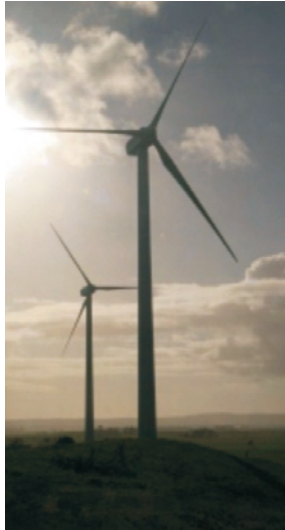


Woodlawn Wind Farm



Project Description

3

3. Project Description

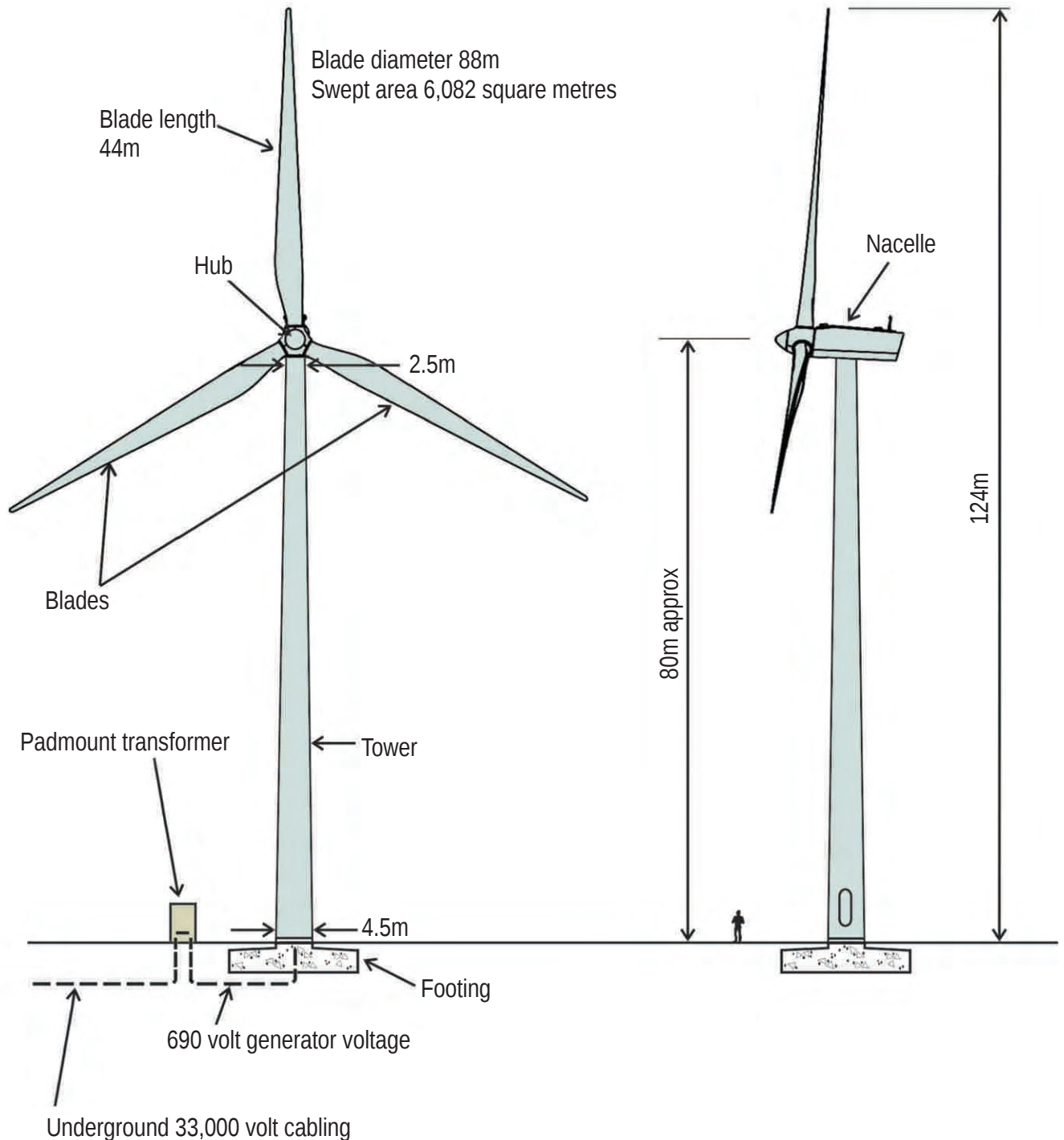
This section of the SEE provides a detailed description of the amended Woodlawn Wind Farm project and the details of the proposed variations from the original project for which consent was granted. The environmental assessment provided in this SEE is directed to the project variations as described in this Chapter.

3.1 Woodlawn Wind Farm project elements

The Woodlawn wind farm as currently proposed comprises 20 wind turbines, site access works, 33 kV collection circuits, a 33 kV overhead transmission line from the Woodlawn Wind Farm to the Capital Wind Farm substation and a 33 kV/330 kV grid connection arrangement.

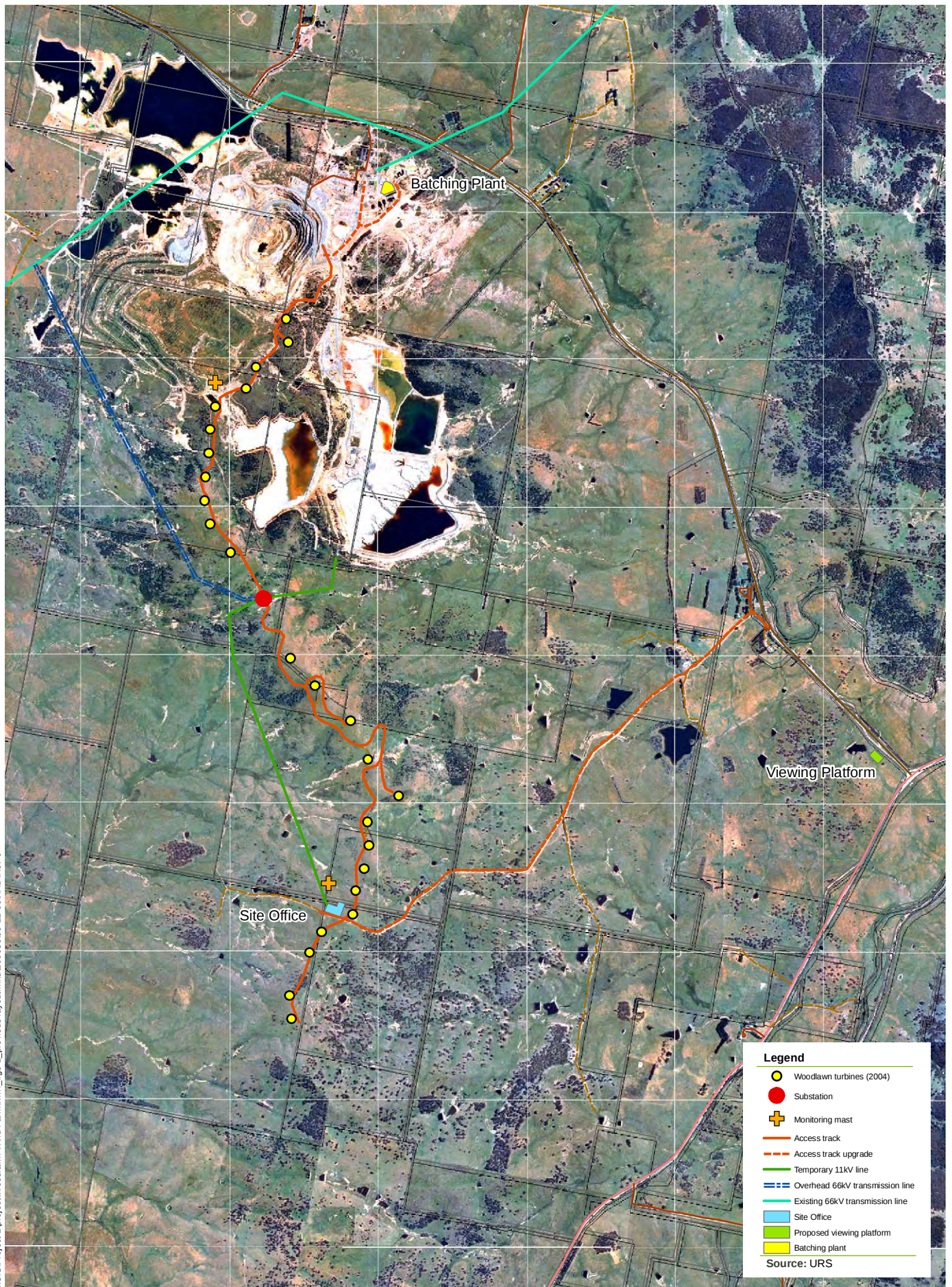
The following variations of the approved project are proposed:

- Variation in lands subject of the consent (as described in Chapter 2)
- reduction in number of wind turbine generators from 25 to 20
- changes to previously approved wind turbines include
 - different turbine equipment, Suzlon S88 2.1 MW model (Figure 3.1) now proposed in place of the Vestas V80 2MW model to which the existing consent applies
 - increase in turbine generator capacity from 2 MW to 2.1 MW
 - increase in hub height for all turbines to 80 metres
 - increased blade length from 40 metres to up to 44 metres
 - selection of off-white colour rather than the light grey option of the existing consent
 - generally minor relocation of turbines within the original turbine array envelope
- change in some turbine locations (approved and revised locations as shown in Figure 3.2 and 3.3 respectively. Figure 3.4 provides a comparison of the locations)
- reduction of the wind farm generation capacity to 42 MW from the originally approved 50 MW
- installation of external (kiosk-type) generator transformers at the base of each wind turbine tower
- relocation of the approved equipment laydown area for temporary storage of equipment items during construction, to a more suitable location. Turbine components will be transported directly to the turbine sites.
- relocation of the construction site office to a central location on the main access track (probably associated with the laydown area)
- construction of 12 kilometres of 33 kV overhead line from Woodlawn Wind Farm to the Capital Wind Farm substation. This negates the need for construction of a substation at the Woodlawn site as previously proposed and the short section of 66 kV overhead line
- upgrade of the intra wind farm collection circuit from 22 kV to 33 kV
- installation of a third 33 kV/ 330 kV transformer at Capital Wind Farm substation
- strengthening of the Capital Wind Farm substation access road causeway
- inclusion of two temporary and two permanent 80 metres meteorological masts
- use of existing gravel borrow pit adjacent to Turbine 17
- temporary increase to access track width from six metres to 10 metres during construction
- removal of all wind turbine lighting requirement



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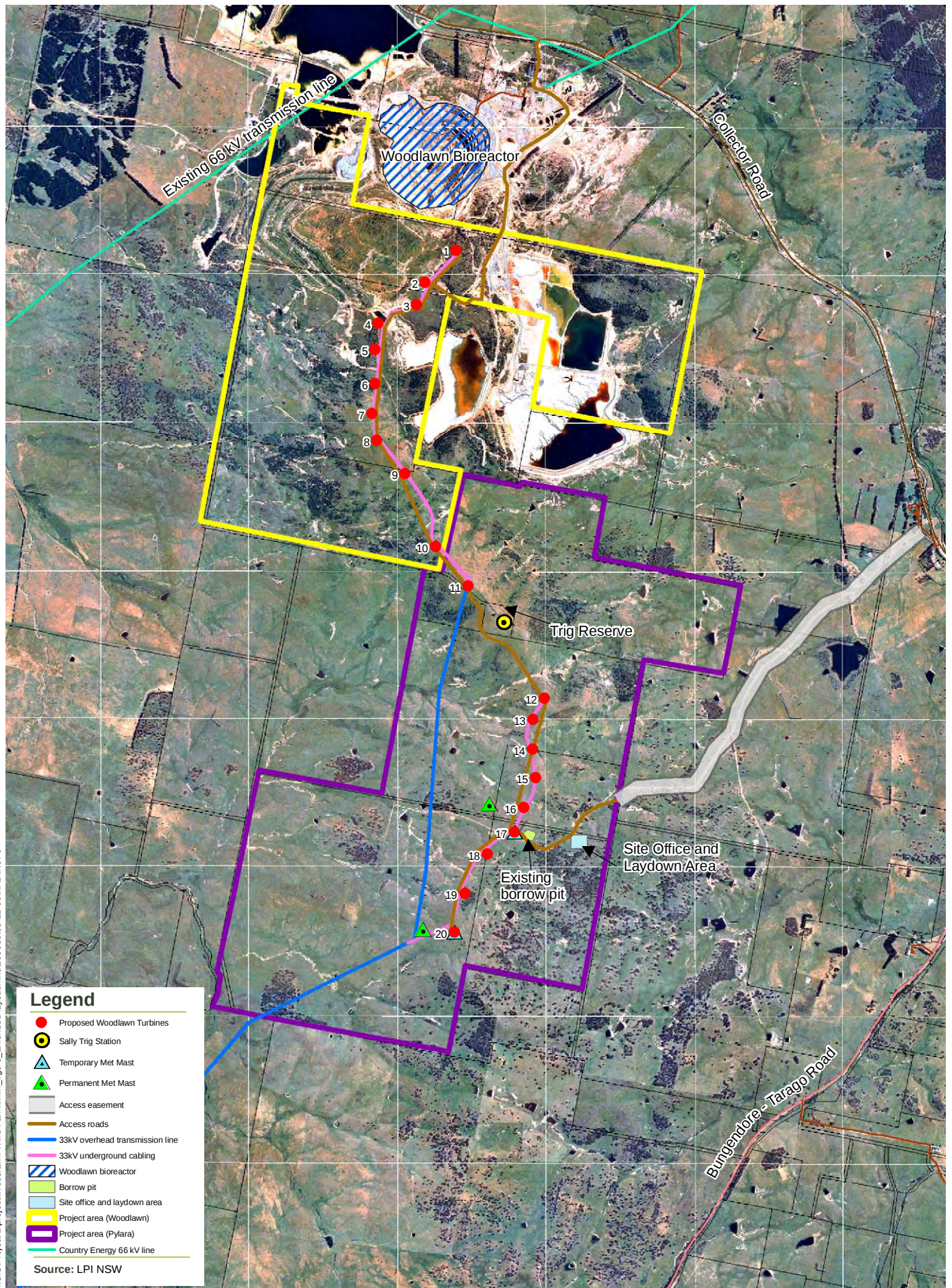
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Projection: MGA

Woodlawn Wind Farm Statement of Environmental Effects

FIGURE 3.2: Approved wind farm layout

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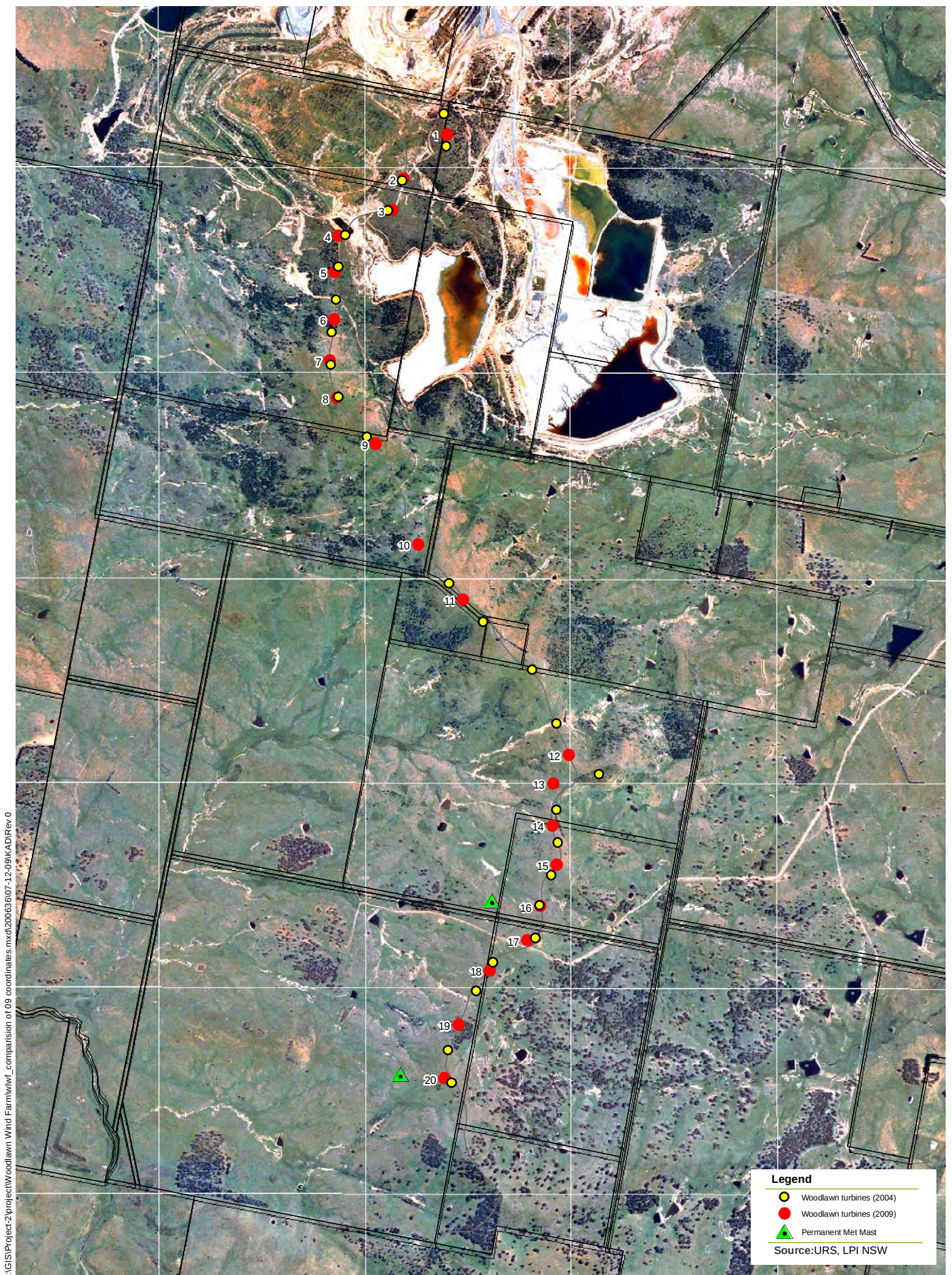
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Projection: MGA

Woodlawn Wind Farm **Statement of Environmental Effects**

FIGURE 3.3: Amended Woodlawn wind farm layout



SCALE 1:25,000 @ A4

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Projection: MGA

Woodlawn Wind Farm Statement of Environmental Effects

FIGURE 3.4: Comparison of approved and amended turbine positions



The location of the wind turbines is within the original turbine array envelope and with the lesser number currently proposed increases the spacing of turbines for parts of the array (Figure 3.4). The grid connection arrangement increases the extent of the overhead line required but fulfils the same purpose as originally proposed without the need for a substation at the Woodlawn Wind Farm site.

3.2 Woodlawn Wind Farm layout

3.2.1 Wind turbine design and specifications

The approved Woodlawn Wind Farm included the installation of 25 wind turbine mostly along the elevated points of the ridgeline south from the Woodlawn mine void and Woodlawn Bioreactor site to within 800 metres of the southern point of the Pylara property boundary (Figure 3.2).

Each of the proposed wind turbines comprises a footing, tower, nacelle, hub and rotor with three blades (Figure 3.1). These components are briefly described below.

- **Tower** – this provides the supporting structure for the turbine. To facilitate its production and transport, the towers are manufactured in four sections which are assembled on-site. Each tower will be fitted with an internal ladder and/or lift to enable inspection and maintenance access to the nacelle
- **Footing** – the tower will be installed on a stub section installed in the reinforced concrete footing. The footing is likely to include ducting for cables and be rock-bolted to the underlying rock.
- **Turbine rotor** – the three bladed rotor and hub are attached to a steel shaft housed within the nacelle. Pitch motors enable the position of each blade to be adjusted for varying turbine operation. The hub and blade rotational joints will be enclosed and protected inside the nose cone.
- **Nacelle** – the nacelle is located at the top of the tower and encloses the gearbox, generator, motors, brakes, electronic components, wiring and hydraulic and lubricating oil systems. This cover protects the enclosed components from the various weather conditions and also provides noise damping for the mechanical and electrical parts. A central opening from the tower provides access to the nacelle for inspection and maintenance purposes.

Proposed modifications in context

Woodlawn Wind Pty Ltd proposes to install Suzlon S88 2.1 MW turbines which have marginally different specifications to the turbines identified in the original EIS. The Suzlon S88 2.1MW turbine general form and key specifications are summarised in Table 3.1 and shown in Figure 3.1.

The construction of the footing is also slightly different to that indicated in the 2004 EIS. Although excavation will still be required, the area excavated will in general be less than that originally proposed (Table 3.1), with each turbine footing being approximately 10 metres by 10 metres and two to three metres deep. Excavation for the turbine footings will be carried out by mechanical equipment.

Each footing will be a reinforced concrete block constructed on a flat concrete base using constructed formwork and an appropriately designed arrangement of steelwork and conduits for electrical and control cables. The concrete block will be about two to three metres thick, tensioned and anchored to the underlying rock. The revised footing design means that only about 95 m³ of concrete is required for each footing. The actual depth of excavation can vary depending on the nature of rock at individual sites. A thin concrete layer will be laid down to cover irregularities in the underlying rock surface and provide a level base for footing construction.

A level hardstand area adjacent each turbine location is part of the approved project. This area will be used for crane operation during wind turbine assembly and placement of turbine components prior to them being raised into position on the turbine structure. The approved laydown area will be generally of the order of 30 metres by 30 metres, with compacted crushed rock providing stability. (Plate 3.1)

Hard stand areas at the turbine sites will be retained after construction for the purpose of any maintenance required and enable a crane to be brought back to site and for laying down turbine components during maintenance activities.

Topsoil from the footing and hardstand earthworks will be stockpiled separately adjacent to the excavation. It will be used for backfilling over the temporarily disturbed ground following construction with the excess being evenly spread around the disturbed turbine site to support site restoration. Excavated material may also be used to prepare a level hard stand area for the large crane required for erection of the turbine. Any excess excavated material may be used elsewhere on the property (in consultation with the landowner) to rehabilitate existing areas of erosion. Rehabilitation of the disturbed areas will be undertaken at the completion of construction to prevent site erosion.

Woodlawn Wind Pty Ltd is also proposing to install external wind turbine generator transformers similar to the Capital Wind Farm design. These will be located near the base of the towers on a small concrete slab and will be of a low visibility shade of brown. The selected transformers are oil filled, however containment measures are incorporated in the transformer footing design to prevent any oil loss, should it occur, from reaching local watercourses.

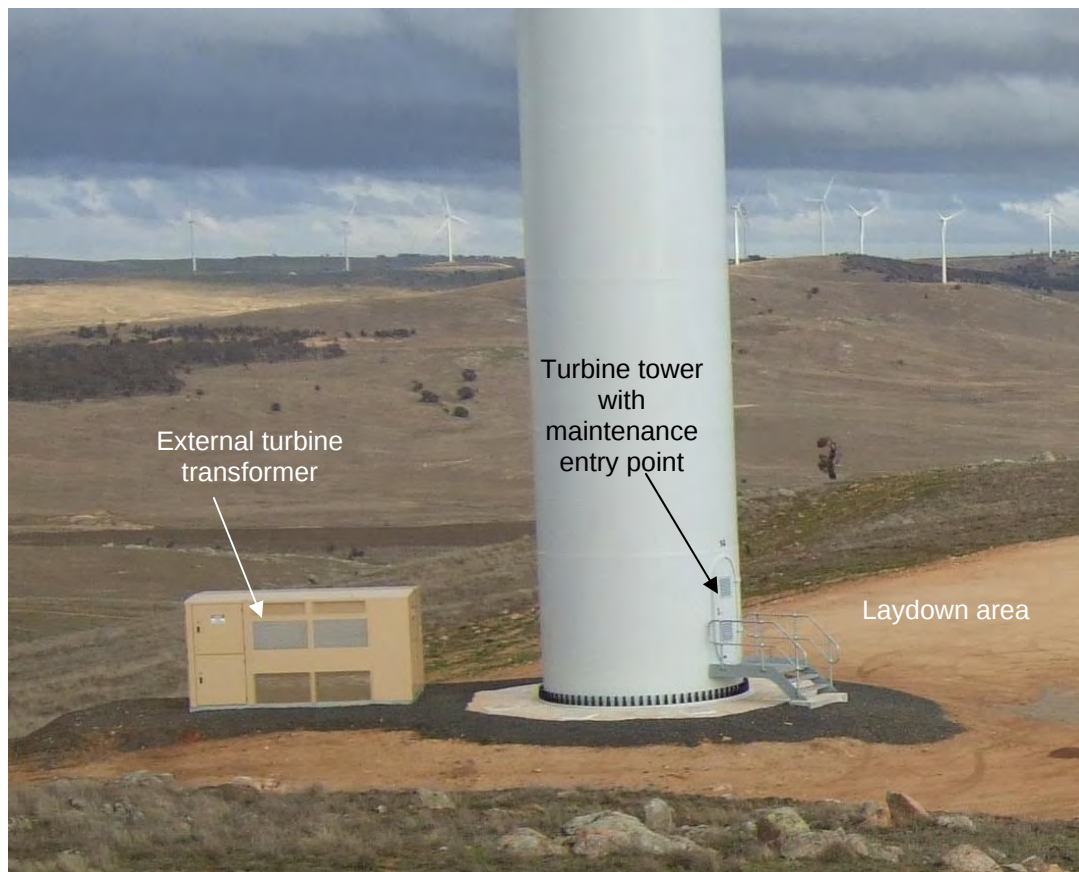


Plate 3.1 – Proposed external wind turbine transformers located at the base of the wind turbine

The amended project involves five less turbines but each turbine will have a larger area swept by the rotor. When these changes are taken into account the amended wind farm is associated with a 3.5% reduction in the area swept by the turbine blades compared to the approved project but there is a slight increase in the output of the turbines due to the increased hub height.

Table 3.1 – Summary of specifications for turbine components for the approved wind farm and for proposed modification

	Approved Wind Farm ⁽¹⁾		Proposed Variations
Manufacture	Vesta OptiSpeed V80		Suzlon S88
Number of turbines	19	6	20
Output	2 MW		2.1 MW
Turbine towers			
Height (hub)	60 m	78 m	80 m
Tower height (excluding nacelle)	58.3 m	76.3 m	78 m
Structure construction	Tubular steel with internal ladder and/or lift consideration of light grey colour for turbines		Tubular steel with internal ladder, painted off-white
Weight	134.3 t	195.6 t	150 to 200 tonnes (4 sections)
Diameter – top (base)	2.3 m (4.0 m)	2.3 m (4.0 m)	2.5 m (4.5 m)
Number of sections	3	4	4
Footings			
Footing design	Reinforced square concrete foundations		Reinforced octagonal concrete footing, secured with rock anchors
Dimensions	13 m x 13 m 2 m below ground	15.7 m x 15.7 m 2.16 m below ground	10 m diameter, 2-3 m below ground level
Rotors / Turbines			
Blade diameter	80 m		88 m
Sweep area	5,027 m ²		6,082 m ²
Rotation	9 – 19 rpm		15.5 rpm
Construction	Closed fibre reinforced epoxy		Fibre reinforced plastic resin
Nacelle			
Dimensions	1.7 m height		6 m long x 3 m wide x 3m high
Construction	(not stated)		Steel and fibre reinforced plastic
Generator transformer			
Dimensions	-		3 m x 2.5 m x 2.2 m

NOTE: ⁽¹⁾ URS, 2004

3.2.2 Relocation of wind turbine sites

With the reduction in the overall number of turbines to 20, the number of turbines located on some of the properties will be varied. All turbine sites will still be located within the original turbine array envelope applicable for the existing consent. These changes are outlined in Table 3.2 below and shown in Figure 3.4. The numbers in parenthesis are the proposed reduction or addition of turbines for the respective parcels of land. The proposed relocations are relatively minor adjustments of the array and together with the retention of the existing turbine envelope and a lesser number of turbines installed the overall impact of the amended wind farm is regarded as less than that for the approved array.

Table 3.2 – Property details and wind turbine relocation for proposed wind farm layout

Lot	DP	Land title details	Turbine No's	Number of turbines (difference)
Veolia – (Woodlawn Farm)				10 (-1)
Lot 92	DP 754919	13/92/754919	1	1 (0)
Lot 91	DP 754919	13/91/754919	2	1 (-1)
Lot 14	DP 754919	13/14/754919	3 – 8	6 (-1)
Lot 94	DP 754919	13/94/754919	9 – 10	2 (+1)
Veolia – (Pylara Farm)				10 (-4)
Lot 21	DP 754919	13/21/754919	11	1 (-1)
Lot 89	DP 754919	13/89/754919	12 – 13	2 (-2)
Lot 27	DP 754919	13/27/754919	14 – 18	5 (0)
Lot 55	DP 754919	6054-107 (AC)	19 – 20	2 (-1)
TOTAL WOODLAWN WIND FARM				20 (-5)

The proposed variations take into account various technical and environmental considerations to achieve the optimum arrangement for the amended array. Table 3.3 indicates the distances of the new turbine locations from the locations identified under the current consent.

Table 3.3 – Proposed turbines locations compared to approved turbine locations

New proposed turbine number	Nearest original turbine number	Distance moved	New proposed turbine number	Nearest original turbine number	Distance moved
1	2	59	11	13	148
2	3	13	12	15	161
3	4	22	13	17	131
4	5	34	14	18	90
5	6	30	15	19	59
6	8	66	16	20	2
7	9	25	17	21	41
8	10	9	18	22	41
9	11	54	19	24	135
10	12	245	20	25	42

The maximum distance of an amended turbine site from a previously approved turbine site is 245m in the case of Turbine 10 that is located in an area where no turbine sites had previously been positioned. Also none of the revised turbine sites are located in the area of the former Turbine sites 13 to 15 as shown in Figure 3.4.

3.2.3 Access to site and internal access tracks

The two approved entry points to the wind farm site are both from Collector Road. Entry to the southern part of the wind farm was at Pylara farm and the Woodlawn Bioreactor entrance provided entry to the northern section of the wind farm.



On site tracks have previously been constructed for motor bike, four wheel drive and occasional stock transport use. Approval was granted for upgrading the current Pylara access track and for the construction of additional access tracks where required. The access tracks were to have been six metres wide with a top layer of gravel, with a grade that would not exceed 14% and would include drainage trenches to manage rainwater runoff.

As part of the works carried out for the land fill and bioreactor site, Collex (now Veolia) upgraded all the existing roads connecting the Tarago Intermodal Facility to the Woodlawn Bioreactor. It was expected that these roads could also be used for the wind farm and no further upgrades would be required for delivery of wind farm components and materials.

Proposed modifications in context

Woodlawn Wind Pty Ltd is now proposing to only use Pylara Farm as the access point to the wind farm site. Table 2.1 shows the property details for the site access route. This will separate wind farm vehicle movements from vehicles accessing the Bioreactor site and former mining areas.

Experience on other wind farm projects has shown that 10 metres is the required width for access tracks during construction to enable movements of a large crane between turbine sites. Accordingly Woodlawn Wind Pty Ltd is proposing to increase the width of the access tracks from six metres to 10 metres to enable access for the large cranes required for turbine erection. The width of these tracks can generally be reduced following construction. However some key sections of the access route may be retained at 10 metres width.

The final locations of tracks will be determined based on design considerations, including grades, slope stability, erosion hazard, visibility and environmental constraints. Upgraded and new access tracks will improve access for the landowner around the property. Construction and maintenance of the access tracks will be subject to a Soil and Water Management Plan. The proposed arrangement of tracks is shown in Figure 10.2. An existing borrow pit located approximately 60 metres east of Turbine 17 will be used to source gravel.

Further details of site access and delivery of large items to site are provided in Chapter 10.

3.2.4 Underground cabling

The existing consent provided for the power output from each turbine to be connected to the onsite substation via permanent 22 kV underground cabling. Location of trenches would generally be adjacent the access tracks between each turbine. Mechanical excavators would be used to excavate trenches 1.1 metres deep and 0.45 metres wide. Cables would be laid on sand and covered by a further layer of sand. The trench would then be backfilled with soil to surface level and rehabilitated to prevent erosion.

The routes of cable trenches will only vary slightly from those proposed by the original consent and are still within the area assessed by the 2004 EIS. The form of the cable installation will be consistent with that described in the 2004 EIS.

Erosion prevention measures would be used to minimise storm water runoff where trenches were located on slopes. The trenching work will be addressed in the Soil and Water Management Plan.

3.2.5 Substation and grid connection

Substation

Consent was granted for the construction of a new substation at the Woodlawn Wind Farm site and located between turbines 14 and 15. An area of 0.12 ha was approved for clearing and levelling. A concrete slab and a concrete bund was to be constructed to provide the substation base and to provide containment for any possible oil spillage resulting from transformer failure. The substation would have contained a control room, compound area, 66 kV switchyard and been enclosed with a



concrete kerb and surrounded by a 2.5 metre high chain link fence. Each turbine would have been connected to the substation via cabling located in trenches generally adjacent to the access roads.

Consent for the following utility services was also granted:

- A rainwater tank to provide for domestic water usage on site, with a reserve water storage tank available for 'top-up' from potable water deliveries by truck.
- Sewage would be treated in a composting septic tank within the substation compound. Only small amounts of domestic waste were expected to be generated on a day to day basis which could be temporarily stored on site and removed by an appropriately licensed contractor.
- Electricity required for normal operation of the substation would be supplied by the wind farm or the grid. The design of the substation would allow electricity to be drawn from the existing grid network when no power is being generated by the wind turbines.

Overhead transmission lines

The existing consent allows for an overhead 66 kV transmission line from the Woodlawn Wind Farm substation to the existing 66 kV line between Goulburn and Queanbeyan. The 66 kV overhead line was to be mounted on 12 metre high concrete monopoles, spaced approximately 100 metres apart. The point of grid connection would have been to the north west of the Woodlawn Wind Farm site. Review of the line capacity together with consideration of the power proposed to be exported from the Woodlawn Bioreactor has led the proponent to develop the alternative connection arrangement described in this SEE.

Proposed modifications in context

Since consent was granted for Woodlawn Wind Farm, Capital Wind Farm located to the south-west of the site has been constructed and commissioned. Capital Wind Farm comprises 67 turbines with a total generation capacity of 140 MW. A 33 kV/330 kV substation is located south-east of the Capital Wind Farm at the point of grid connection.

Woodlawn Wind Pty Ltd is proposing to connect the Woodlawn Wind Farm to the Capital Wind Farm substation, negating the need to construct the approved substation at the Woodlawn Wind Farm site. For grid connection it is proposed to construct 12 kilometre of 33 kV overhead line from Woodlawn Wind Farm to the Capital Wind Farm substation. Property details for transmission line easements are shown in Chapter 2. The Capital Wind Farm substation access road causeway will be strengthened to allow access for the new transformer.



Plate 3.2 – Proposed location for the additional 33 kV/330 kV transformer at the Capital Wind Farm substation for Woodlawn Wind Farm grid connection



Plate 3.3 – Typical double circuit single pole 33 kV overhead transmission line

3.2.6 Site office and storage

Consent was gained for the establishment of a site office and adjacent raw material storage area located on the ridgeline at the south end of the site. The area was to be fenced off with a designated parking area (Figure 3.2). It also included water tank, office space, toilets, meeting rooms and first aid rooms. A temporary 11 kV line was to be installed from the existing power supply located at the proposed substation.

Proposed modifications in context

The requirement for construction of a temporary site office and its general form remains unchanged but its location is now on the access road to the east of Turbine 18 (Figure 3.3). The relocation of the site office is proposed due to the exposed nature of the approved site on the ridgeline and the suitability of a more sheltered location adjacent the existing Pylara farm track that will provide access to the wind farm site. The revised location is also more suitable for site security, site safety and receipt of equipment deliveries to the construction site. The new site is within a cleared and previously disturbed area which is less visible from surrounding areas and is considered to provide for reduced environmental impact. The contractor may choose to use generators to provide the electricity supply at the temporary site office facility or to install power supply from the grid.

3.2.7 Quarry

The proponent has indicated that an existing borrow pit located on the ridgeline north of the proposed access track and approximately 60 metres east of Turbine 17 will be used to source gravel for on-site access tracks (Figure 3.3). The quarry is located on cleared, previously disturbed land. No additional vegetation clearing is proposed. An alternative site is also available on the Capital Wind Farm lands but may not be required if there is adequate suitable material at the Woodlawn Wind Farm site. Should these not be suitable then off site sources may be used to provide gravel to the wind farm site.

The contractor will implement appropriate sediment and erosion controls at the quarry to reduce environmental impact. The quarry site will be rehabilitated once it is no longer required or exhausted. Erosion and sediment controls and the quarry rehabilitation will be detailed and undertaken in accordance with an approved CEMP.

As the quarry is situated in an elevated position, it may be partly visible from some viewpoints to the east of the site. However there are few residences that would have views to this part of the ridgeline and the quarry is expected to have low visibility from surrounding public viewpoints. In addition the quarry will be a temporary visual feature, as the site will be rehabilitated on completion of construction.

3.2.8 Batching plant

The consent included allowance for a batching plant that was proposed to be located to the north of the ridgeline near the Woodlawn mine site. The batch plant would only be used for a limited period when turbine footings are being poured and the contractor may choose to deliver concrete to the site from Bungendore as was done for the Capital Wind Farm.

The option to source concrete on site or from Bungendore will be determined by the contractor prior to commencement of the construction phase. Use of an off-site source would increase vehicle movements to and from the site on 20 days but is likely to result in marginally reduced environmental impact on site.

3.2.9 Viewing platform

The consent for Woodlawn Wind Farm included the construction of a viewing platform, situated off Collector Road a short distance west of the intersection of Collector Road with the Tarago to Bungendore Road. Parking for up to 20 cars and two buses was proposed. The design of the car park and road entrance complied with the relevant Australian and New Zealand Standards and guidelines. The provision of a viewing platform, its location and design criteria remain unchanged. Goulburn-



Mulwaree Council will be consulted in regards to the design of works to connect the parking area at the viewing platform with Collector Road.

3.2.10 Wind monitoring masts

At the time of preparing the original EIS, two wind-monitoring masts were already located on the site. The proponent proposed to remove the original two masts and construct two new masts. These masts were to be subject to a separate development application and were therefore not assessed as part of the September 2004 EIS.

Proposed modifications in context

Woodlawn Wind Pty Ltd is proposing to dismantle the two existing wind-monitoring masts and to construct two temporary and two permanent 80 metre meteorological masts. The location of the new temporary masts will coincide with turbine locations 17 and 20. The temporary masts will be removed after a sufficient period of monitoring has enabled correlation of wind data from the pairs of temporary and permanent masts and prior to construction of the turbines at the respective temporary mast sites. Figure 3.3 shows the locations of the existing masts and the locations of the proposed permanent masts. The masts are a minor visual feature relative to the turbines and their installation can be undertaken with insignificant environmental impact.

3.2.11 Transport of equipment and materials

The construction phase involves a large number of vehicles travelling to and from the site over the construction period. The vehicles include overmass and oversize vehicles associated with delivery of turbine components and the additional 33 kV/330 kV substation transformer.

Consent was given for approximately 200 trips per day comprising about 100 light vehicle and 98 heavy vehicle trips per day, occurring through a component delivery period of about six months. Delivery of turbine components was indicated to be scheduled so that no intermediate storage of the equipment would be required. Installation of the turbines would occur as the turbine parts were delivered. Two cranes (one large and one small) were to be used for the assembly of the turbines.

Proposed modifications in context

The traffic issues for the construction and operation of Woodlawn Wind Farm require consultation with Local Councils and the community and the development of a comprehensive Traffic Management Plan. It is proposed that the Traffic Management Plan developed for Woodlawn Wind Farm will largely reflect the procedures that were successfully applied for the Capital Wind Farm construction and use the approved route for the transport of equipment to Capital Wind Farm.

The review undertaken for this SEE has indicated that the overall volume of vehicles using the local roads will be lower than that estimated in the 2004 EIS. This is partly due to a decrease in the number of turbines being constructed and in addition it is also indicated that the proponent will use the innovative anchored footings design that uses less concrete volume and less reinforcing steel per footing compared to estimates in the 2004 EIS. The combination of the factors results in a significant decrease in vehicle movements to and from the site.

The approved route for the transport of the turbine components and a more detailed breakdown of the number of trips and vehicles use is described in Chapter 10.

3.2.12 Site clearing and restoration

Preliminary site clearing for the construction of the access tracks, preparation of the turbine sites and installation of underground cables and the site office and laydown area was allowed for in the project description on which the existing consent is based. Any cleared vegetation will either be transferred to a green waste facility for recycling or used on site for mulching as part of the site landscaping works. Any topsoil removed during clearing would be stockpiled and reused during landscaping operations



once construction is completed. The procedures for the clearing activity will essentially remain unchanged from the approved proposal and be undertaken in accordance with an approved CEMP.

Rehabilitation of the site will be on-going with rehabilitation of each individual turbine location occurring as assembly of each turbine is completed. Trenches will be backfilled and revegetated as soon as practicable after cable installation is completed. If a temporary 11 kV overhead line is installed for the temporary construction site office, it will be dismantled in conjunction with removal of all contractors' facilities. Waste and surplus materials will be removed from site progressively as practicable.

Ongoing maintenance of rehabilitated areas and weed management will be integral to the site restoration works.

3.3 Construction hours

Noise impacts of construction works were addressed in the 2004 EIS and are reviewed in this SEE. Consent was given for construction activities to occur during approved hours as shown below:

- Monday to Friday: 7am to 6pm
- Saturday: 7am to 1pm
- Sunday: No construction permitted

Some activities may be carried out in association with construction outside of these hours; including works not causing noise emissions which would be audible at any nearby residences not located on the Premises.

Due to the significant setback of the neighbouring rural residences from the wind turbine sites and the degree of mitigation of construction noise with distance it is considered that erection of the turbines during suitable weather conditions is able to be undertaken out of hours without risk of significant noise impact for neighbours. Such activity would only occur infrequently and where suitable conditions are not available during approved working hours. The ability to erect turbines out of hours will also assist in compressing the overall construction time, therefore reducing any impact on neighbouring properties.

3.4 Employment

It was estimated that a maximum 45-60 construction employees would be on site at any one time for the 180 day construction period. The actual number at any point in time will vary with the stage of construction works and the contractors staffing arrangements.

An estimated three to four staff would manage the operational wind farm during normal working hours, with remote management capabilities available. Operations staff may be based at Capital Wind Farm substation and visit the Woodlawn Wind Farm site as necessary for inspections and maintenance.

The employment levels for construction and operation are expected to remain generally the same for the amended project as indicated in the 2004 EIS.

3.5 Wind farm development phases

Subject to a modification to the Development Consent being obtained, the final design and construction arrangements will, if necessary, be updated to address the full set of consent conditions. This stage would also take account of any additional geotechnical investigations, updated wind resource monitoring and revised energy modelling. However any changes at this stage would be expected to be of a minor nature and with no significant change to the environmental impacts.

The Project's Construction Environmental Management Plan (CEMP) would be developed by the project contractor in accordance with the Department of Planning's *Guideline for Preparation of Environmental Management Plans* and must be submitted to the Department of Planning for its



approval. The Contractor will undertake the required construction works and equipment supply in accordance with the CEMP to ensure compliance and achieve the project environmental objectives. All sub-contractors will be required to address requirements of the CEMP in respect of the management of their component of the project construction works.

The following development phases will take place.

- Preconstruction compliance activities including gaining approval of the CEMP.
- Construction activities in accordance with the approved CEMP
- Wind farm commissioning in accordance with the approved Operational Environmental Management Plan (OEMP)
- Operation and maintenance of the wind farm
- Decommissioning or replacement of wind turbine equipment

These activities have been addressed in the 2004 EIS and are representative of the typical phases for the development. The sequence of activities and conduct of construction and operations activities is required to be consistent with consent conditions.

3.5.1 Construction activities

The actual duration of construction works may vary depending upon the scheduling of activities such as site access and any delays that may be encountered due to factors such as unfavourable weather conditions or supply of equipment or materials.

The principal activities involved in the construction phase will include the following:

- site establishment
- transport of people, equipment and materials to the site by local roads
- earthworks for access track construction, turbine footing construction and cable trenches
- erection of 20 turbines and supporting structures
- underground cable and generator transformer installation
- grid connection works
- progressive commissioning of the turbines in conjunction with the wind farm commissioning sequence
- removal of temporary facilities and restoration of the site

For further information on the approved construction activities for the Woodlawn Wind Farm reference should be made to the 2004 Woodlawn Wind Farm EIS.

Environmental management of construction impacts

The principal environmental issues typically associated with construction works for wind farm developments include:

- construction traffic management
- constraints on the location and extent of site earthworks and any clearing
- soil and water management
- dust control for road construction and soil stockpiles
- management of quarrying activities at the borrow pit adjacent to Turbine 17 and associated crushing plant if used. Lot 48 DP 754877 of Capital Wind Farm provides an alternative source. Delivery from off site sources would be addressed by the project traffic management plan.
- management of issues associated with concrete batch plant if used
- construction noise controls
- fuel storage and handling
- waste storage, handling and disposal
- bush fire prevention
- coordination with property owners and effects on stock

- weed control and site restoration

Best practice environmental management requires that the environmental issues associated with construction projects are identified and managed in accordance with an Environmental Management Plan (EMP). These issues will be addressed in the CEMP.

Specific aspects of these issues are outlined in the various chapters of the SEE and Chapter 15 provides a compilation of controls to be applied.

3.5.2 Wind farm commissioning

The commissioning process will include assessment of wind farm performance and compliance with the equipment specifications and the consent relating to operational aspects. The operation of the various components will be tested to ensure the wind farm's safe and reliable operation and equipment compliance with contract specifications and environmental requirements. Commissioning will commence after the substation and connection works have been completed and the substation transformer has been energised.

Due to progressive commissioning of the turbine groups, some turbines may be energised and operating under reliability test conditions while construction of others is still being completed.

3.5.3 Operation and maintenance of the wind farm

Once commissioned, the wind farm will operate with a small on-site work force of about three to four staff. Additional visits by other technical staff will be made where assistance is required for inspection and routine or non-routine maintenance. Staffing will be managed to ensure continued safe and reliable operation and on site activities will occur in accordance with the OEMP.

3.5.4 Decommissioning of wind turbine equipment

At the end of its economic life the wind turbine equipment will either be replaced with comparable new equipment or the wind farm will be decommissioned. Decommissioning will involve dismantling and removal of the above-ground equipment and site rehabilitation. Access tracks may be retained depending on the landowner's wishes.

