of the site

### 3.1.2 Site Offices and Depot

A construction depot comprising site office facilities and a laydown area for storage of turbines components prior to erection, would be located on the Mountain Station site for use during the construction period. The proposed area is located in a cleared grassed area free of significant vegetation or vulnerable and threatened habitats. No trees or shrubs shall be removed for the site depot and laydown area.

The area has been inspected for indigenous artefacts and is not located within an area of heritage significance or near an item of heritage significance. The site depot would contain, approximately 4 demountable office spaces, storage tanks sized for amenities and emergency requirements, 2 pump out toilet blocks, a meeting room, an amenities and a first aid room and carparking area for construction staff and contractors. All buildings would be temporary and would be removed following completion of construction activities. A temporary 2 m high chain wire mesh fence would surround the site depot for safety and security. Night time lighting and security services would be provided during the construction period.

The adjacent laydown area would cover an approximate area of 1000m2 and be used to store turbine components prior to erection, cable drums, containers, workshops and machinery used on site. The site shall be maintained during he construction timeframe and fully removed and rehabilitated at the completion of construction works.

The proposed location of the site offices and depot are illustrated in Figure 3.0.

#### Laydown Area

A laydown area located at Mountain Station will allow temporary storage of turbine components, solar frames and modules and other components arriving to site prior to erection. The laydown area is also required for unpacking of containers, and used by various wind turbine and electrical technicians to install and prepare the nacelles, hubs and blades. Tower sections are generally taken directly to the turbine erection platform however in some cases may be stored at the laydown area until required.

The laydown area has been located adjacent to the site depot in an area that is cleared, shielded from excessive wind, flat, and ideally placed in between the site access point and turbine erection platforms.

The proposed location of the laydown area adjacent to the site depot is illustrated in Figure 3.0.

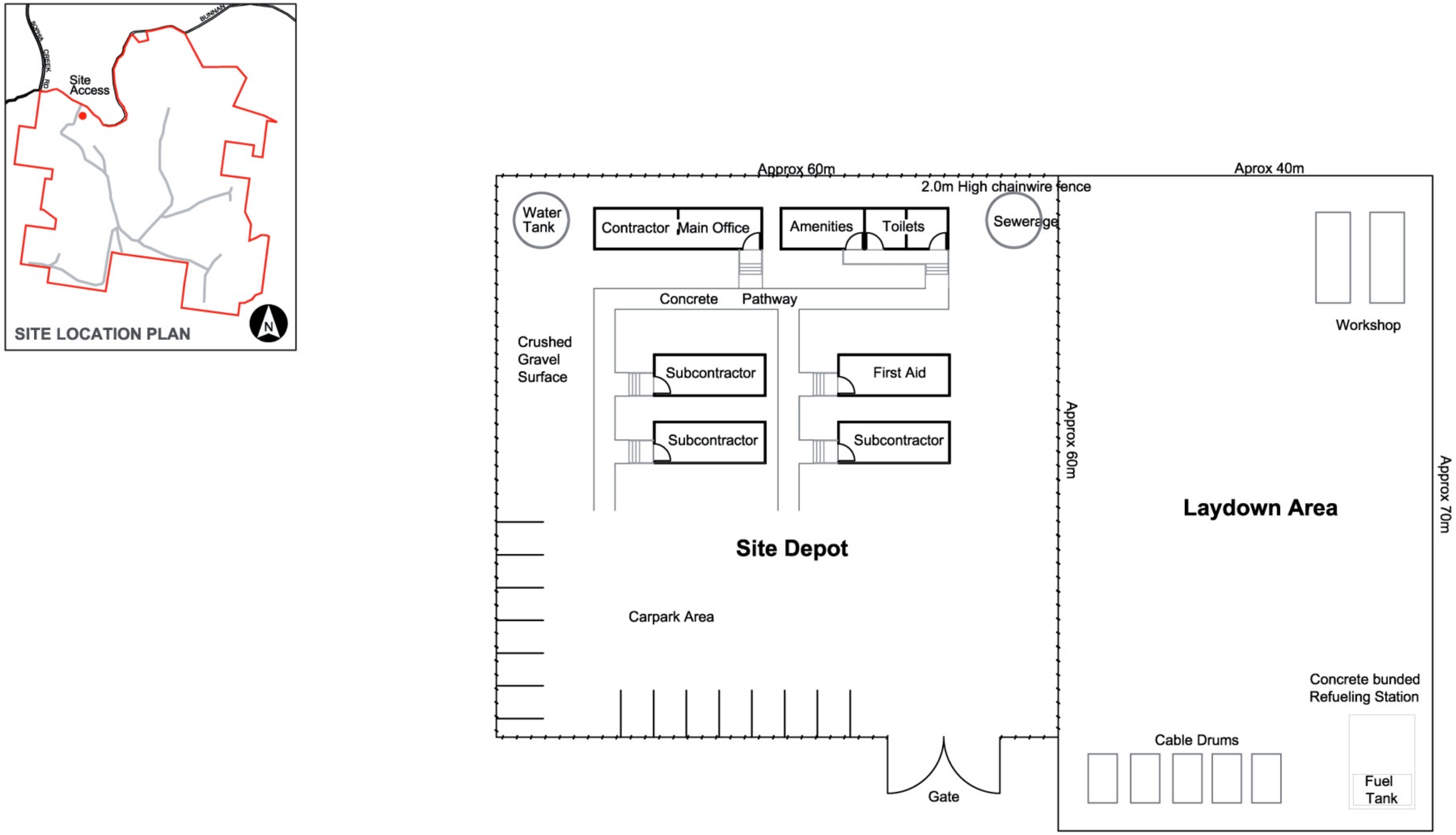
### 3.1.3 Concrete Batching Plant

During the construction process a concrete batching plant would be set up to supply high strength concrete for concrete works including wind turbine foundations, building slabs and solar frame foundations. The batching plant may also be used in other concrete works including in-situ concrete tanks for the mini hydro plant, concrete foundations for building pads and other minor works. The batching plant will reduce overall traffic generation especially during labour intensive periods around foundation works. Ready-mixed concrete would be used in some instances for smaller works. Ready mixed concrete would be sourced locally for smaller jobs such as building foundations or where the batching plant is not in use. Traffic estimates for the construction phase are summarised in Table 3.0. and have assumed that additional movements for building slabs and incidentals generated in relation to ready-mixed concrete for some works.

The concrete batching plant would be located at Mountain Station near the existing access road in a suitably flat area away from dry creeks of drainage depressions. The on-site batching plant will require a level area of up to 50m x 35m onsite to locate the loading bays, hoppers, cement and admixture silos, concrete truck loading hardstand, water tank, and bins for aggregate and clean sands. Depending on the final location, the site may include an in-ground water recycling first flush pit to prevent dirty water escaping onto the site, and would be fully remediated after the construction phase.

Sand and aggregate material will be sourced locally and trucked to the site to be stored in bins. Water for the batching plant will be stored on site in a rainwater tank and topped up from a water tanker delivering to the site.

The proposed location of the Concrete batching plant is illustrated in Figure 3.1 below.
Figure 3.2 shows the preliminary layout of the concrete batching plant and configuration.




**Site Offices and Laydown Area - Plan (N.T.S)**

Kyoto energypark ***Figure 3.0 - Site Offices and Laydown Area (Preliminary Design Layout)***



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*Figure 3.1 Proposed location of Concrete Batching Plant/Site Offices and Depot/Laydown Area*

### 3.1.4 Internal Access Tracks

Access to the site during construction would be via Bunnan Road for both sites. The existing tracks within the farm have been constructed for use by motorbikes, 4-wheel drive vehicles and occasional stock transport. Due to the volume and types of traffic expected during construction all tracks (new and existing) would have to be upgraded to a maximum 5m width. Lengths of existing and proposed new access road are provided in Table 3.6. Access track construction would involve grading and removal of topsoil (only on proposed tracks), placing and compacting of crushed rock road base, and the installation of drainage and sedimentation control works.

Access tracks would generally not exceed a grade of 10%, and would be limited to a maximum of 14%. Access tracks would include grassed swales along the edge of the tracks to capture stormwater run-off. Drainage discharge would be managed to minimise erosion. Any excess excavated material would be reused as fill wherever possible subject to geotechnical testing.

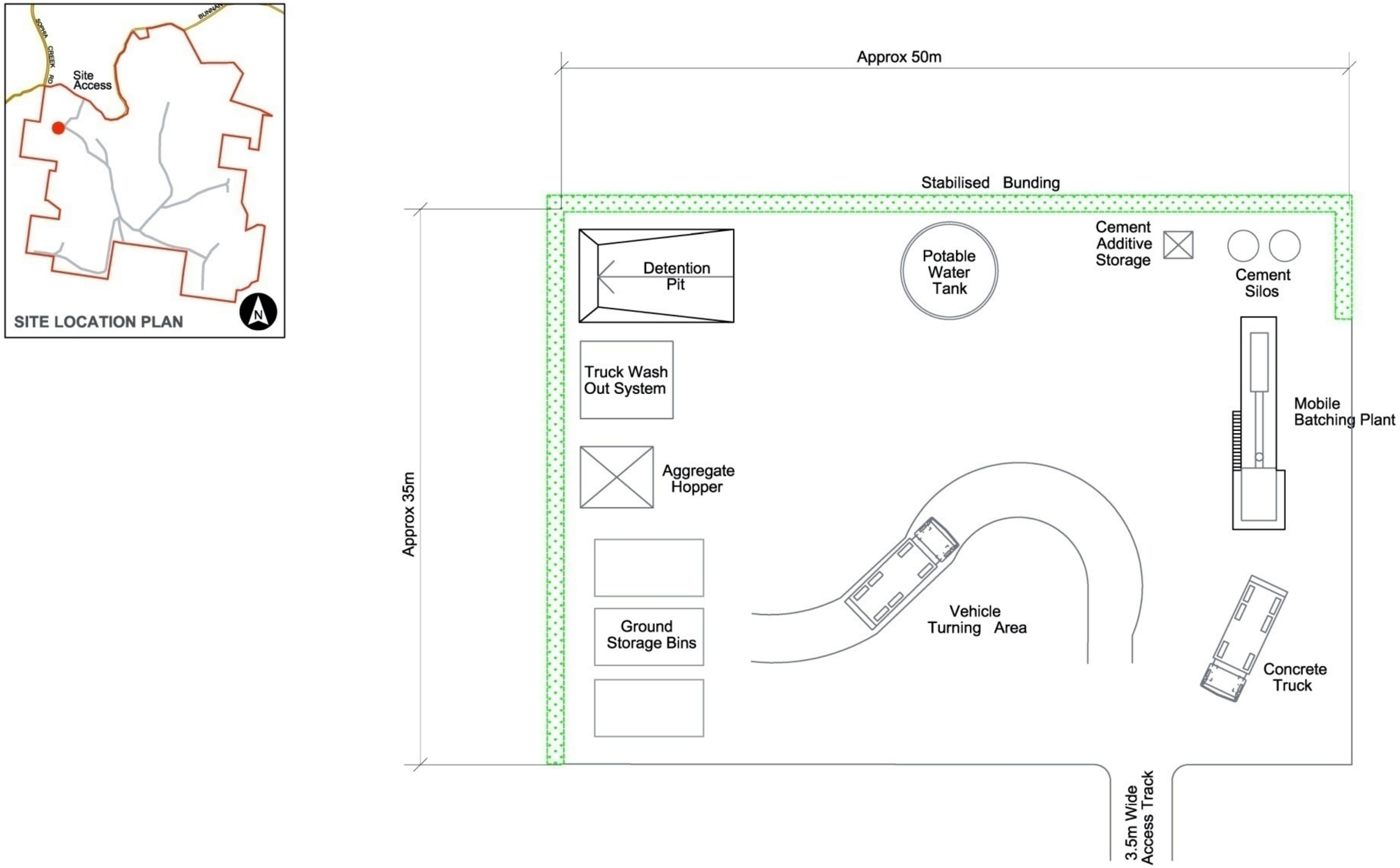
During construction, tracks would be required to enable the movement of heavy equipment such as cranes and heavy haulage of turbine components to turbine pads.

### 3.1.5 Crane Hard Stand Areas

A level lay down area adjacent to each turbine location would be constructed for crane use during turbine assembly. The hardstand pad shall be excavated to suitable subgrade depth material and replaced with road base material (if required) as a final surface. No concrete shall be used for the hardstand as the area shall be rehabilitated will be allowed to grass over upon completion of construction. Road base material would be transported to the site and used a compacted hardstand surface prior to erection.

Excavated subgrade would be stockpiled nearby or used for fill in track construction and earthworks. The 20 m x 30 m pad would be constructed at the same time as the access tracks. Turbine locations are mainly sited within cleared or predominantly cleared areas, however an additional 10m width around hardstand area has been allowed for in the Flora and Fauna assessment for possible vegetation clearance.

Figure 3.4 shows the general layout of the Crane Hardstand area for typical turbine construction.




**Concrete Batching Plant - Plan (N.T.S)**

| Kyoto energypark | *Figure 3.2 - Concrete Batching Plant (Preliminary Design Layout)* | This drawing is protected by copyright. Reproduction or publication of the whole or part of the drawing without a license of the owner of the copyright is an infringement of copyright. | pamada | A4 |
|---|---|---|---|---|

File path : Z:\01 Pamada\60 Kyoto\04 Design\EA Report\Figures\Concrete Batching Plant

### 3.1.6 Turbine Foundations

Excavation would be carried out by mechanical equipment. Once the foundation excavation is complete a concrete layer would be laid to provide a level working area for erecting the formwork and reinforcement. Steel reinforcing would be installed followed by placement of the lowest tower section. Concrete is then poured on top of the steel reinforcing in 450mm layers in a single pour.

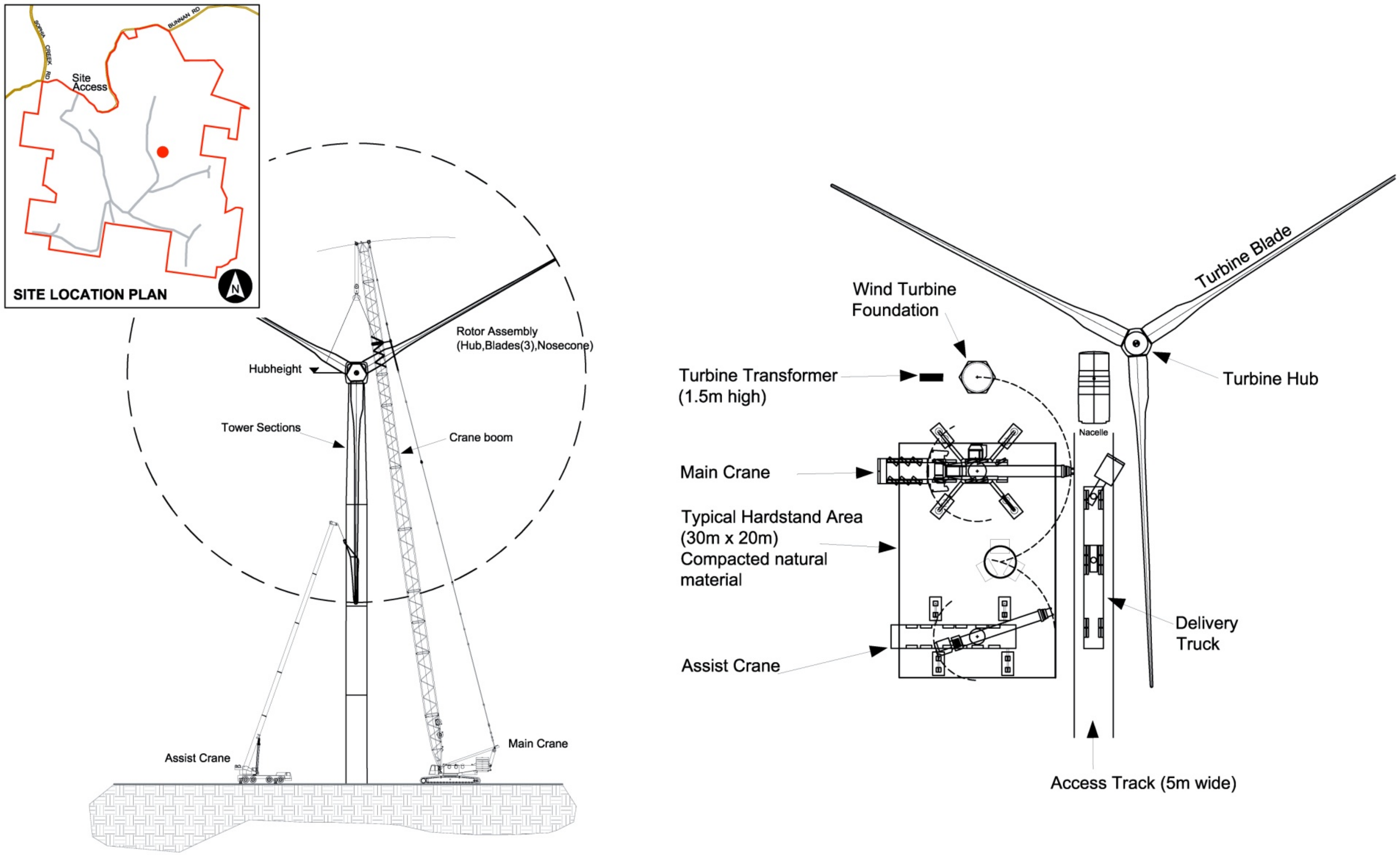
Any topsoil or rock excavated would be stockpiled adjacent to the turbine footing excavation and covered with geotextile material to limit dust generation and the loss of the material. Subject to geotechnical testing, the contractor would use excavated material to backfill the foundation footing and/or to prepare a level hard stand area for the crane pad. The area of disturbance around a turbine footing during excavation is generally 3-5 metres from the edge of the turbine footprint.

The final surface level of the turbine footing shall be buried below final ground surface level as shown in Figure 3.3. The area surrounding the footing shall be grassed with suitable locally grown grass species and maintained during the life of the turbine.

*Figure 3.3 Typical Concrete Wind Turbine Foundation*

#### On-site Surplus Excavated Material

Excavated material will be reused as much as possible to avoid the generation of surplus waste from site. Any soil or rock excavated to create access tracks or foundations would be re-used as compacted material, subject to further geotechnical testing. A requirement in the construction contract will be included to source construction materials from local sources wherever possible, including local material suppliers and contractors. All materials would be stored in dedicated storage areas, with appropriate protection installed to prevent any loss of material (e.g. dust generated from stockpiles or sediment in stormwater runoff).




Typical Wind turbine erection - Elevation (N.T.S)

Crane hardstand area and layout - Plan (N.T.S)

Kyoto energypark | *Figure 3.4 - Layout of Turbine Construction Site (Hardstand Area)*



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### 3.1.7 Substation Switchyard and Control Building

The proposal would require the establishment of a single substation at Mountain station for connection to the grid. Components of the substation design will include:

- Civil works
- Earthing
- Yard surface finishing
- Fence gate and electrical lighting
- 2 x transformers
- Substation control building
- Substation switch room
- Communication equipment
- SCADA/RTU control system
- Protection & controls
- Grid metering
- Auxiliary systems
- Cabling and terminations

An area of approximately 0.24 ha would be cleared and levelled by mechanical excavator, and a reinforced concrete slab would be constructed to provide the substation base. A concrete bund would be constructed to provide containment in the event of oil spillage from a transformer failure, together with an oil/water separator to remove traces of oil from stormwater collected in the bund. The substation would be enclosed within a concrete kerb and 2.5 m high chainlink fence, with the enclosed area finished with a layer of crushed rock. The substation would incorporate a range of electrical safety measures including an underground copper 'earth grid' and appropriate lightning protection.

The noise assessment identified a need for earth bunding constructed around the north western perimeter of the substation at a total height of 4m. This bund shall be constructed from suitable overburden and grassed.

Figure 2.15 shows preliminary layout and configuration of the proposed site substation. Final sizing and design of the substation components shall be undertaken prior to construction.

### 3.1.8 Turbine Transportation and Assembly

The Traffic and Transport Assessment (Appendix J) describes the proposed route and method of transport for the turbine components, and describes the impact of traffic generated as a result. The 105 m high turbine towers would be transported to the site in 5 parts. Each tower part would be approximately 20 m in length and between 29 to 63 tonne in weight per section. Delivery of turbine components would be scheduled so that they can be directly installed at each location where feasible, with minimal requirement for intermediate storage on site. A laydown area adjacent to the site depot has been proposed for turbine parts storage and installation. Towers and turbines would be assembled following completion of turbine foundations and in the following phases:

- ***Lift 1:*** assembly of tower (i.e. the lowest tower section is bolted to foundation stub which was installed as part of the foundation construction, then other sections are progressively bolted on);
- ***Lift 2:*** installation of nacelle on top of the completed tower;
- ***Lift 3:*** assembly of rotor (blades, hub and nose cone) at ground level;
- ***Lift 4:*** final assembly of turbine, with complete rotor lifted into position and attached to main shaft protruding from the nacelle

A large crane (main crane) and an additional small crane (assist crane) would be set-up on the crane pad, and would lift each tower section component into place followed by the nacelle and the rotor. The rotor would be assembled on the ground prior to positioning. Approximately one turbine can be lifted into place each day (weather permitting). Figure 3.5 shows the typical setup for lifting of turbine components at the crane hardstand area.

*Figure 3.5 Crane Erection of Tower Tube.*

Figure 3.4 shows the proposed dimensions of the crane hardstand area to be constructed adjacent to the turbine foundation for safe erection of turbine components.

### 3.1.9 Construction Activities Mt Moobi Solar PV Farm

Construction of a solar photovoltaic array of up to 10MW capacity is proposed on the Mt Moobi Plateau, Mountain Station. The final solar array will utilise between 15-21 hectares of relatively flat area and up to 1000 solar modules dependent on the final design mix and type of fixed structure used.

The components of the solar plant including solar panels, supporting structures, step-up substations and metering cubicles, tracker units and associated cabling. The construction of the PV plant would take approximately 6 months to install (not including transport and delivery). Main components including solar panels, supporting frames or trackers, transformers and cubicles would be prefabricated off site and installed on site. Construction activities for the plant would be limited to the Mt Moobi Plateau and involve the following:

- Installation of erosion and sedimentation structures;
- Minor cut/ fill and site preparation works;
- Installation of 33kV transformer(s);
- Underground trenches, marshalling areas, cabling;

- Construction of concrete foundations for tracker frames;
- Fitting and erection of frames and module supports;
- Installation of solar modules and inverters;
- Commissioning of Plant;
- Rehabilitation and Visual screening works

The anticipated operation timeframe for the Solar PV Plant is limited by life expectancy of the solar cells which is currently 25 years. After this time the plant would be replaced with more efficient cells or decommissioned as required. All components are recyclable.

### 3.1.10 Construction Activities Mini-hydro Plant

The preliminary design of the Mini Hydro Plant is contained within Section 2.4.6. Final design of the system shall be undertaken during the final design stage prior to construction. Construction of the mini hydro plant shall involve the following main activities:

- Install sediment and erosion control structures
- Clearing of vegetation as required around header and bottom tanks.
- Striping topsoil and stockpiling
- Construct 3.5 m wide access track to bottom tanks and hydro facility
- Excavation and preparation of sub-grade foundation for in-situ concrete tanks.
- Place formwork and pouring of header and bottom tanks and slabs.
- Installation of mini-hydro turbines and control plant facility
- Installation of pipework, fittings and valves.
- Electrical reticulation, control cables and step-up transformer
- Commissioning and testing
- Installation of top up water supply and storage tank.

The anticipated timeframe for completion of the mini hydro plant is 5 months duration as shown in Table 3.2.

The overall development footprint of the Mini-hydro plant is provided in Figure 2.13.

### 3.1.11 Internal Power Cables

Permanent underground cables shall be used internally to the site to interconnect turbine groups, the mini hydro plant and Solar PV plant to the proposed new substation on the Mountain station. Permanent underground electrical and fibre optic cables would be laid in trenches located immediately adjacent to the access tracks, alongside each turbine.

A mechanical excavator would excavate trenches 1.5-2.0m deep and 0.75 m wide. Power cables and control cables would be laid on a base layer of washed sand and covered with a layer of sand then backfilled with suitable soil. Mechanical protection and a marker strip would be installed. The trench would be backfilled and compacted back to surface level and grass reinstated to prevent erosion along the trench. Where trenches are located downslope, erosion prevention measures would be used to slow stormwater runoff and prevent erosion prior to grass establishment.

### 3.1.12 Construction Equipment

This assessment has estimated the construction equipment required to complete all project activities on site. Key construction machinery included below has also been used for the noise assessment modelling for construction activities under worst case conditions. Construction machinery will typically include;

- 30-40 tonne Excavator with rock breaker attachment;
- Mini Excavator for trenches;
- Grader;
- Bulldozer;
- 2 x 40 tonne articulated dump trucks;
- 2 x steel drum rollers;

- 1 x mobile concrete batch plant;
- Concrete trucks;
- Concrete pump;
- Front end loader,
- Drill rig for geotechnical work;
- Trucks (flat beds, semi-trailers, extendable trailer);
- Main and assist Cranes;
- Fork lift;
- various 4WD and service vehicles;
- Multi-tyred tractor;
- Mobile Rock Crusher

Machinery will not be in use all of the time during construction. Considerations of worst case conditions have been assessed for noise compliance by Wilkinson Murray in Appendix D.

### 3.1.13 Hours of Operation

Construction activities on the site would generally occur between **Mon to Fri (7am to 7pm)** and **Sat (7am to 1pm)** excluding Sundays and public holidays. Work activities outside these hours of general operations would be required to allow for the following exceptions:

- Deliveries of oversize and overmass components (including turbine towers, nacelles, blades and substation transformers). It may be necessary to transport these components outside general working hours to satisfy RTA special haulage permits (see Section 17.2). Haulage of these components would occur on back roads and at slow speeds with minimal disturbance to residencies within the area (*see Appendix J Traffic and Transport Impact Assessment*).
- Erection of turbine components by heavy lifting cranes would need to occur when wind conditions are calm enough to allow for conditions for safe erection at height. Therefore crane crews would generally be allocated over a 24 hour period during the wind turbine erection period to facilitate the safe and efficient erection of these components. Erection activities outside general working hours would only be required during exceptional circumstances. Activities are generally very quiet and would be well below noise exceedances criteria at nearest receivers as predicted in the Noise assessment (*see Appendix D – Noise Assessment Wilkinson Murray Section 7*).

### 3.1.14 Site Restoration

Rehabilitation of construction areas would be an on-going process following the completion of construction at each of the turbine locations across the site. In addition, cable trenches and areas around the site compound would be backfilled, restored and revegetated. Crane hard stand areas would be revegetated using soil cover and vegetable mulch with local grass seeds. Following completion of construction, drainage and landscaping works, all contractors' facilities, waste and surplus materials would be removed from the site. Ongoing maintenance of rehabilitated areas would be carried out to ensure land stabilisation when ground cover is established. Weed management would be an integral element of these rehabilitation works.

A detailed description and layout of the restoration works including timeframes will be prepared prior to construction and documented in the Vegetation Management Plan for the Kyoto Energy Park proposal.

### 3.1.15 Traffic Generation during Construction

Traffic movements have been split into truck and car movements. Estimated traffic movements for the construction period have been estimated and represented in Table 3.0. Truck movements would generally involve either special purpose vehicles (oversize and overmass components) and general truck deliveries for other components. Traffic movements would occur over a period of 20 months being the anticipated timeframe for the construction phase.

Turbine components arriving at the site will generally be delivered directly to turbine pad areas for assembly and final erection. A lay down area is proposed to allow for excess storage of turbine components, cable drums and other parts prior to final delivery to the turbine pads.

Between 20-70 construction employees would be required on site at any one time. Table 3.0 describes the likely vehicle types and movements involved in the construction process.

All services and materials supplied to site would be sourced externally. An option to source road based material from the existing road base quarry on Middlebrook Station has been included as an option in this report.

*Table 3.0 – Estimated Construction Vehicle Movements*

| Item | Quantity | One-Way vehicle movements | Sourced Internally/ Externally | Vehicle type |
|---|---|---|---|---|
| **Site Establishment** | | | | |
| Concrete Batching Plant | 8 | 8 | External | Semi-trailer |
| Site offices/depot | 13 | 13 | External | Truck |
| Delivery of civil plant/Cranes/machinery | 35 | 35 | External | Semi-trailer, Platform Truck, Truck |
| **Access Roads** | | | | |
| Aggregate from quarry | 11240m3 | 1613 | Internal/ External | Truck |
| Dust suppression (3 trucks per day) | 17ML | 1440 | External | 12t Water Tanker |
| **Turbine Foundations** | | | | |
| Concrete | 6300m3 | 1260 | Internal | Concrete Truck |
| Sand and aggregate | 4221m3 | 603 | External | Truck |
| Cement | 1584m3 | 287 | External | Cement tanker |
| Water | 1391m3 | 116 | External | 12t Water Tanker |
| Reinforcement steel | 950m3 | 101 | External | Semi-trailer |
| Steel Anchors | 880t | 45 | External | Semi-trailer |
| **Wind Turbine components** | | | | |
| Tower sections (x5) | 210 | 210 | External | Extendable trailer |
| Nacelles | 42 | 42 | External | Platform Truck |
| Blades (2 per truck) | 126 | 63 | External | Extendable trailer |
| Hubs | 42 | 42 | External | Semi-trailer |
| Nose Cones | 42 | 42 | External | Semi-trailer |
| Containers (20’/40’) | 105 | 105 | External | Truck |
| Transformers | 42 | 42 | External | Truck |
| **Site Substation** | | | | |
| Slab | 10m3 | 2 | External | Concrete Truck |
| Transformers | 2 | 2 | External | Platform Truck |
| Other components/fence | 8 | 8 | External | Truck |
| Control room/Other | 10 | 10 | External | Truck |
| Crushed rock | 150t | 10 | External | Truck |
| **Closed-loop hydro Plant** | | | | |
| Pipe delivery | 1500m | 15 | External | Truck |

| Item | Quantity | One-Way vehicle movements | Sourced Internally/ Externally | Vehicle type |
|---|---|---|---|---|
| Concreting Works | 160m3 | 32 | Internal | Concrete Truck |
| 200kW hydro units | 5 units | 2 | External | Truck |
| **Maintenance Shed** | 13 | 13 | External | Semi-trailer |
| **Managers residence** | 16 | 16 | External | Truck |
| **Visitor's/Education Center** | 25 | 25 | External | Truck |
| **Underground 33kV cables/control** | 18.136km | 66 | External | Semi-trailer |
| **66/33kV transmission** | | | | |
| Pole installation | 220 poles | 74 | External | Semi-trailer |
| Line work | 22km | 60 | External | Truck |
| **Solar PV Plant** | | | | |
| Solar Trackers/frames | 1000 trackers | 350 | External | Platform Truck |
| Solar Panels/Cables | 20 | 20 | External | Platform Truck |
| Concrete foundations | 2800m3 | 560 | Internal | Concrete Truck |
| Solar switchyard | 1 | 1 | External | Truck |
| Water | 616m3 | 51 | External | 12t Water Tanker |
| **General** | | | | |
| Site personnel | Av 10/day | 4803 | External | Car/4WD |
| General deliveries | 12/week | 880 | External | Truck |
| Waste disposal | 2/week | 147 | External | Truck |
| Site Disestablishment | 41 | 41 | External | Semi-trailer |
| **Total** | | **8452 Trucks**<br>**4803 Cars** | | |

### 3.1.16 Traffic Generation during Operations

Increases in traffic flows would occur from daily commuting of KEP management and staff, periodic maintenance and replacement parts, external consultants for environmental monitoring and replanting works, water tanker used for topping up, and traffic associated with tourism. Table 3.1 shows the estimates of operational traffic flows for each component. There would be very few intermittent daily traffic movements associated with the KEP facility.

The wind component of the park represents the greater proportion of ongoing employment. The closed loop hydro plant and solar PV plant will require operation and ongoing maintenance for the life of the plant. This maintenance will be minimal by the nature of the components and has been factored into the overall maintenance of the Park. The solar and hydro components will also be controlled within the existing control facilities of the Park and have the ability to be monitored offsite.

There would be employment associated with the manager's residence. These would include the Manager, any support/office staff and grounds keeping staff. The operation of the Visitor's and Education Centre may also employ a small number of staff.

Table 3.2 lists the basic maintenance requirements for the KEP. Much of the monthly and bi annual maintenance would be undertaken by KEP staff. Specialist maintenance crews would be used annually or during larger maintenance or component replacement jobs. Some larger replacement parts may require larger machinery to access the site however this would be on rare occasions.

External Consultants would be used mainly on a quarterly or yearly basis. Some offsetting and replanting works would require additional staff during early years of KEP operation which has been included in traffic estimates.

Additional water for amenities would be trucked to the site from an external registered bore located in Scone. Estimates for additional water usage have been included calculated and expected to be minimal over the yearly period.

Existing tourist accommodation is located at Middlebrook Station, off Middlebrook Rd.  Accommodation is currently accessed by large bus groups visiting the site and also by individual tourists. Existing tourist activities on both sites include round trips to Mountain Station and Mt Moobi lookout by the landowner. It is envisaged that these tourism activities will continue along the same route and merge with tourism potential for the proposed Visitors and Education Centre.

Intermittent traffic generated would also be from visits to the site from educational groups such as local schools, TAFE students, University or tourist groups and would be expected during the daytime only. These activities are expected to be in buses (individually or in groups) with an estimate of 3-4 bus trips per week included in the traffic estimate.

*Table 3.1 – Estimated Operational Vehicle Movements per annum*

| Item | Quantity | One-Way vehicle movements p.a | Sourced Internally/ Externally | Vehicle type |
|---|---|---|---|---|
| **Operations** | | | | |
| Local KEP Management and Staff | 4 | 1200 | External | 4WD/Car |
| Maintenance and Testing | | | | |
| - Heavy Vehicle | 120 | 120 | External | Truck |
| - Light Vehicle | 5 | 100 | External | |
| External Consultants | 10 | 120 | External | 4WD |
| Tourism | | | | |
| - Bus | 4 | 4 | Internal/ External | Bus |
| - Car | 60 | 60 | External | 4WD/Car |
| Additional Water | 22 | 22 | External | 12T Water Tanker |
| **Total (per annum)** | | **146 Trucks**<br>**1480 Cars/4WD** | | |

Traffic flows during operations would equate to a maximum of 146 truck or heavy vehicle movements and 1480 light vehicle movements per annum. These movements would not considerably impact upon existing flows into Scone or along Bunnan Road or interrupt flows from additional vehicles accessing the sites.

### 3.1.17 Grid Connection Agreement

The Kyoto Energy Park proposal will generate between approximately 93 to 137 MW of total capacity into the local grid network. Two options for grid connection have been investigated including a 66kV connection (Option 2) and a 132kV connection (Option 4) based mainly on final overall capacity of the Kyoto Energy Park. A full description of the connection options is covered in Section 19.8 of this report.

THE local network distributor is Energy Australia who is responsible from managing the network in the area including fault considerations for new generators and cumulative impacts associated with new capacity. At the time of connection Energy Australia will also consider impact of the Kyoto Energy Park under operation by computer modelling of network impacts and fault considerations on the local grid.

Subject to receipt of approval, the Kyoto Energy Park will seek a connection agreement with Energy Australia for connection to the network.

## 3.2 Operation

The operating life of the generator technologies (wind turbines, solar and hydro components) is collectively in the order of 25-30 years duration.

### 3.2.1 Operational Agreement

The Kyoto Energy Park Company expects to reach a Warranty, Operation and Management agreement with the turbine manufacturers. This is termed a “turnkey” operation. Under this agreement, the manufacturer would agree to operate, manage and maintain for the period of the warranty on each of the generators. Once the warranty expires, the generator would become responsible for the operation, management and maintenance of the wind farm. Ongoing maintenance of the Energy Park components would be undertaken on site.

### 3.2.2 Detailed Design and Contract Management

Once approvals have been obtained and tenders for the design and construction have been awarded, the project design can be finalised. This stage takes account of updated wind resource monitoring (micro siting), revised energy modelling and the procurement of the latest equipment and technology that is potentially available to the proponent at that time, including turbines and solar plant technology.

Project environmental commitments, including undertakings arising from the impact assessment, consent conditions and any licensing conditions will be compiled and used to prepare the Project Environmental Management Plans (EMPs). The Project EMPs would also be incorporated into the Contract Specifications for the required construction works and equipment supply to ensure compliance and achieve the project environmental objectives. Tenders will be called using the abovementioned specifications and tenderers’ records of performance will be reviewed as part of the selection process to ensure that they are able to achieve the required performance.

## 3.3 Decommissioning

### 3.3.1 Wind Farm Component

The wind turbine components of the Kyoto Energy Park is expected to have an indicative base life of up to 25-30 years for current machines available within Australia. The design life of the turbine is based on the fatigue life of the blades and main electrical components. Once the wind turbines reach the end of their economic life, they will likely be refurbished or replaced with newer more efficient technology, in similar locations to that shown in the report.

At the end of the Kyoto Energy Park life full decommissioning would occur through a phased approach to dismantle the equipment and remove it from the site. Decommissioning steps would include:

- isolation of turbines from substation; removal of rotors and nacelles using a large crane and removal from the site for recycling. The steel tower sections would be unbolted from the concrete foundation and the foundation base would be filled in and remediated. All turbine parts are recyclable.
- rehabilitation of access tracks not required for ongoing land use activities;
- removal of the entire above ground substation infrastructure and reuse where possible; site contamination assessment of the switchyard if necessary, removal of any contaminated soils from the site and disposal at an appropriate facility. Validation survey to ensure any contaminated material has been removed;
- removal of underground power and communication cabling within trenches and rehabilitation to fully restore to original environment.
- break up of foundations within the substation and substation underground infrastructure and disposal off site at an appropriate disposal facility.

### 3.3.2 Mt Moobi Solar PV Farm

The solar cells would generally have a design life of 25 years. The solar modules are made to the dimensions of the frame and can be replaced during or at the end of 25 years. All other components of the plant including low voltage electrical systems and inverters would be replaced at the end of the design life for continued generation of solar energy.

Regular maintenance of the frames during operation of the solar plant would allow the design life in excess of 25 years. Other components of the plant including low voltage electrical infrastructure systems and wiring would be located in shallow pre-cast concrete trenches and would be replaceable.

### 3.3.3 Mini- Closed-loop hydro plant

The Closed loop hydro plant components can be replaced during the life cycle of the plant, including pipes and turbine impellers. General maintenance of the hydro will ensure a design life of at least 30 years duration. Other components of the plant are modular and can be replaced relatively easily throughout the life of the system.

### 3.3.4 Building Structures

During operation of the Kyoto Energy Park building structures shall be used as ancillary facilities to support operations. These facilities include the Maintenance Shed, Visitor's and Education Centre and Manager's residence. It is likely that upon full decommissioning of the site that each building component may form some residual use or function.

## 3.4 Development Timeframe

The main development phases are detailed in Table 3.1 together with estimates of time for completion of each.

*Table 3.2 Kyoto Energy Park - Development Phases*

| Development Phases | Description | Duration |
|---|---|---|
| Kyoto Energy Park Project Approval | • Receipt of project approval | Item |
| Final Design | • Micro-siting Analysis and Turbine Layout Optimisation<br>• Procurement of Generator components from market<br>• Civil Works Design<br>• Preparation of CEMP and EMP and sub management plans for environmental management. | 5-8 months |
| Preparation of Contract specifications | • Preparation of contract specifications for civil works, equipment supply and electrical works. | 1-2 months |
| Tendering | • Offers sought for specified works, tenders assessed and contracts awarded | 1 month |
| Construction Works* | • Works including all phases of the construction program under CEMP | 20 months |
| Connection Agreement with Energy Australia | • Contract specifications for power supply to distribution network | Item |
| Power Purchase Agreement | • Contract for sale of power to the grid. | Item |
| Project operation | • Generation and supply of electricity to the grid when suitable energy is available | 25 years (solar)<br>30 years (wind)<br>30 years (mini-hydro) |
| Operational maintenance and environmental performance | • Monitoring of wind turbines, communications, control equipment, civil and electrical infrastructure and metering.<br>• Maintenance of access roads and sedimentation structures<br>• Environmental monitoring as per the EMP | Monthly |
| | • Lubrication and inspection of turbine systems. Condition monitoring activities such as oil sampling undertaken. | Semi-annual |
| | • All of semi-annual service plus inspection of bolt connections, welds<br>• Full annual EMP report. | Annually |
| | • Full annual service plus complete inspection. Corrosion protection activities such as painting would be considered for all components. | Every 4 years |
| Replacement, refurbishment, decommissioning and site restoration | • Replacement, refurbishment and/or removal of equipment and restoration of site at end of design life | 4-6 mths |

**See Construction timeline Table 3.2*

## 3.5 Construction Timeframe

The overall timeframe for construction of the Mountain and Middlebrook Station sites is anticipated to take 20 months duration as outlined in Table 3.2 below. The actual duration may vary, depending upon the detail of the final contracts, scheduling of activities and any delays that may be encountered due to factors such as unfavourable weather conditions or supply of equipment or materials.

Table 3.1 illustrates that construction is intended to commence 8-11 months after receipt of approval.

General working hours for construction activities would be between 7am and 7pm Monday to Friday and between 7am and 1pm Saturdays. Some activities would be necessary outside general hours, including transportation of some heavier components and rescheduling of erection activities to minimise risks during extreme conditions. No work would be conducted on Sundays or Public Holidays.

Construction activities would be phased with different activities being carried out at different locations across the site, so few locations would be worked on at any one time.

The anticipated timeframe for installation of the Solar photovoltaic plant will vary with options for technology used as described. Works will include minor earthworks, preparation of concrete footings, delivery of solar trackers, installation, connection, commissioning of the plant and visual landscaping on Mt Moobi Plateau. The solar Plant would be connected via a series of step-up transformers and reticulated into the proposed 33kV electrical cable on Mt Moobi Plateau, Mountain Station.

The timeframe for completion of construction of the Closed-loop hydro plant is approximately 4 months, including minor earthworks, preparation of concrete works and pouring, installation of pipe and connections, installation of hydro units and electrical connection to the internal 33kV underground reticulation on site.
Construction of ancillary works including electrical works (substation and powerlines), buildings (Maintenance Building, Managers Residence, Visitors and Education Centre) would be undertaken by individual contractors and managed under the Construction Environmental Management Plant (CEMP)

*Table 3.3 - Kyoto Energy Park - Construction Timeline*

| Kyoto Energy Park Construction Program | Mth1 | Mth2 | Mth3 | Mth4 | Mth5 | Mth6 | Mth7 | Mth8 | Mth9 | Mth10 | Mth11 | Mth12 | Mth13 | Mth14 | Mth15 | Mth16 | Mth17 | Mth18 | Mth19 | Mth20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Mountain Station** | | | | | | | | | | | | | | | | | | | | |
| Site Establishment | ■ | | | | | | | | | | | | | | | | | | | |
| Upgrade access tracks and hardstands | | ■ | ■ | | | | | | | | | | | | | | | | | |
| Establish batching plant | | ■ | | | | | | | | | | | | | | | | | | |
| Internal underground cabling | | | ■ | ■ | ■ | | | | | | | ■ | | | | | | | | |
| Turbine concrete foundation | | | | ■ | ■ | ■ | ■ | | | | | | | | | | | | | |
| Construct substation/switchyard/control | | | | | | | ■ | ■ | | | | | ■ | ■ | | | | | | |
| External connection to the Grid* | | | | | | | | | ■ | ■ | ■ | ■ | ■ | | ■ | | | | | |
| Erect WTGs | | | | | | | | ■ | ■ | ■ | ■ | ■ | | | | | | | | |
| Construct Mini Hydro Plant | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | | | | | |
| Commission Wind Turbines | | | | | | | | | | | | | | | ■ | | ■ | ■ | | |
| Construct Maintenance building | | | | | | | | | | | | | | | ■ | | | | | |
| Construct Manager's residence | | | | | | | | | | | | | | | ■ | ■ | | | | |
| Construct Visitor's Education Centre | | | | | | | | | | | | | | | | | ■ | ■ | | |
| Install Mt Moobi Solar PV Farm (5MW) | | | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | |
| Commission Solar Plant | | | | | | | | | | | | | | | | | | | ■ | |
| Project operation (Wind + Hydro) | | | | | | | | | | | | | | | | | | | ■ | |
| Project operation (Solar) | | | | | | | | | | | | | | | | | | | | ■ |
| **Middlebrook Station** | | | | | | | | | | | | | | | | | | | | |
| Upgrade access tracks and hardstands | | | | ■ | ■ | | | | | | | | | | | | | | | |
| Internal underground cabling | | | | | ■ | ■ | | | | | | | | | | | | | | |
| Turbine concrete foundation | | | | | | | ■ | ■ | | | | | | | | | | | | |
| Erect WTGs | | | | | | | | | | | | | ■ | ■ | ■ | | | | | |
| 33kV to Site Substation | | | | | | | | | | | ■ | ■ | ■ | | | | | | | |
| Commission Wind Turbines | | | | | | | | | | | | | | | | | | | ■ | |

** Includes timeframe for 132kV connection Option 2 (Vemtec 2008)*

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The funding of this proposal and report is 100% Australian.
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