

6 The Project

6.1 Introduction

This section provides an updated description of the Project which reflects the changes made in response to submissions received during the public exhibition of the EA.

The Project involves the construction, operation and decommissioning of a wind farm with up to 282 wind turbines, together with the associated and ancillary infrastructure.

The main components of the Project are:

- ▶ up to 282 wind turbines, each with:
 - a capacity between 1.5 and 3.6 MW;
 - three blades mounted on a tubular steel tower, with a combined height (tip height) of a maximum of 165 meters;
 - an adjacent pad mounted wind turbine transformer (or located within the steel tower), crane hardstand area and related turbine lay down area;
- ▶ a new overhead powerline approximately 43 km in length, rated at up to 330kV capacity, from the connection substation to the wind farm site. The powerline will then continue north within the wind farm site for approximately 39 km to connect all the collection substations on the wind farm site;
- ▶ a new 330kV connection substation located adjacent to the existing TransGrid Wollar to Wellington 330kV transmission line, located near Ulan;
- ▶ up to four new collection substations located across the wind farm site;
- ▶ operation and maintenance facilities incorporating a control room and equipment storage;
- ▶ various construction facilities including; temporary concrete batching plants, rock crushing equipment, temporary lay down facilities and construction compounds;
- ▶ underground and overhead 22kV or 33kV electrical reticulation cabling linking the wind turbines and the collection substations;
- ▶ access tracks required for each wind turbine and the related facilities;
- ▶ minor upgrades to local roads, as required for the delivery, installation and maintenance of wind turbines and the related facilities;
- ▶ the subdivision of land so as to create new lots for the proposed connection substation; and
- ▶ temporary and permanent wind monitoring masts for wind speed verification, weather and general monitoring purposes.

An overview of the revised wind farm layout can be seen in Figure 6-10 with more detail of the site shown in Figure 6-11 to Figure 6-18.

6.2 Changes since exhibition of EA

The wind farm layout and design has been amended to incorporate findings of further site investigations and consideration of issues raised by the community and other stakeholders through the public exhibition of the original EA, and through further consultation with the community.

The following sections outline the key changes made since the exhibition of the EA and should be read in the context of the EA. Figure 6-1 to Figure 6-5 provides an overview of the current layout with a comparison to the layout exhibited in the EA.

6.2.1 Wind Turbine Layout

There have been a small number of changes to the turbine layout. Wind turbine locations were reviewed following the receipt of submissions from public and government stakeholders along with requests from landowners involved in the project. A total of 6 turbines have been removed from the proposal and 20 have been relocated for reasons described in Table 6-1. No additional turbines have been added to the project and the relocated turbines were all moved within the existing survey area, ensuring impacts were minimised within the known ecological values assessed. The changes have also been highlighted in Figure 6-1.

The turbine capacity has been slightly increased from 3.5 to 3.6MW to reflect turbine models currently on the market and to maximise the energy benefit of the project. There would be no increase in the dimensions of the turbine (tower height and blade length).

Table 6-1 Changes to the turbine layout

Turbine No.	Distance relocated (m)	Bearing relocated	Reason for move
2	398	SW	Avoid native vegetation
14	43	NW	Inter-turbine spacing
16	277	W	Improve constructability, avoid native vegetation.
53	80	W	Inter-turbine spacing
69	Deleted		Landowner request to avoid existing airstrip.
77	3218	N	Landowner request to avoid existing airstrip.
78	80	N	Improve constructability, avoid native vegetation.
83	95	NW	Inter-turbine spacing, avoid native vegetation.
90	72	W	Improve constructability
92	Deleted		Landowner request to avoid existing airstrip.
102	199	SE	Improve constructability
117	69	N	Avoid native vegetation
118	29	N	Avoid native vegetation
119	585	W	Reduced Visual Impact for E3-3
120	86	NW	Inter-turbine spacing
155	2065	SW	Relocated the single turbine proposed within Liverpool Plains Shire Council.
168	65	W	Improve native vegetation separation.
179	Deleted		Avoid noise and shadow flicker impacts at residence F7-3
186	523	NW	Improve native vegetation separation. Reduce noise and visual impacts for neighbouring residents.
204	Deleted		Avoid noise and shadow flicker impacts at residence F7-3
214	68	NE	Avoid native vegetation.
216	Deleted		Avoid noise and shadow flicker impacts at residence F7-3
223	1946	SW	Avoid native vegetation.
224	123	SW	Improve constructability
228	Deleted		Avoid noise and shadow flicker impacts at residence F7-3
245	97	W	Avoid native vegetation.

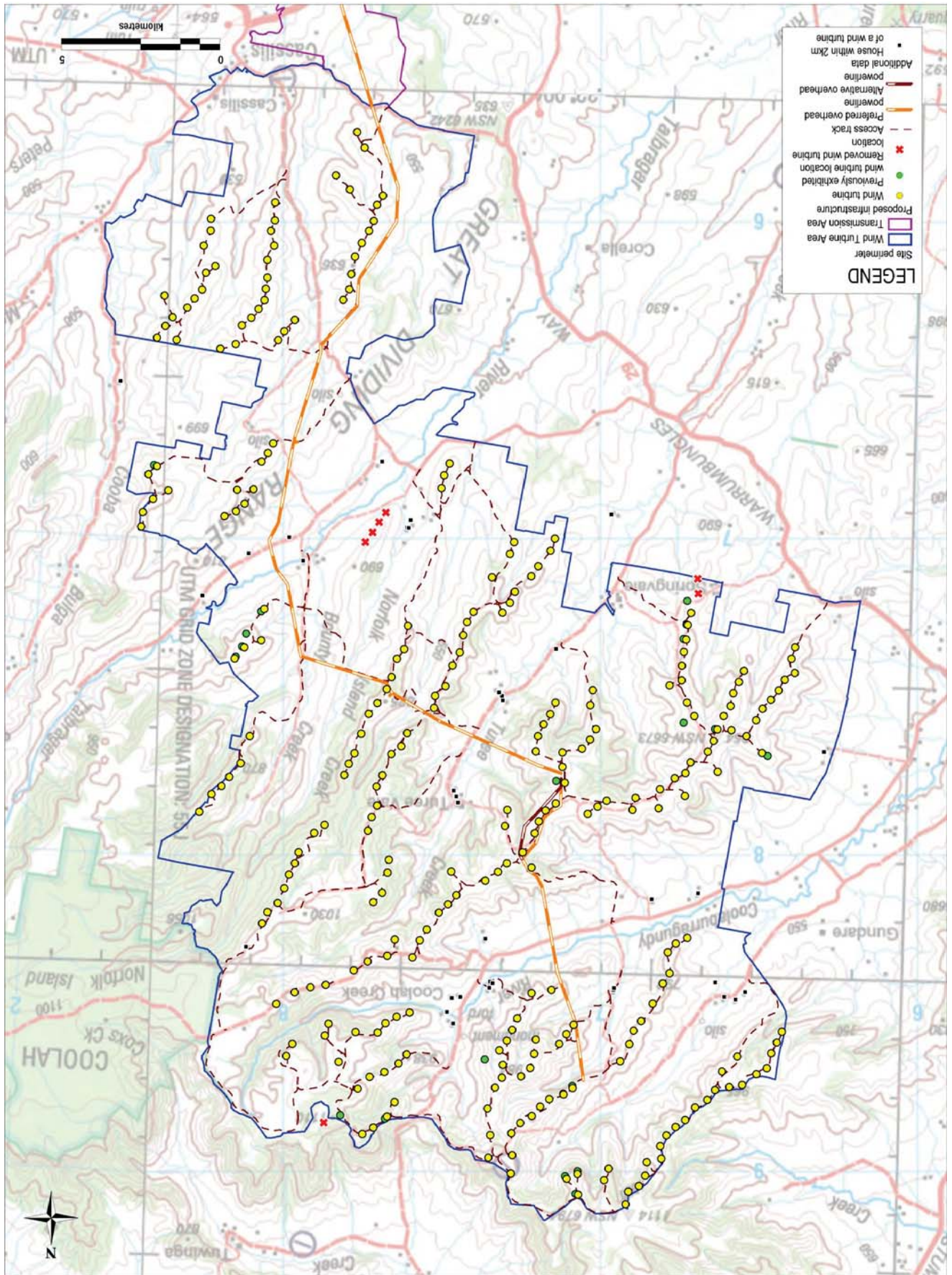


Figure 6-1: Changes to the turbine layout



Figure 6-2: Example of change to wind turbine layout

6.2.2 Powerline Layout

Two branches of the main powerline in the northern section of the site have been consolidated into one continuous line running from north to south. The overall number of substations on site and the temporary site facilities will remain the same, but their locations have been adjusted to accommodate the realignment of the main powerline. Likewise, the onsite overhead reticulation cabling has been adjusted to fit into the new design of one single powerline.

The net result of these changes means an overall reduction in the footprint required, in turn reducing the impact area for vegetation clearing. Some micro-siting of the main powerline has also occurred to ensure that the easement avoids wooded areas wherever practical.

The most noticeable change to the proposal is the alignment of the main powerline running from the southern boundary of the site down to the connection substation at Ulan. While a preferred and alternate route was submitted as part of the EA, this has largely been consolidated into a single route.

The final alignment of the preferred route has been achieved after extensive consultation with landowners and land authorities including:

- ▶ NSW Office of Environment and Heritage (OEH) which manages the State Conservation Areas through which the powerline will pass;
- ▶ NSW Crown Lands - which manages paper and crown road corridors;
- ▶ Ulan Coal Mine Limited - which is a significant landholder within the corridor; and
- ▶ the Mudgee Local Aboriginal Land Council and NSW ALC which holds an undetermined land claim in relation to portions of the powerline corridor.

A contiguous powerline route which is commercially, technically and environmentally acceptable has now been identified.

A detailed summary of the process the Proponent has gone through to minimise the impacts from the main powerline and a summary of the alternate options considered is contained in Section 5.

Table 6-2 Changes to the powerline layout

Item No.	Comment
Changes within the wind farm site	
1	330kV line from proposed Substation - Coolah Tops to Substation - Bounty Creek (Alternate) removed as part of the simplification of the main powerline and to minimise visual impact across the site.
2	330kV line moved between 1-3.5km east to connect the relocated Gundare and Coolah East Substations
Changes to the Transmission Line from wind farm site to connection substation at Ulan	
3	330kV line relocated north-west through Durridgerie SCA to reduce ecological impacts. The route then continues west to cross Ulan road near Cliffdale Road.
4	330kV line relocated to western side of Ulan road between Cliffdale Rd and Durridgerie Rd.
5	330kV line realigned to avoid Square Tail Kite nest (approximately 4km north of connection substation)

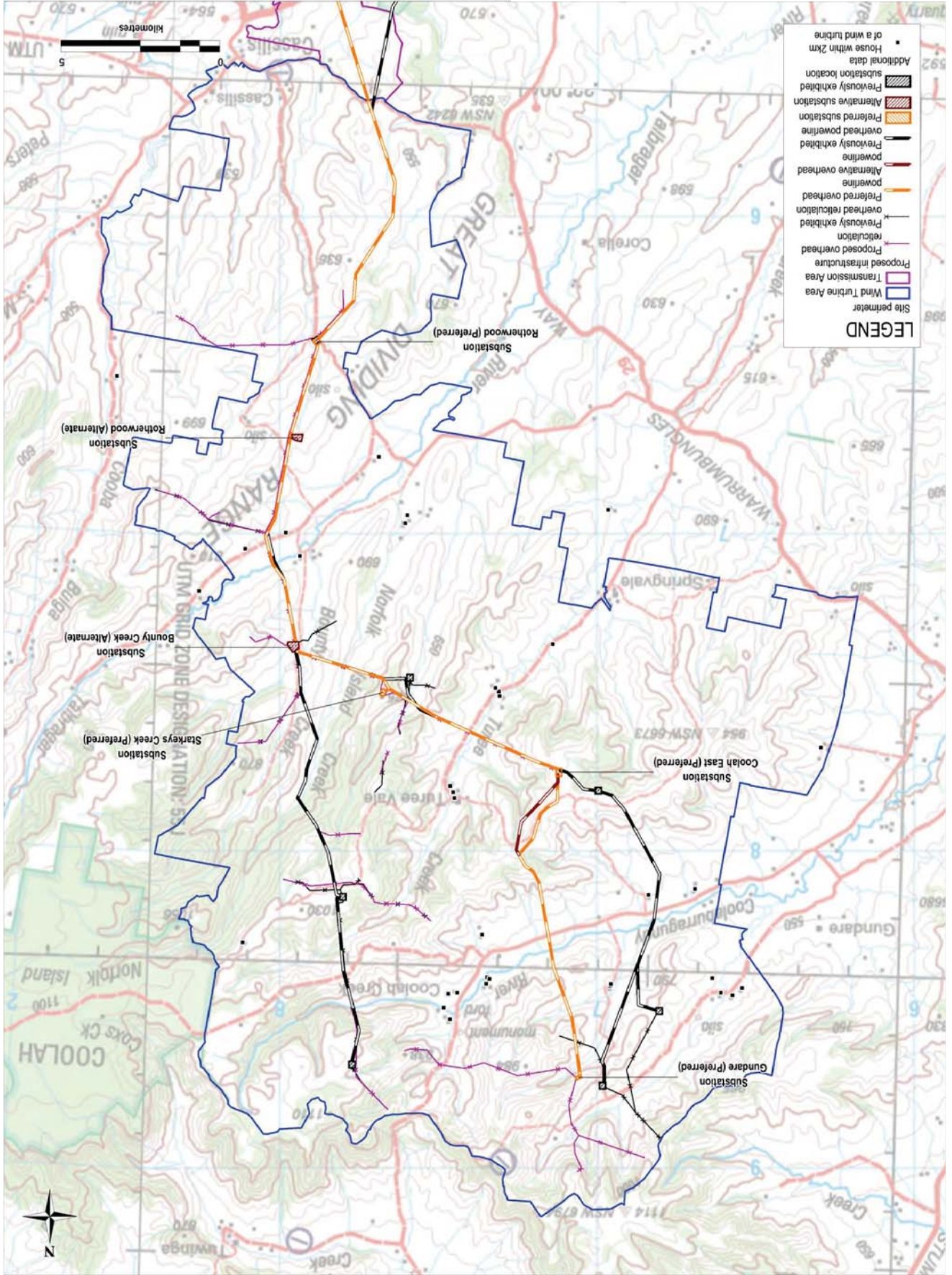


Figure 6-3 Changes to the Powerline layout – Wind Farm Area

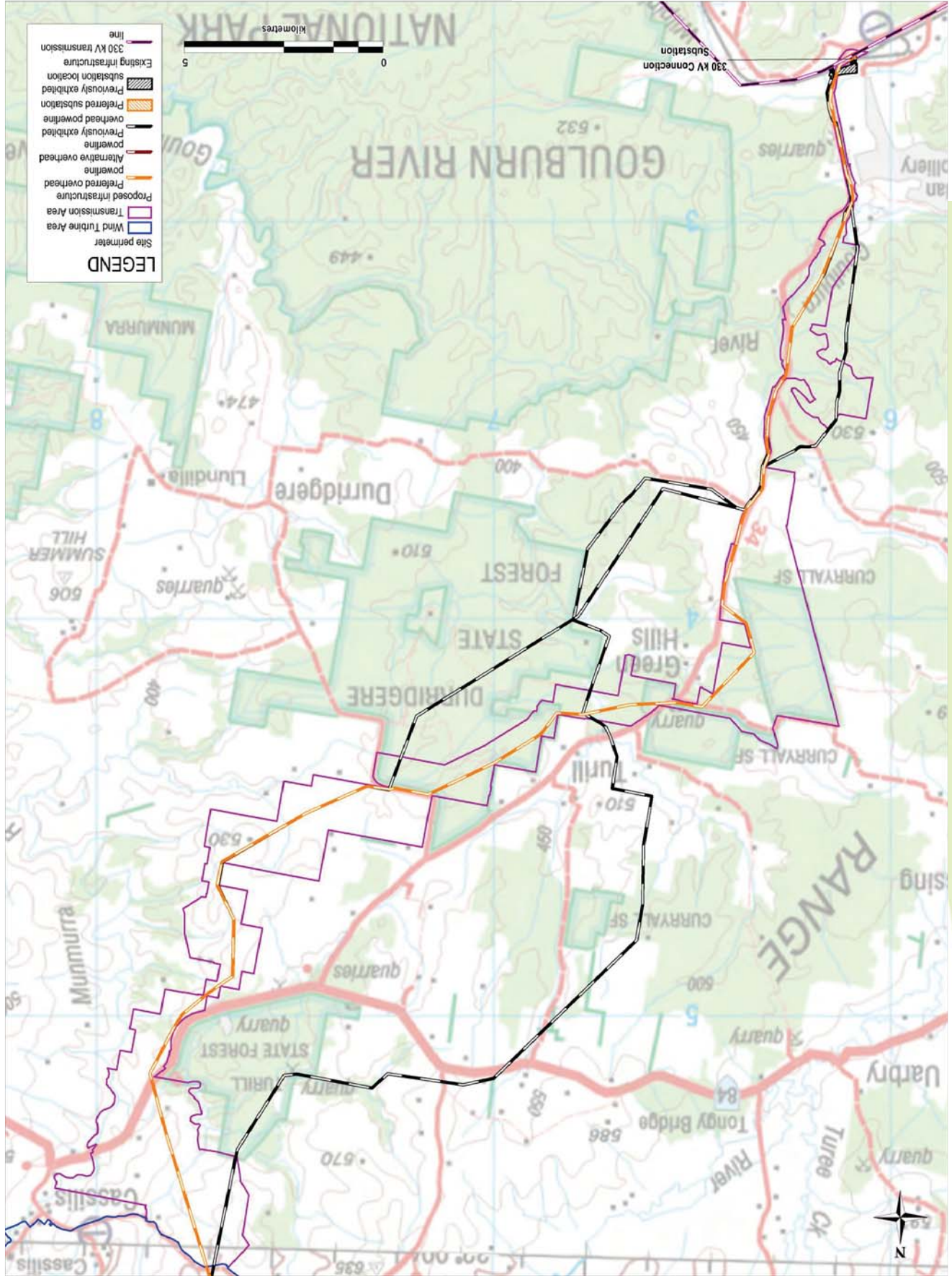


Figure 6-4: Changes to the Powerline layout - Transmission Area

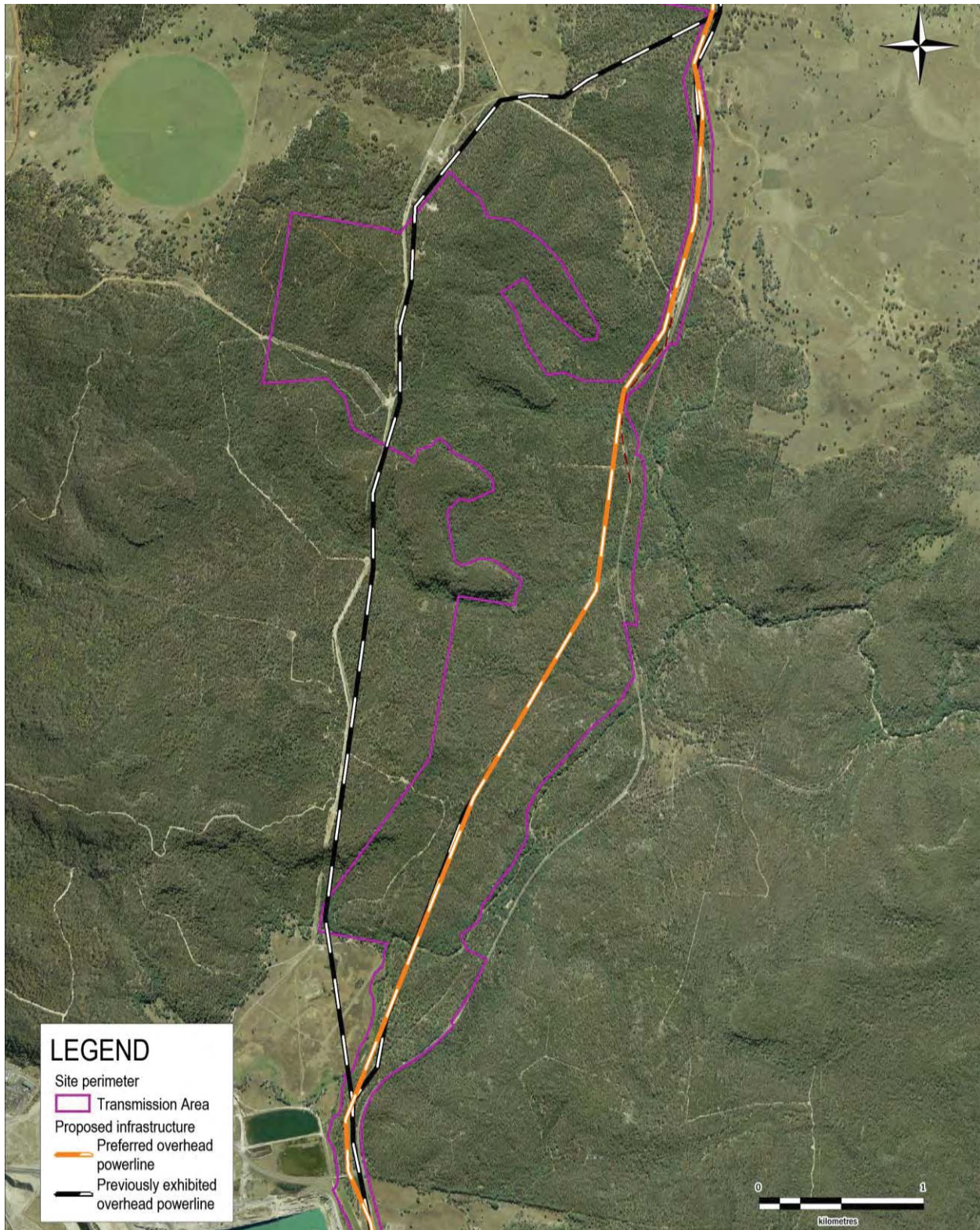


Figure 6-5: Example of changes to the powerline route

6.2.3 Connection Substation

The connection substation has been relocated and is now adjacent to the existing 330kV transmission line from Wellington to Wollar on land currently owned by Ulan Coal Mine Limited (UCML). The Proponent was advised by UCML that the preferred and alternate options presented in the EA created challenges to ongoing and future operations at the mine. In consultation with UCML the connection substation was relocated to a more suitable location south of the rail line.

Land Subdivision

The new location of the proposed substation is shown in Figure 6-6. It is located on Lot 4 in Deposited Plan 1214133 (4/1214133). This proposal also seeks approval to subdivide the land shown in Figure 6-6 to create a new lot for the connection substation and associated facilities.

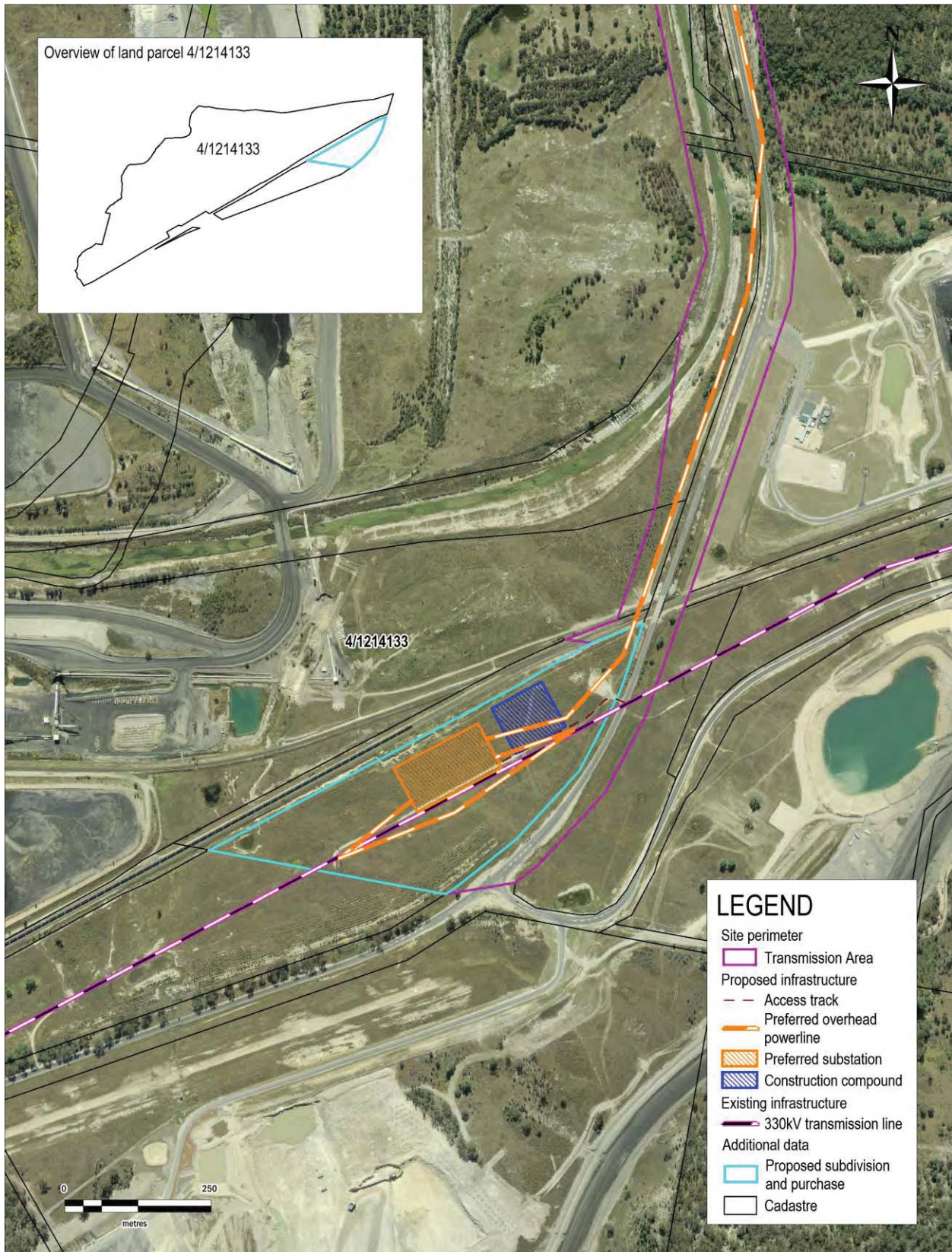


Figure 6-6: Proposed connection substation and subdivision

6.2.4 Collection substations and temporary construction facilities

The EA presented six collection substations on the wind farm site with several alternate options. As part of design development and as a result of simplifying the main powerline, the number of proposed substations has been reduced to four preferred locations with two alternate locations. Figure 6-3 shows how the main powerline simplification has enabled the reduction in substations and the new locations compared to those exhibited in the EA.

Table 6-3 Changes to the O&M facility, substation, concrete batch plant and other infrastructure layout

Item No.	Comment
1	Gundare Substation (Preferred) relocated 785m East to accommodate simplification of the main powerline
2	Turee North Substation (Preferred) removed - redundant substation option removed due to simplification of main powerline.
3	Coolah Tops Substation (Preferred) removed - redundant substation option removed due to simplification of main powerline.
4	Coolah East Substation (Preferred) relocated 1,360m South East to accommodate simplification of the main powerline
5	Gundare Substation (Alternative) removed - redundant substation option removed due to simplification of main powerline.
6	Starkeys Creek Substation (Alternate) relocated 960m North East and reclassified as Starkeys Creek (Preferred) as part of design development resulting from the simplification of the main powerline.
7	Bounty Creek Substation (Preferred) reclassified as Bounty Creek Substation (Alternative) as part of design development resulting from the simplification of the main powerline.
8	Construction compound and concrete batch plant situated between turbines 62 and 139 removed (On Coolah Creek Rd) in response to submissions received by nearby residents.
9	New construction compound location proposed 2,000m south of turbine 115 to replace removed compound on Coolah Creek Rd. New location provides improved screening from local road and nearby residents.
10	Construction compound and concrete batch plant situated between turbines 201 and 126 removed (on Turee Vale Rd)
11	New construction compound and concrete batch plant locations proposed 1,250m S of turbine 44 to replace removed compound on Turee Vale Rd. New location provides improved screening from local road and nearby residents.
12	New site access point with construction compound and concrete batch plant locations proposed 1,000m SW of turbine 23. Improved access to turbine locations. Construction compound would be used for turbine component delivery and would reduce the number of movements for oversized and concrete vehicles on local roads
13	New site access point with construction compound and concrete batch plant locations proposed 1,850m SE of turbine 5. To reduce vehicle movements on local roads by maximising the internal access tracks created for the project.
14	New construction compound location proposed 1,500m SE of turbine 10. Alternate compound location for new site access point.
15	330kV connection substation (Preferred) relocated 650m SW. Relocated at the request of the landowner Ulan Coal Mine Limited for operational reasons.
16	330kV Connection Substation (Alternative) removed. Redundant substation option removed following consultation with Ulan Coal Mine Limited.
17	Construction compound adjacent to 330kV Connection Substation (Alternative) relocated 400m S adjacent to 330kV Connection Substation (Preferred). Relocated along with preferred Connection Substation.

6.2.5 Overhead and Underground Reticulation

Overhead and underground electrical reticulation has been amended as a result of the changes to turbine locations and electrical infrastructure such as the substations and main powerline. Overhead reticulation has been utilised to accommodate the simplification of the main powerline and generally is used when underground reticulation is not practical, for example when crossing rivers or valleys. Underground reticulation generally follows the access tracks between turbines and substations and any changes to the access track layout include relocation of the associated underground reticulation.

Table 6-4 Changes to Overhead and Underground Reticulation

Item No.	Comment
1	33kV preferred and alternate line moved from turbine 45 north to 98 to avoid areas used for aerial agriculture
2	33kV line added from turbine 154 to new proposed northern section substation to allow the removal of 330kV line and associated substation.
3	New 33kV line added to facilitate the simplification of the 330kV powerline between 184 and 207

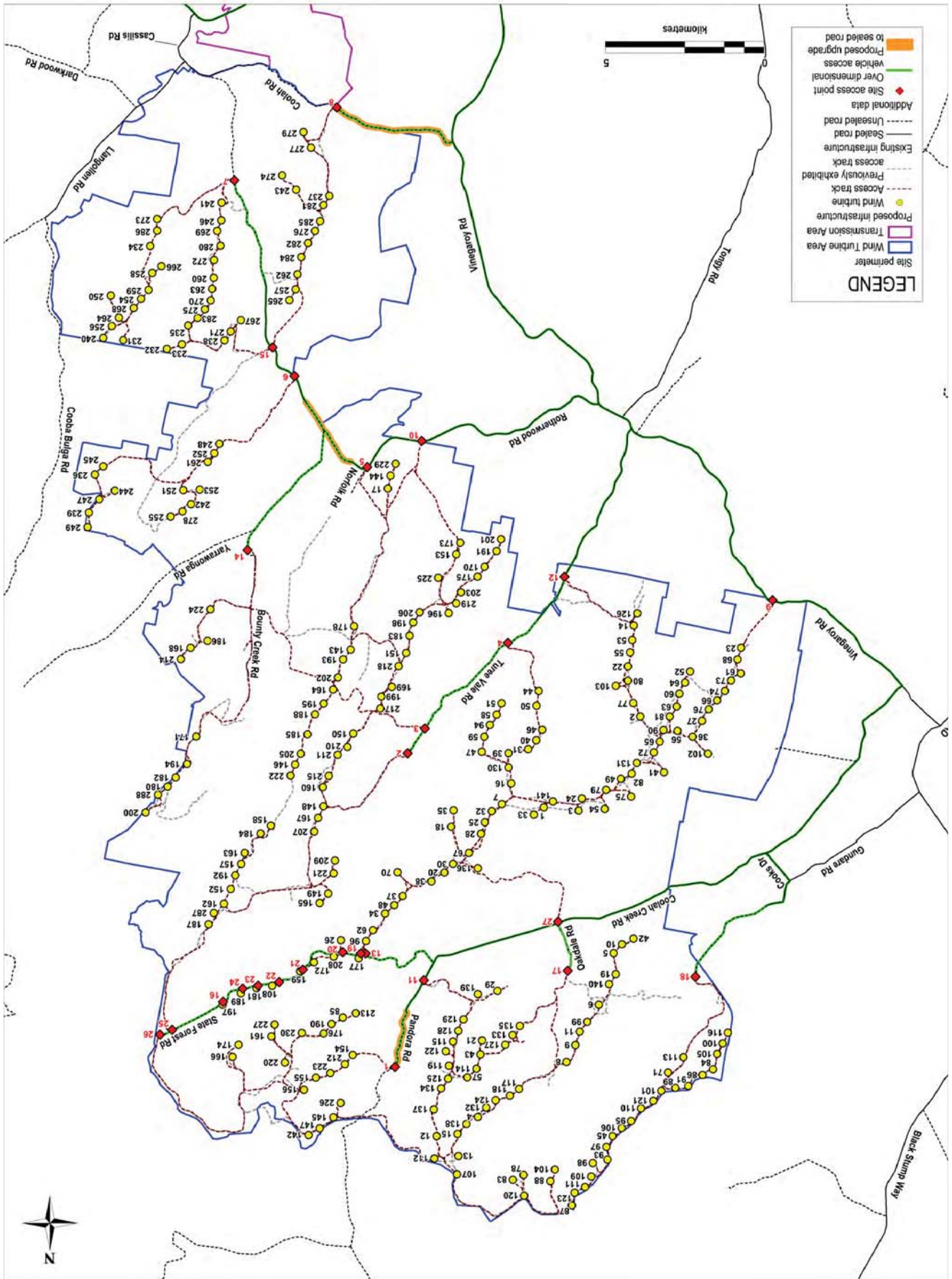
6.2.6 Site Access

Access tracks across the wind farm have been updated to accommodate the relocation of other infrastructure such as substations and construction compounds. Additional site access points are proposed to address concerns about the location of construction compounds and traffic on local roads. Two new site entry points outlined in Table 6-5 will reduce the number of vehicle movements on Turee Vale Rd and Coolah Creek Rd and enable more suitable locations for construction compounds and batching plants.

Table 6-5: Changes to site access

Item No.	Comment
1	Access track from turbine 262 to Rotherwood Rd relocated to provide direct access to the proposed <i>Substation – Rotherwood</i> .
2	Track from <i>Substation – Rotherwood</i> to turbine 255 removed following design development.
3	Access track to turbine 179 not required after four turbines were removed.
4	Track to <i>Substation - Starkeys Creek</i> removed after substation was relocated.
5	Alternate access track to turbine 200 removed. Access from construction compound at Substation – Bounty Creek through to turbine 200 was redesigned to minimise total distance and vegetation clearing.
6	Access Track between turbine 222 and 158 removed to avoid native vegetation clearing.
7	Track to turbine 69 removed after the turbine was deleted.
8	Access track between turbine 66 and 52 removed to avoid vegetation clearing.
9	Access Track between turbine 131 and 60 removed and surrounding tracks simplified to reduce the overall footprint and vegetation clearing.
10	Access Track between turbine 7, 1 and 3 removed and surrounding tracks simplified to reduce the overall footprint and vegetation clearing.
11	Access tracks from Gundare Road and Site Entry Point 17 to the <i>Substation – Gundare (alternate)</i> no longer required after substation was removed.
12	Access track leading to the previous location for turbine 155 removed after the turbine was relocated.
13	New Access Track from Site Entry Point 10 (Rotherwood Road) to turbine 173 and turbine 17 to improve constructability of associated turbines.
14	New Access Track from Site Entry Point 9 to turbine 23 to improve constructability of associated turbines and minimise the number of turbine components delivered via Turee Vale Road.
15	New Access Track from Site Entry Point 1 to turbine 154 to improve constructability of associated turbines.
17	New Access Track from <i>Substation – Starkeys Creek</i> to turbine 217 and Site Entry Point 14 due to design development following the simplification of the Main Powerline and associated collection substations.
18	New Access Track from Site Entry Point 17 to <i>Substation – Gundare</i> to replace the track removed (Item no. 11) following design development after the simplification of the main powerline and associated substations.
19	New Access Track from Site Entry Point 27 to turbine 136 to provide direct access from batching plant to turbine locations and minimise the number of vehicle movements on public roads.

Figure 6-7: Changes to site access and access tracks



6.2.6.1 Upgrades and Maintenance of Local Roads

The proponent has committed to upgrading, widening or sealing sections of the roads identified on the delivery route as necessary to meet design standards for delivery of turbine components. The Proponent will be responsible for repairing any damage caused to local roads as a result of construction traffic by way of pre and post dilapidation reports. A full list of the proposed upgrades can be found in Appendix E in the updated Traffic and Transport Assessment.

Table 6-6 and Figure 6-8 show the roads that have been identified for delivery of turbine components.

Table 6-6: Over-dimensional and over-mass route

Road	Purpose	Start - End	Length (m)	LGA
Vinegaroy Rd	Primary Access Route	Golden Hwy to Coolah Creek Road	31,850	Upper Hunter (UHSC) and Warrumbungles (WSC)
Coolah Rd	Access Point 8	Vinegaroy Rd to Access Point 8	4,010	UHSC
Rotherwood Rd	Access Points 10, 5, 6, 15 & 7	Vinegaroy Rd to Access Point 7	19,580	UHSC and WSC
Yarrowonga Rd	Access Point 14	Rotherwood Rd to Bounty Creek Rd	4,020	UHSC
Bounty Creek Rd	Access Point 14	Yarrowonga Rd to Access Point 14	740	UHSC
Turee Vale Rd	Access Point 12, 4, 3 & 2	Vinegaroy Rd to Access Point 2	13,030	WSC
Coolah Creek Rd	Access Point 11	Vinegaroy Rd to Pandora Rd	18,350	WSC
Cook Drive	Access Point 18	Coolah Creek Rd to Gundare Rd	1,090	WSC
Gundare Rd	Access Point 18	Cooks Dr to Access Point 18	4,660	WSC
Oakdale Rd	Access Point 17	Coolah Creek Rd to Access Point 17	1,620	WSC
Pandora Rd	Access Point 1	Coolah Creek Rd to Access Point 1	3,680	WSC
State Forest Rd	Access Point 13, 16 & 19-26	Coolah Creek Rd to Access Point 26	10,380	WSC
Ulan Rd	Access Point 32	Golden Highway to Access Point 32	29,500	Mid-Western Shire Council

6.2.7 Wind Monitoring Masts

The proponent has installed a number of temporary monitoring masts as outlined in Table 6-7. This proposal seeks the ongoing approval of wind monitoring masts at these locations, as well as further temporary and permanent wind monitoring masts for wind speed verification, weather and general monitoring purposes. All masts would be installed within the development envelope.

Table 6-7 Temporary monitoring mast locations

Mast Name	Mast Height	Easting	Northing
LVP1	71 m	766406	6476283
LVP3	80 m	772864	6480233
LVP4	80 m	781159	6463372
LVP5	80 m	776064	6472822
LVP7	80 m	768418	6490132
COO	40 m	772984	6472178

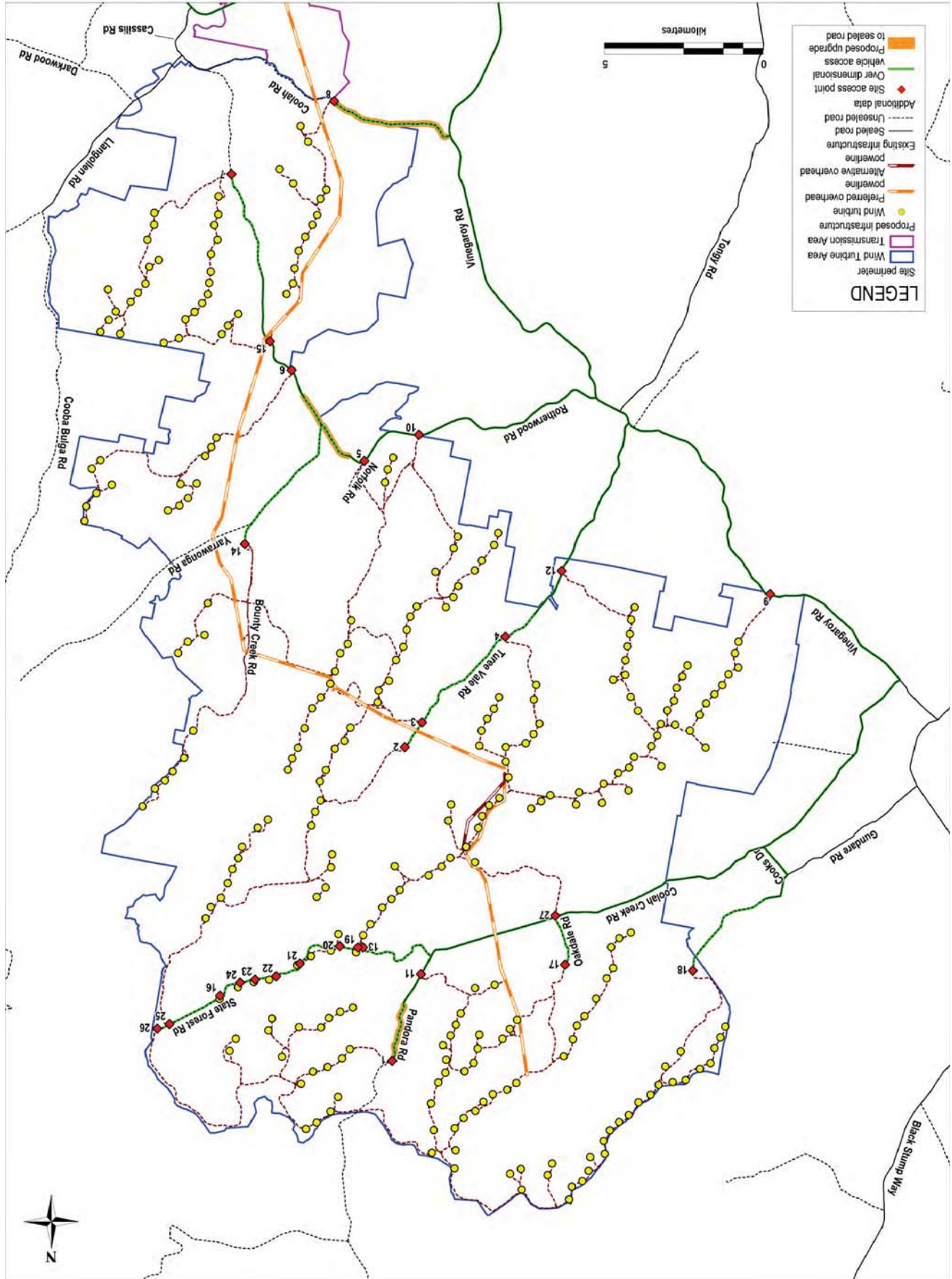


Figure 6-8 Proposed over-dimensional and over-size site access – Wind Farm Area

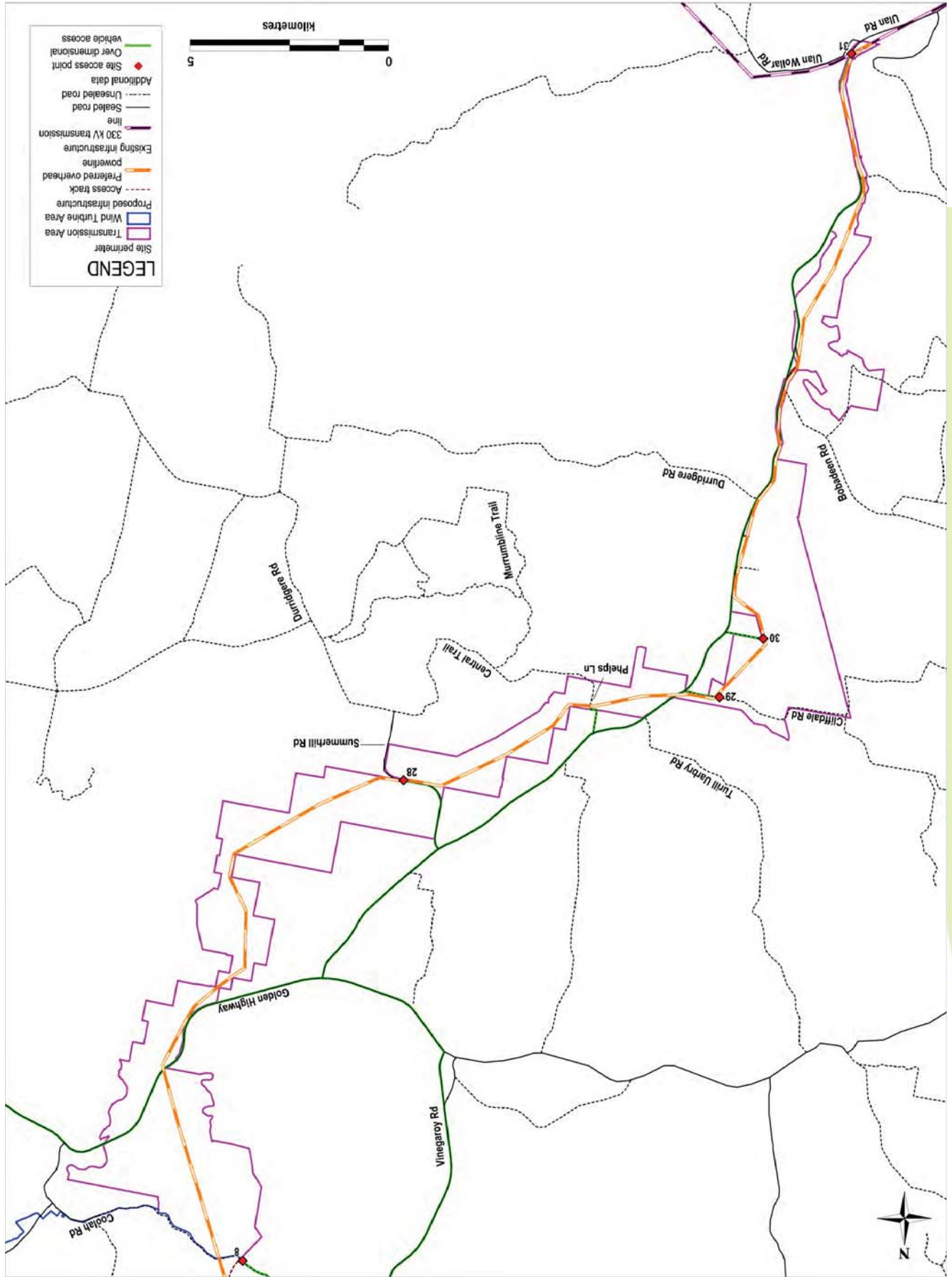


Figure 6-9 Proposed over-dimensional and over-size site access - Transmission Area

6.3 Revised infrastructure layout

The revised infrastructure layout in this report has been through a number of design iterations since the project was displayed on public exhibition in 2014. The design process has focused around four core principles:

- ▶ Minimising and/or avoiding where possible native vegetation and sensitive environmental areas;
- ▶ Maximising positive impacts (clean energy production and greenhouse gas reduction);
- ▶ Incorporating practical limitations in relation to construction and operation of the site; and
- ▶ Responding to feedback from host landowners, community members and stakeholders.

The revised layout includes 282 wind turbine locations together with the ancillary structures, access tracks and electrical infrastructure required to connect the project into the existing national electricity network. The proposed infrastructure layout presents a single option for the main powerline connecting the wind farm site to TransGrid's transmission network, one that reduces ecological impacts from both the preferred and alternate options displayed in the EA.

An overview of the revised layout can be seen in Figure 6-10 and detailed figures showing all proposed infrastructure can be seen in Figure 6-11 through Figure 6-18.

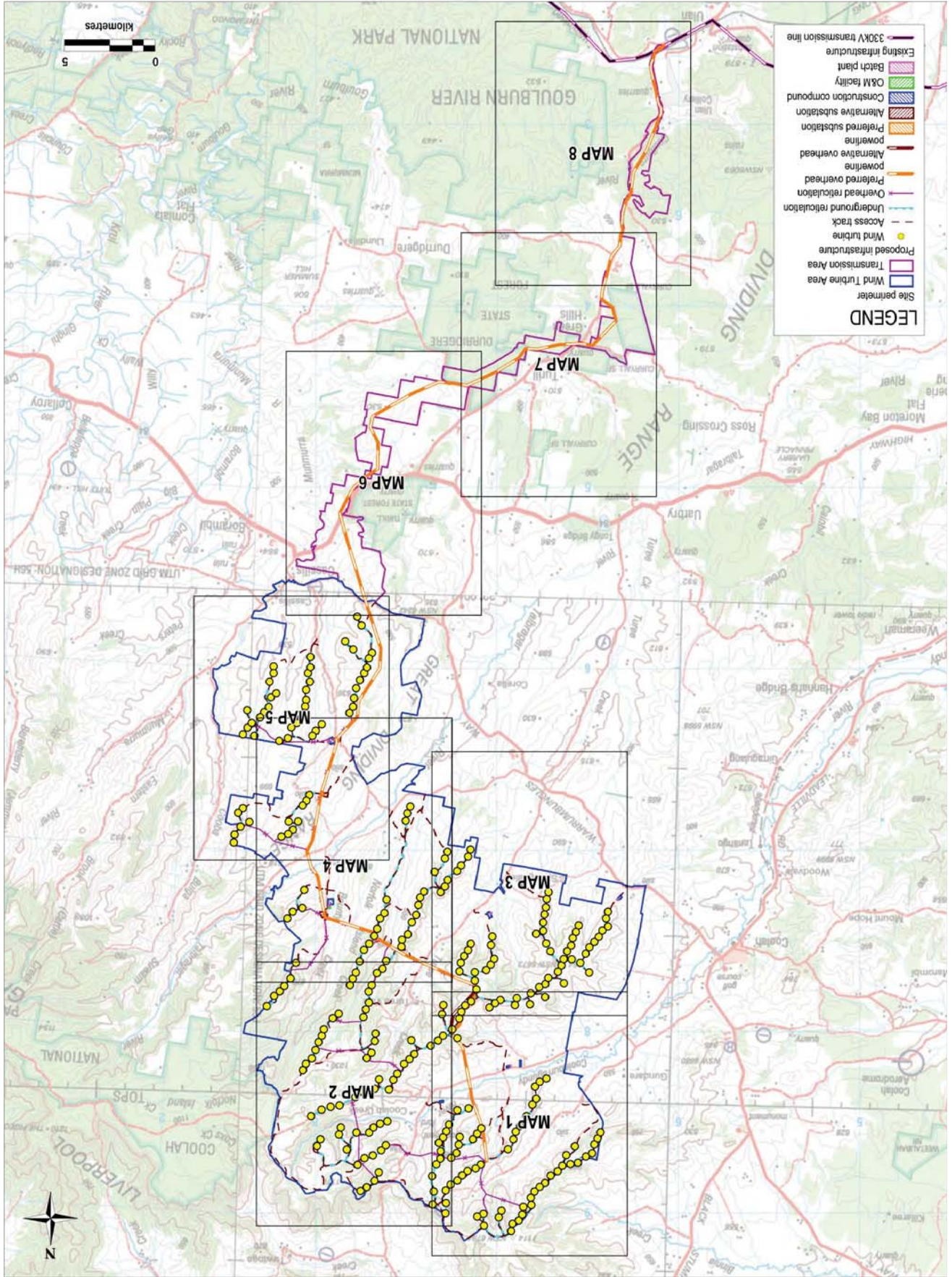


Figure 6-10 Overview of the revised layout for the Liverpool Range Wind Farm

Figure 6-11 Proposed infrastructure layout - Map 1

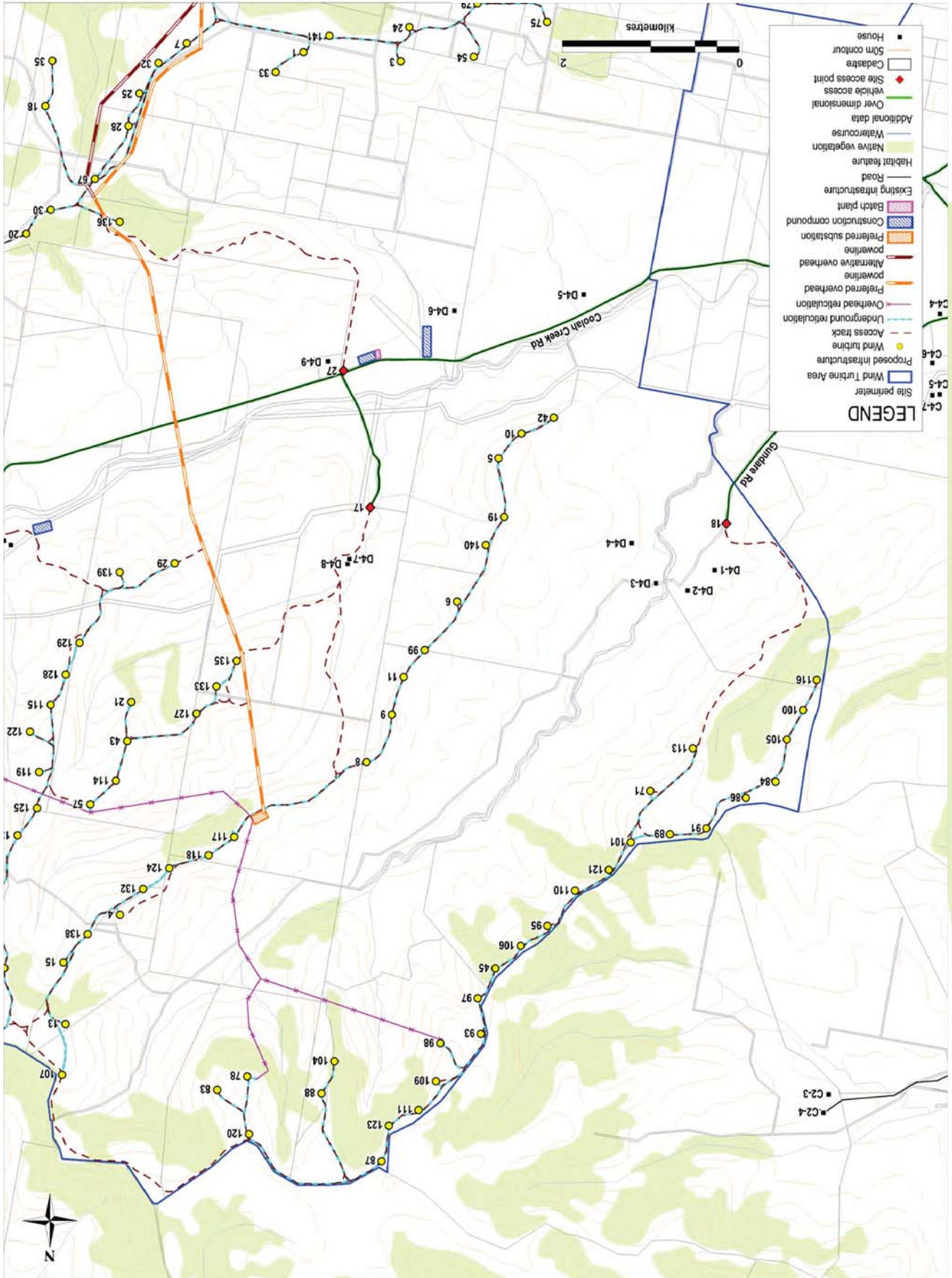


Figure 6-12 Proposed infrastructure layout - Map 2

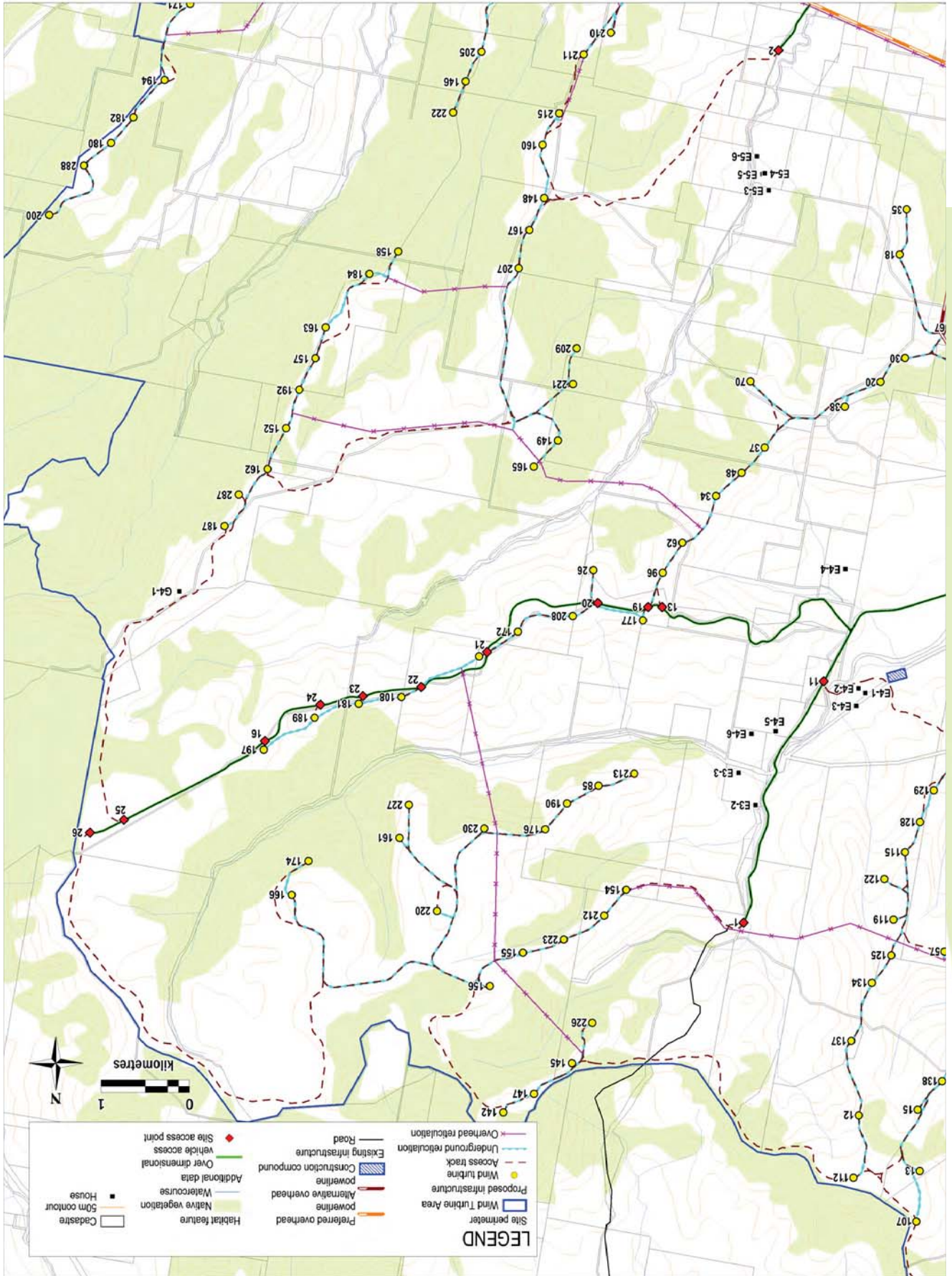
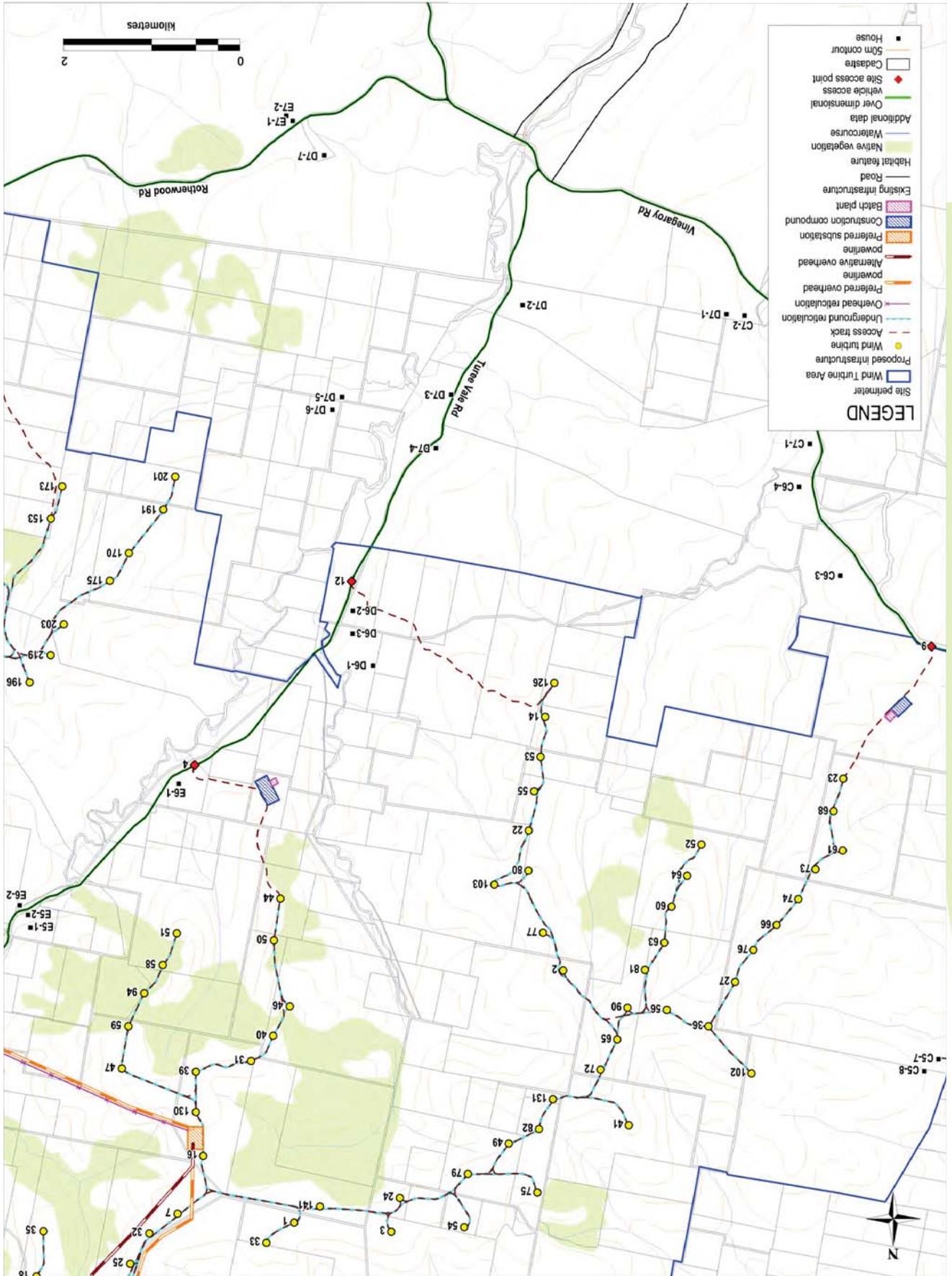


Figure 6-13 Proposed infrastructure layout - Map 3



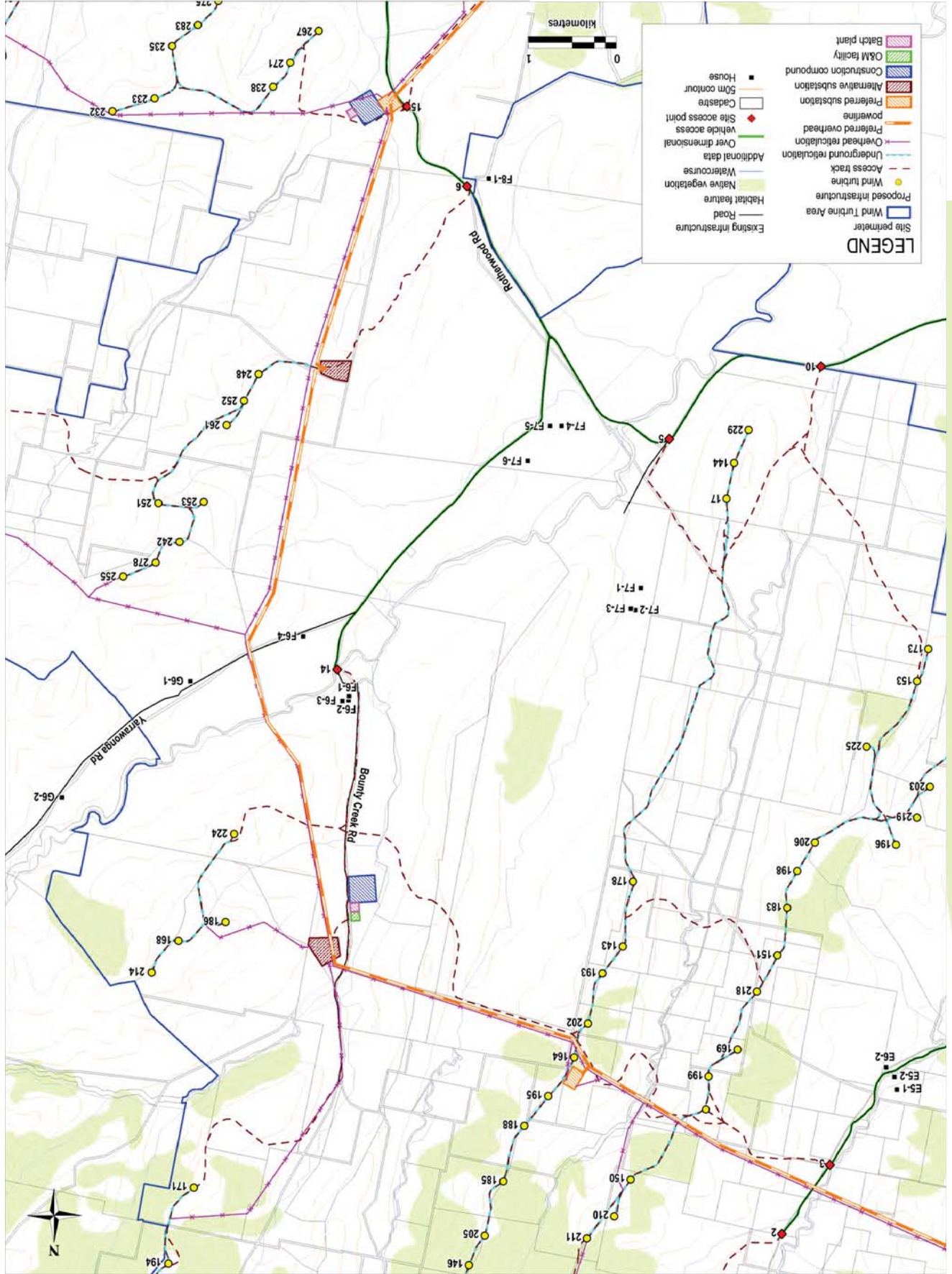
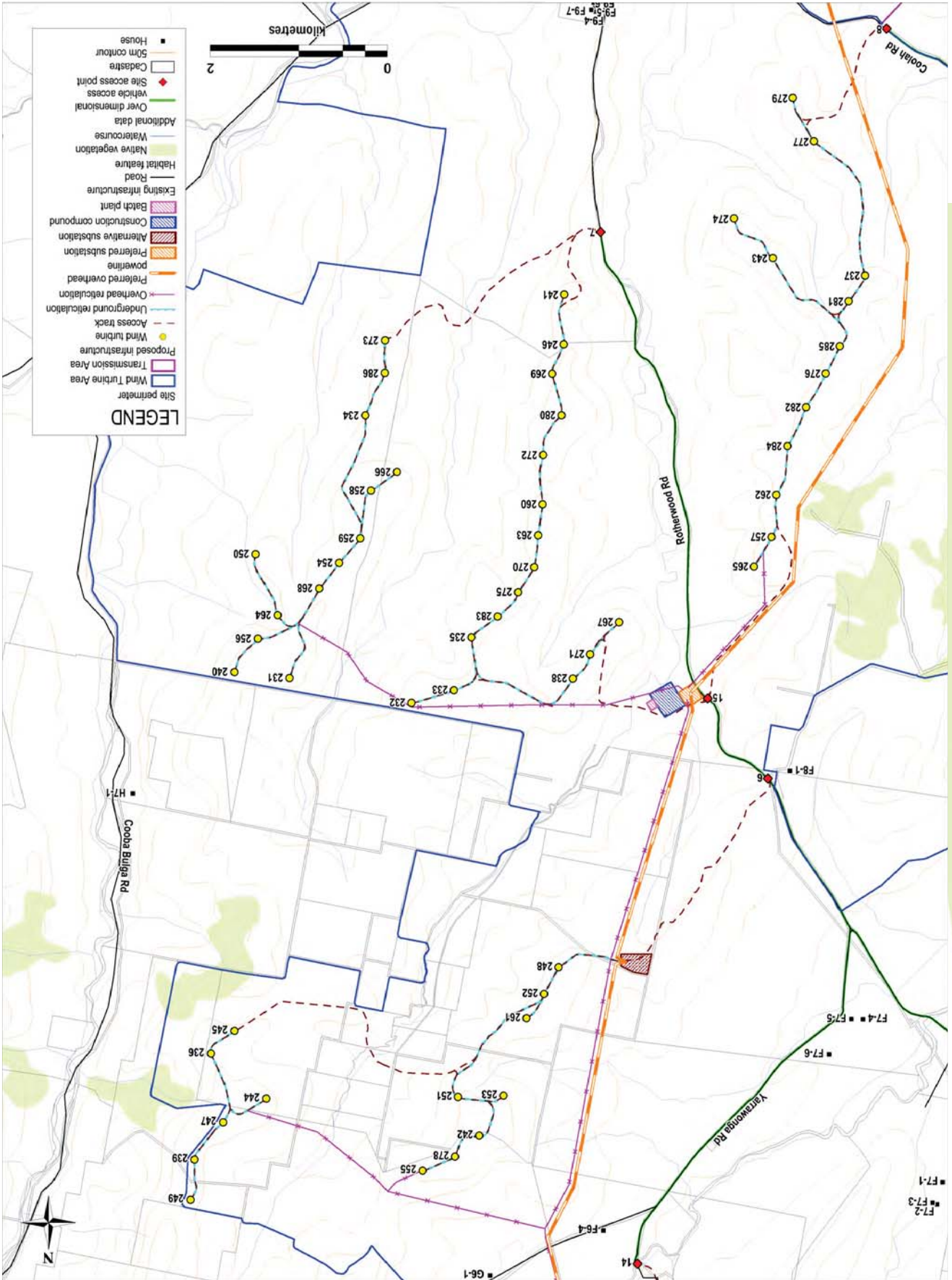


Figure 6-14 Proposed infrastructure layout - Map 4

Figure 6-15 Proposed infrastructure layout - Map 5



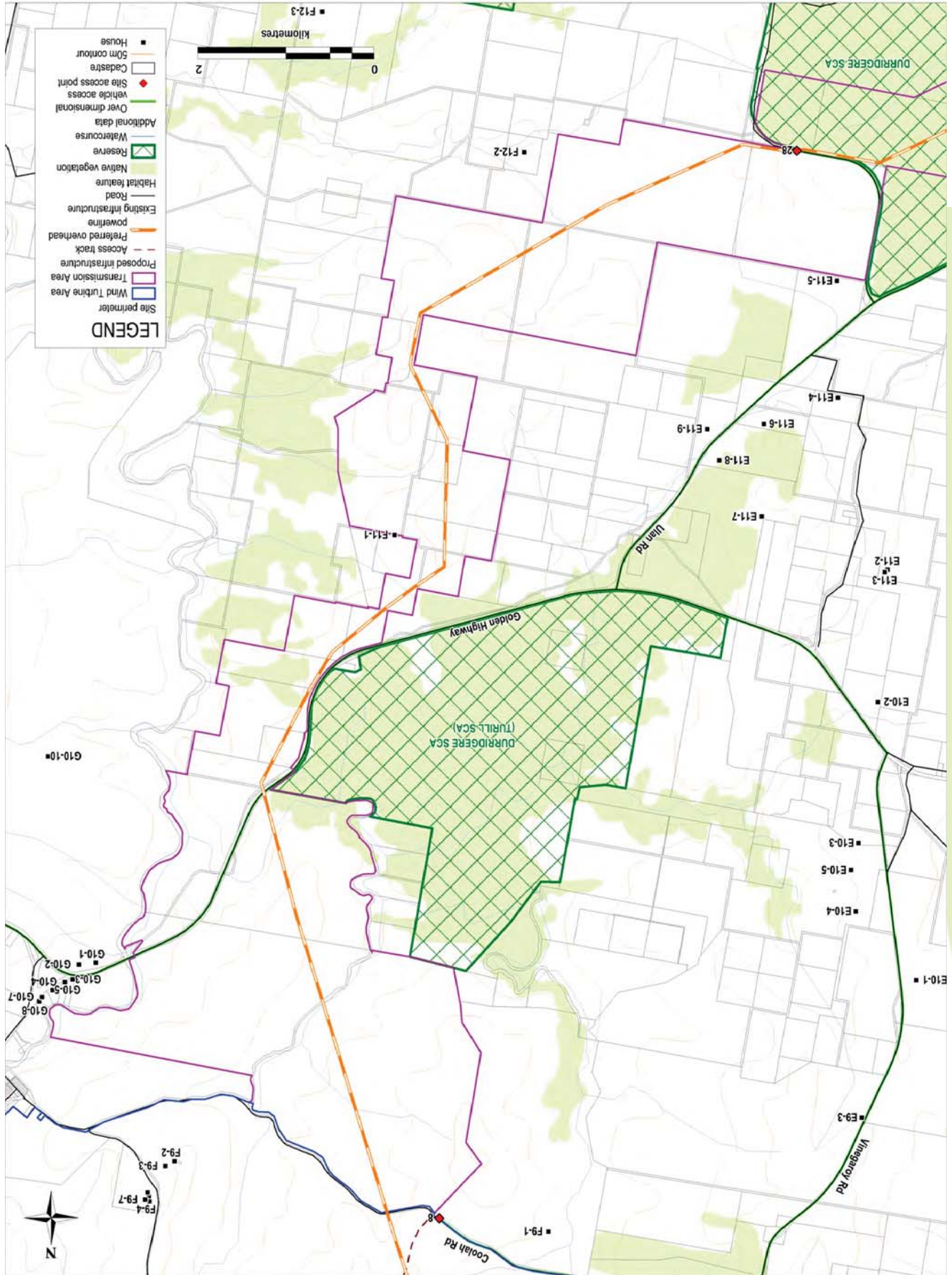


Figure 6-16 Proposed infrastructure layout - Map 6

Figure 6-17 Proposed infrastructure layout - Map 7

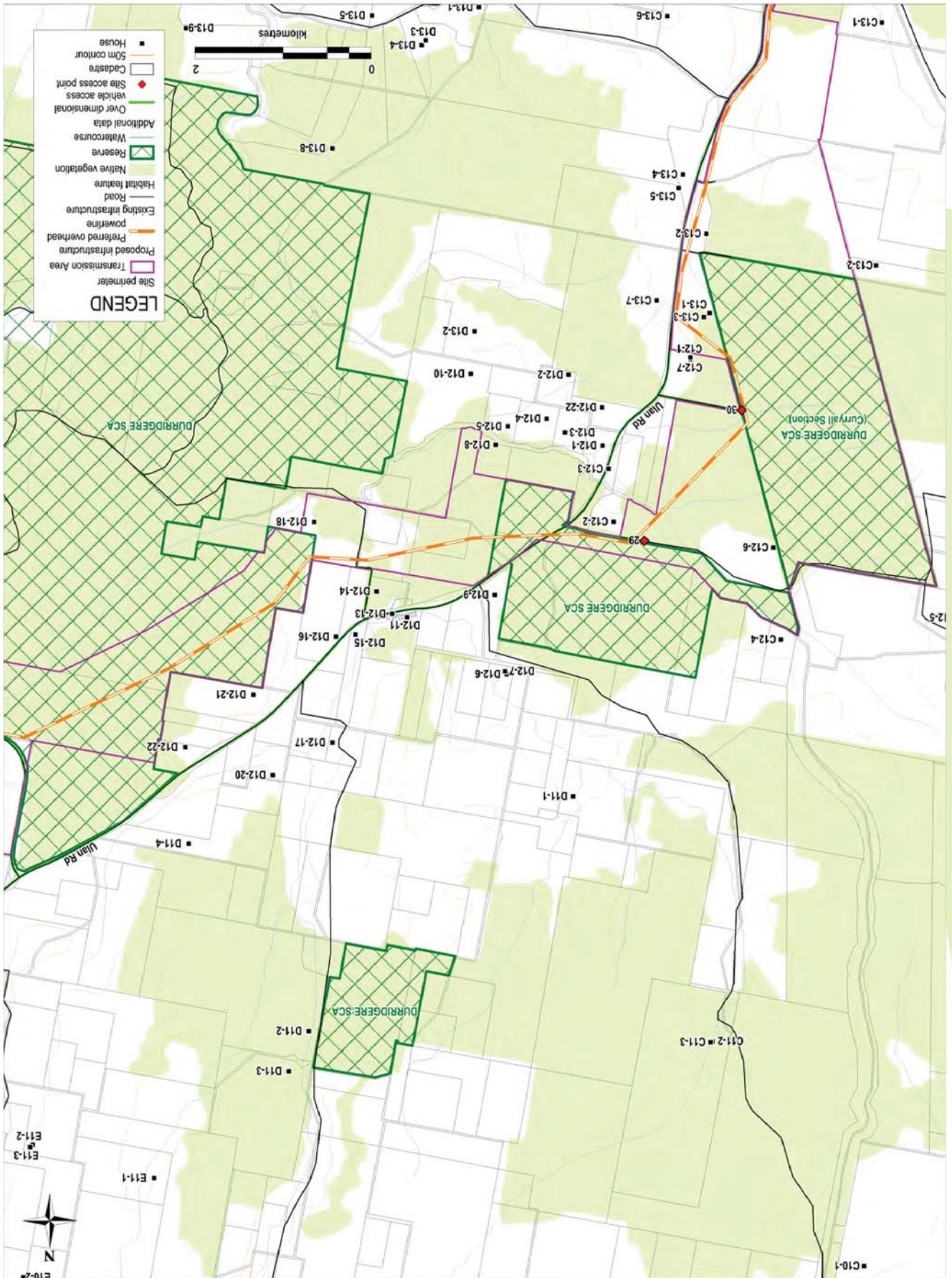
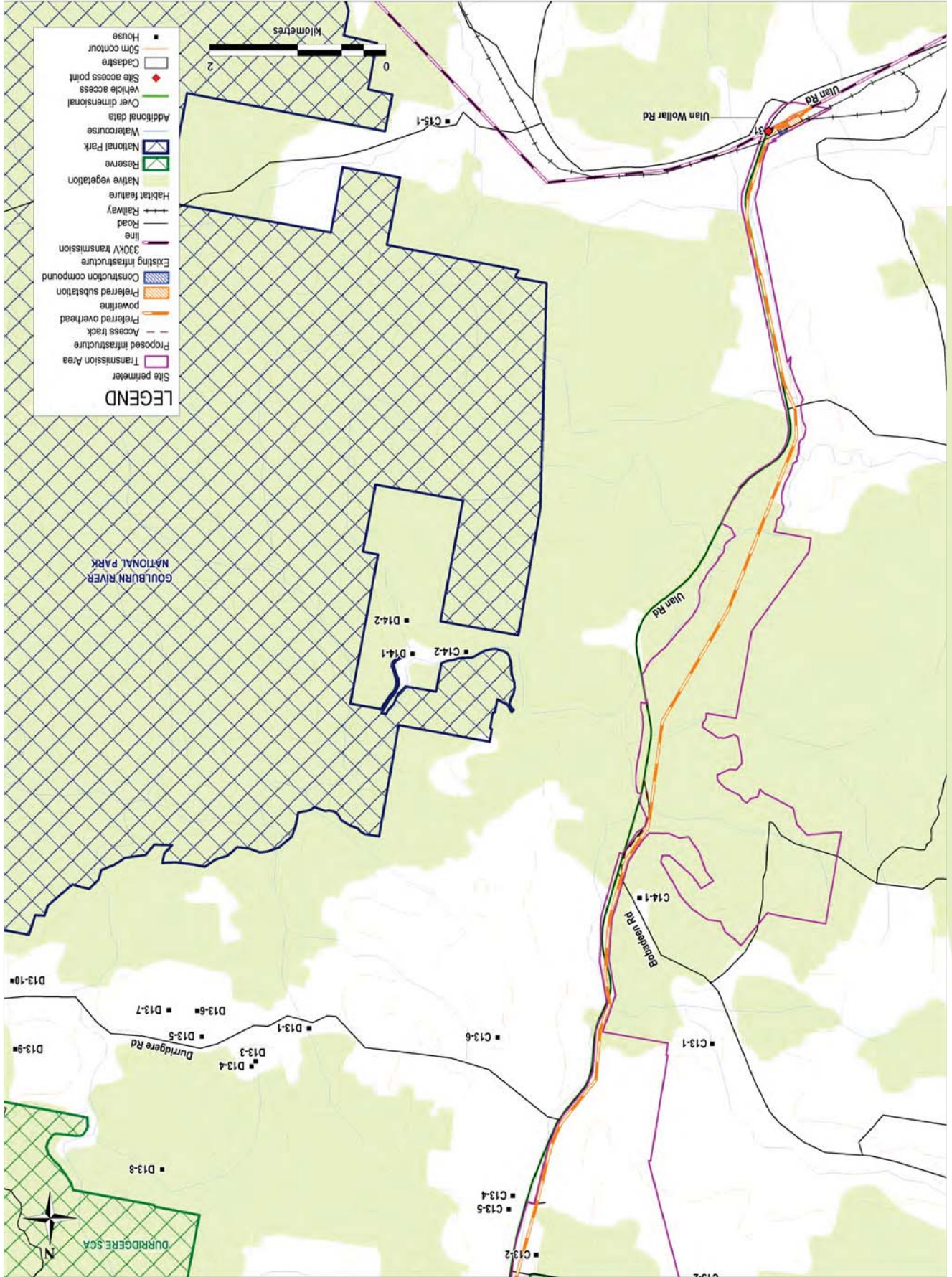


Figure 6-18 Proposed infrastructure layout - Map 8



6.3.1 Development Envelope and micro-siting

In developing the project, allowance has been made for final micro-siting of infrastructure for engineering, commercial or environmental reasons. Micro-siting would be carried out post approval but prior to construction and take into consideration final wind turbine selection and other issues.

To provide greater certainty about the area within which the proponent can micro-site infrastructure, a Development Envelope has been defined within which all equipment is required to be located using the principles outlined below. The Development Envelope maps (Figure 6-19 to Figure 6-27) indicate the area within which the Proponent seeks approval to microsite infrastructure without needing to request a modification to the Development Application. The Development Envelope has been defined in two sections:

- ▶ Area that has been surveyed with the impacts assessed (all infrastructure currently proposed within this area), and
- ▶ Area adjacent to land surveyed that is suitable for micro-siting but would be surveyed and assessed if required (ie. if infrastructure was micro-sited within this area).

The ability to relocate wind turbines within the Development Envelope allows the overall project benefits to be maximised. Wind turbines have minimum spacing requirements between them to optimise energy yield and avoid early degradation of the equipment. These minimum spacing requirements relate to the design and physical size of the selected wind turbine. Accordingly, the final selection of the turbine model and any micro-siting of a turbine location will likely require adjustments to the location of nearby turbines.

In preparing the Development Envelope, wind turbine relocation is limited to movement along ridges where wind turbines have already been proposed:

- ▶ The Development Envelope takes into consideration the topography of the land by following existing ridgelines.
- ▶ Consistent with previous approvals, maximum “sideways” relocation distance (across ridgelines) is 250m from the proposed turbine locations, while the flexibility to relocate wind turbines along ridgelines is retained to ensure minimum turbine spacing requirements can be maintained.
- ▶ The width of the Development Envelope is adjusted to suit the terrain and known environmental limitations - wider where the ridge lines are wider / lower side grades, and narrower where ridgelines are narrower with steeper side grades.

In relation to other infrastructure, the Development Envelope is limited to land which contains proposed infrastructure (both permanent and temporary) and allows a maximum relocation distance of approximately 250m from the centreline of linear infrastructure (access tracks and powerlines) and from the boundary of substations, compounds and batch plants.

A number of constraints were then considered and, where necessary, applied to the Development Envelope:

- ▶ Biodiversity - All areas identified as native vegetation in “Moderate-Good condition” or better were excluded from the Development Envelope except areas where existing turbines have been proposed (noting that such areas have appropriate management commitments). Note, all conditions set out in the SOCs related to protection and management of biodiversity (including offset obligations) will apply at all times to turbines relocated within the Development Envelope.
- ▶ Archaeology - The nature of the site, with low concentration scatter of archaeological items, means that no specific sites were identified with a requirement to be avoided. Accordingly, the Development Envelope is not affected by Archaeology impacts.
- ▶ Visual Impacts - Minor relocations of wind turbines along existing ridgelines within the Development Envelope will in general have minimal visual impact from a distance. However, in order to minimise any visual impacts, all houses within 2 km of the existing wind turbine locations were identified, and the distance to nearest turbine determined. A buffer was then mapped around these houses to ensure that no wind turbine moved more than 5% closer to the relevant residence. Note, 5% at 2km relates to a maximum 100 m micro-siting distance. These buffer areas were excluded from the Development Envelope.

- ▶ Noise Impacts – The final layout for the project will be required to meet the project noise limits contained in any consent, consistent with the existing noise guidelines. The Development Envelope does not therefore include any noise exclusion areas.
- ▶ Project boundary - Wind turbine blades will not be permitted to overhang the project boundary, however access tracks would be permitted adjacent to the project boundary. As a result, the Development Envelope extends to the project boundary.

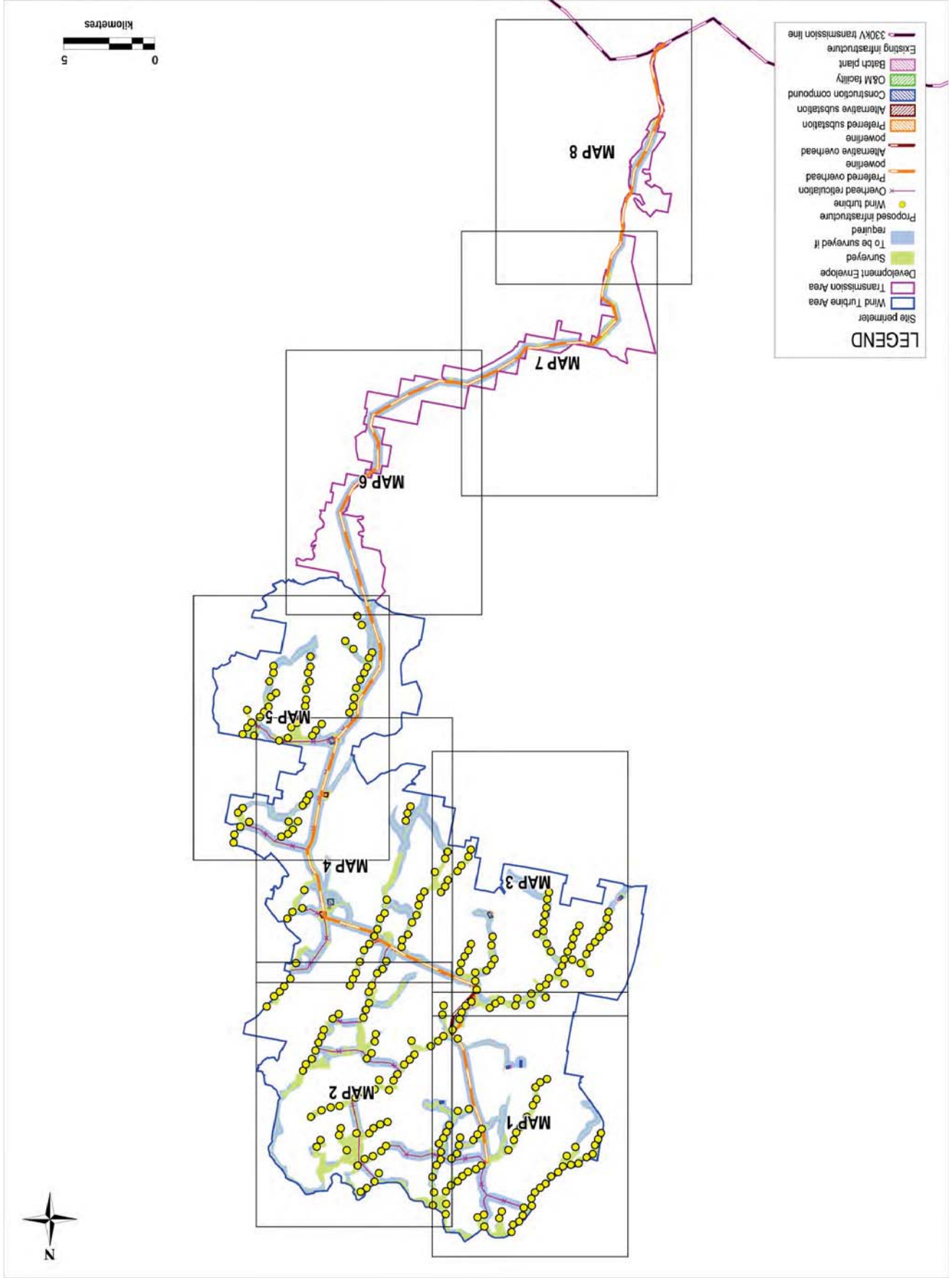
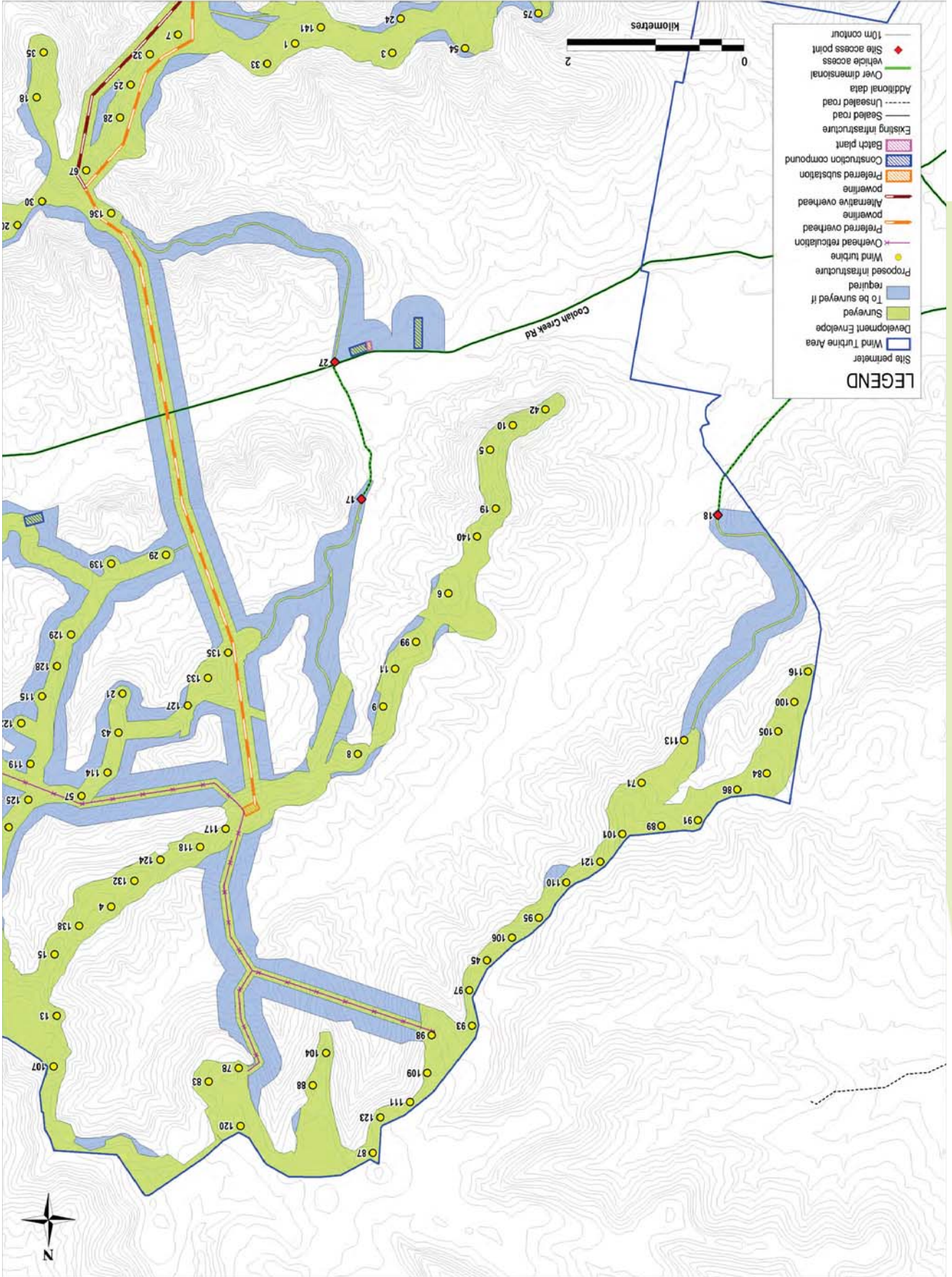


Figure 6-19 Proposed Development Envelope – Overview Map

Figure 6-20 Proposed Development Envelope – Map 1



- LEGEND**
- Site perimeter
 - Wind Turbine Area
 - Development Envelope
 - Surveyed
 - To be surveyed if required
 - Proposed infrastructure
 - Wind turbine
 - Overhead reticulation
 - Preferred overhead powerline
 - Alternative overhead powerline
 - Preferred substation
 - Construction compound
 - Batch plant
 - Existing infrastructure
 - Sealed road
 - Unsealed road
 - Additional data
 - Over dimensional
 - Vehicle access
 - Site access point
 - 10m contour

EPURÓN

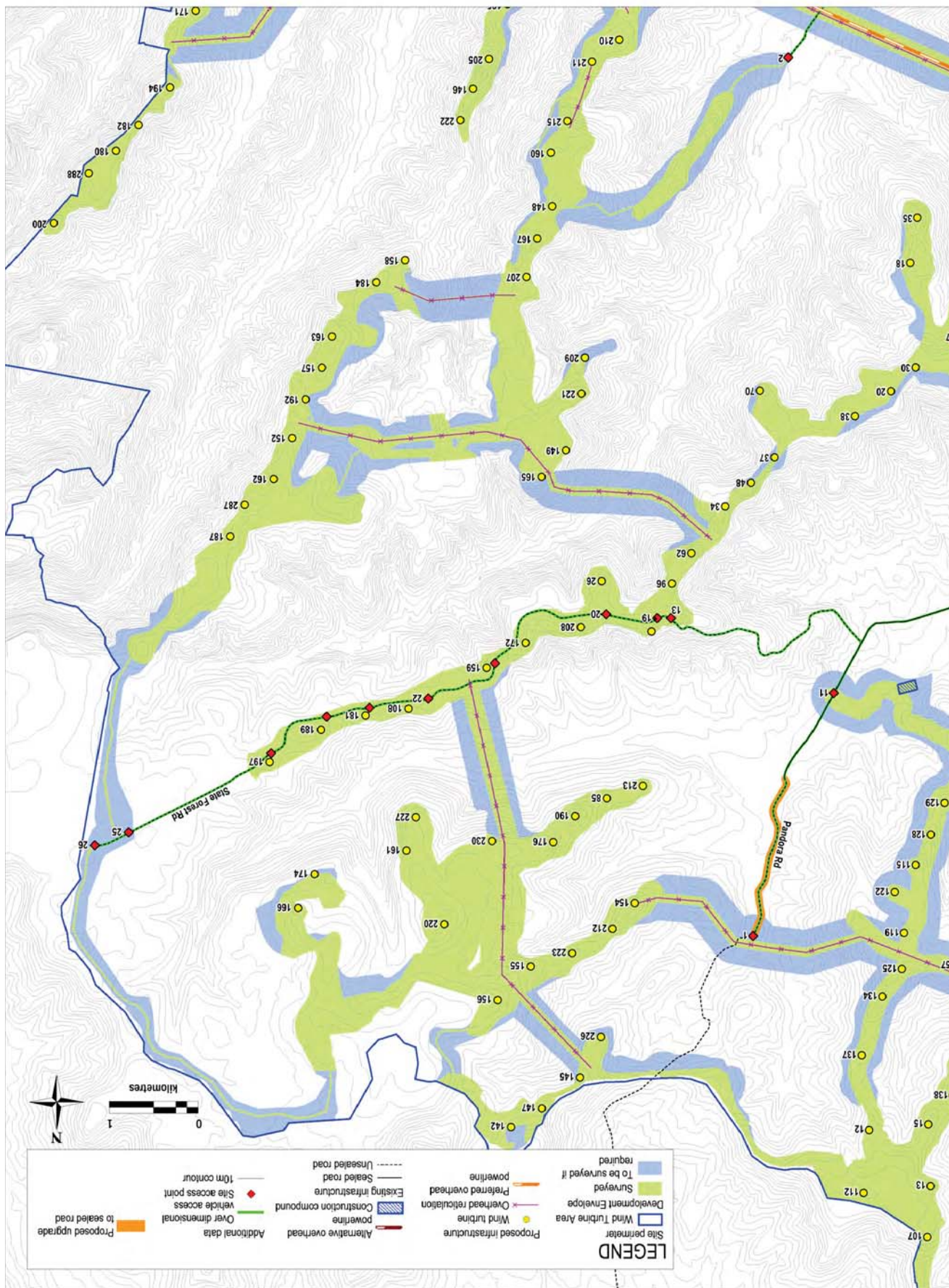
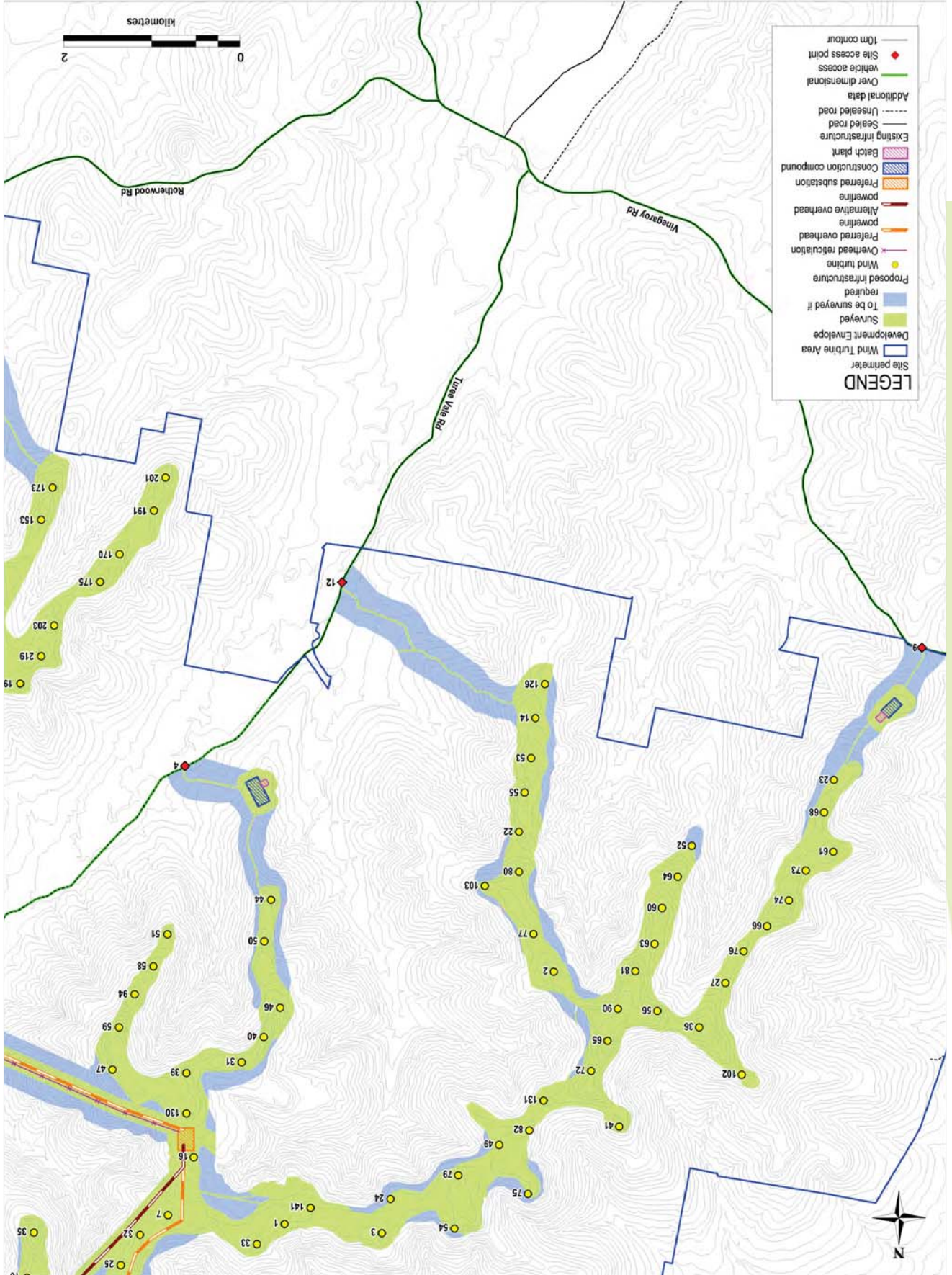


Figure 6-21 Proposed Development Envelope – Map 2

Figure 6-22 Proposed Development Envelope – Map 3



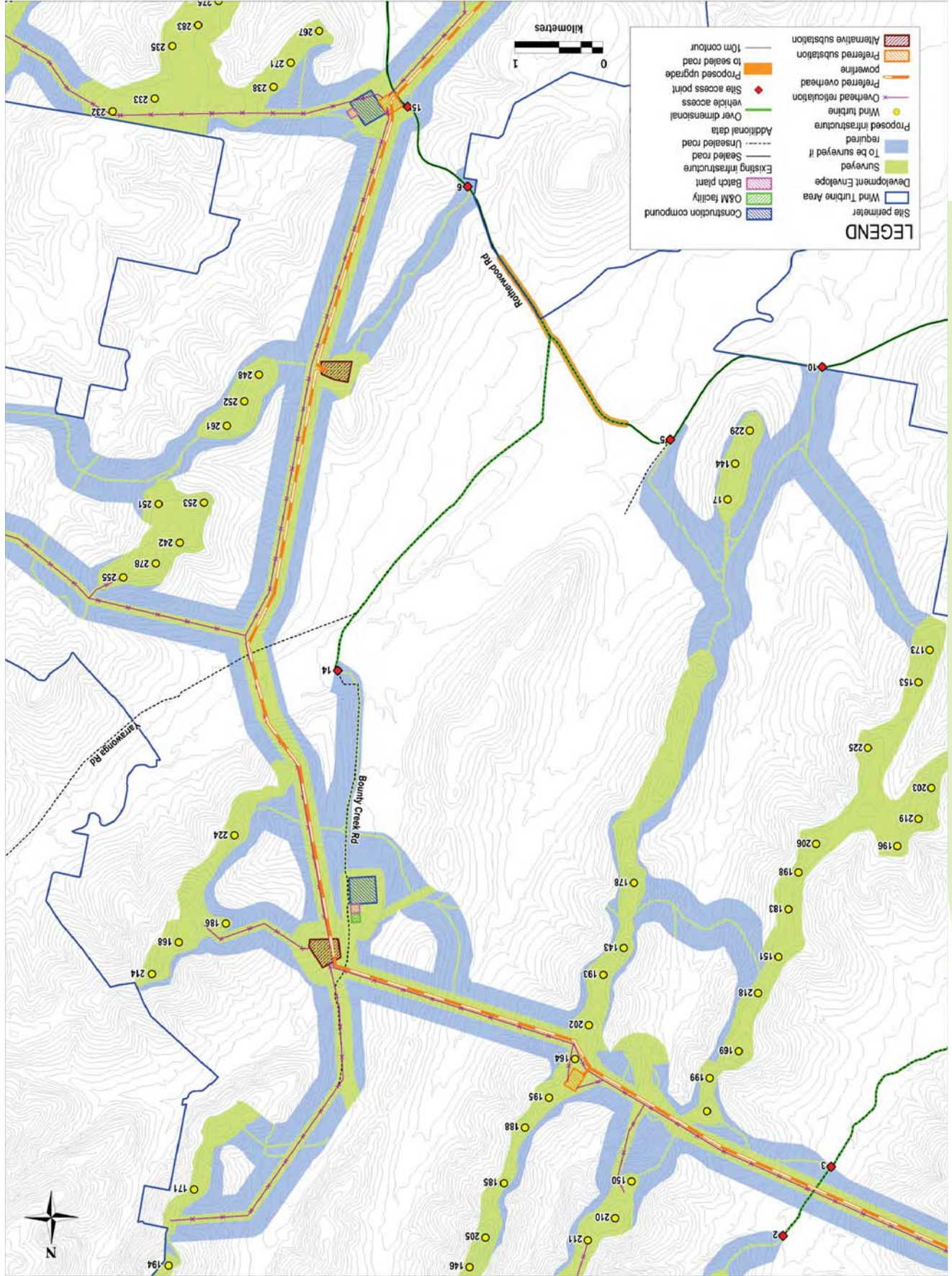
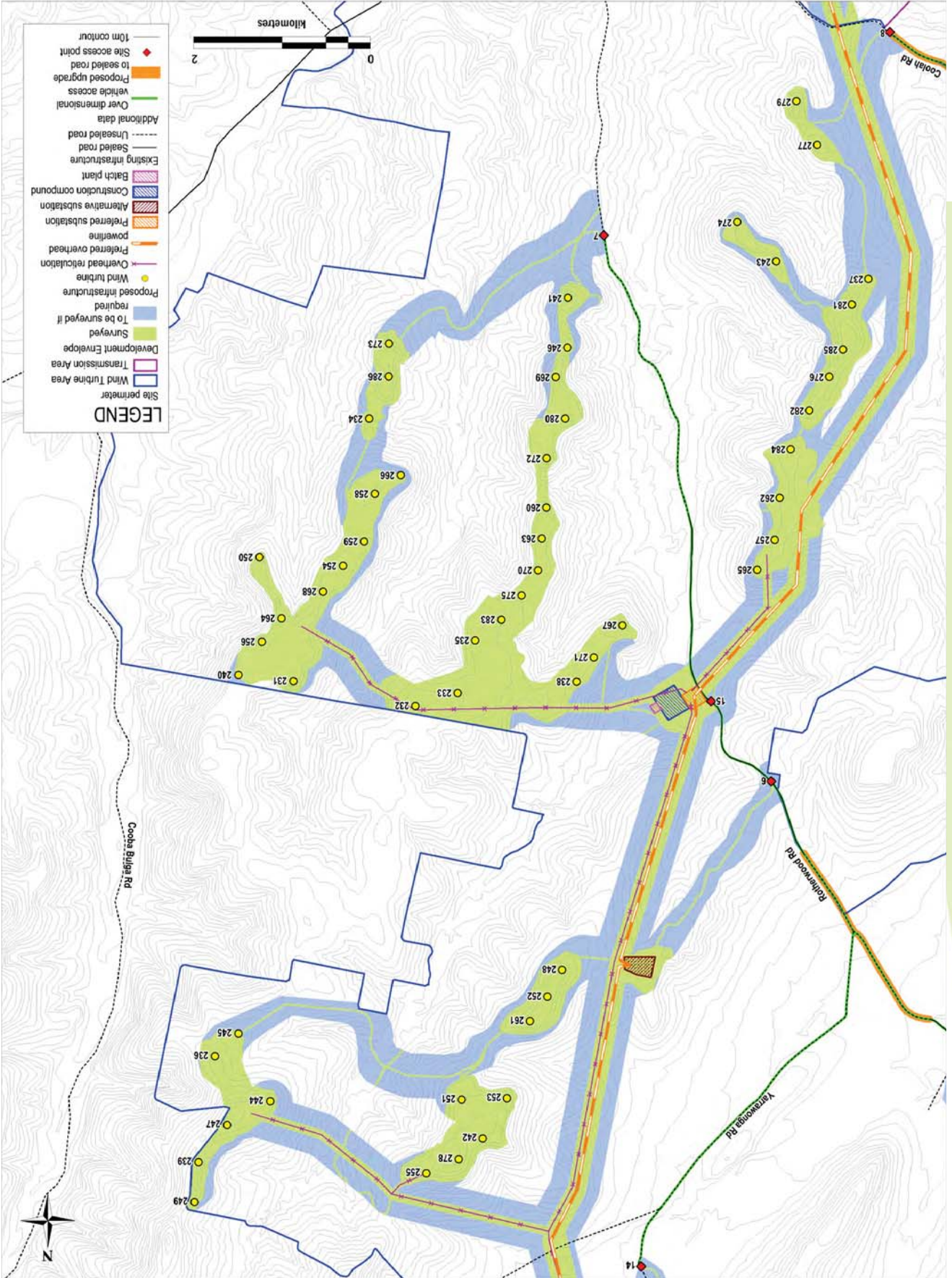


Figure 6-23 Proposed Development Envelope – Map 4

Figure 6-24 Proposed Development Envelope – Map 5



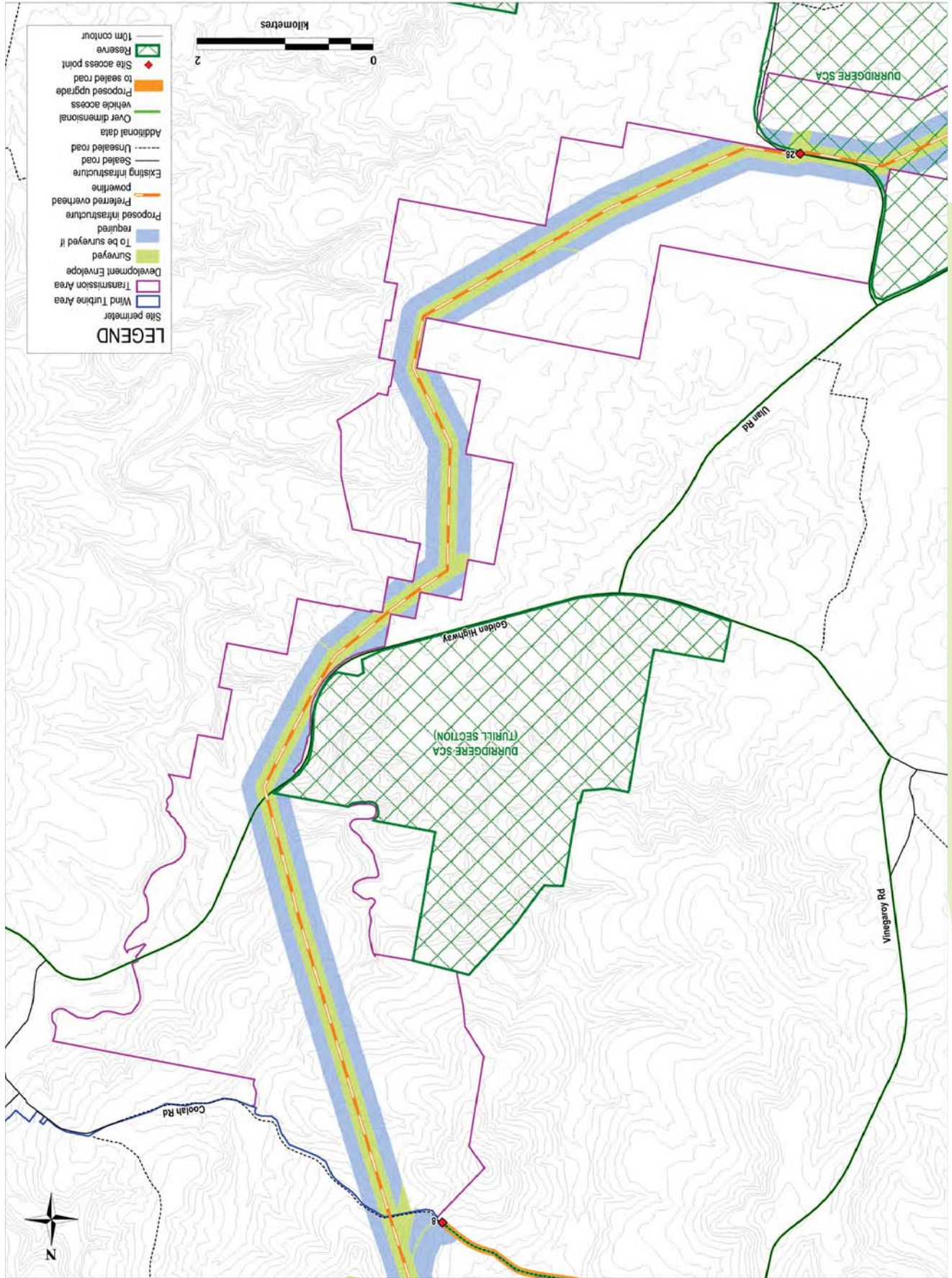
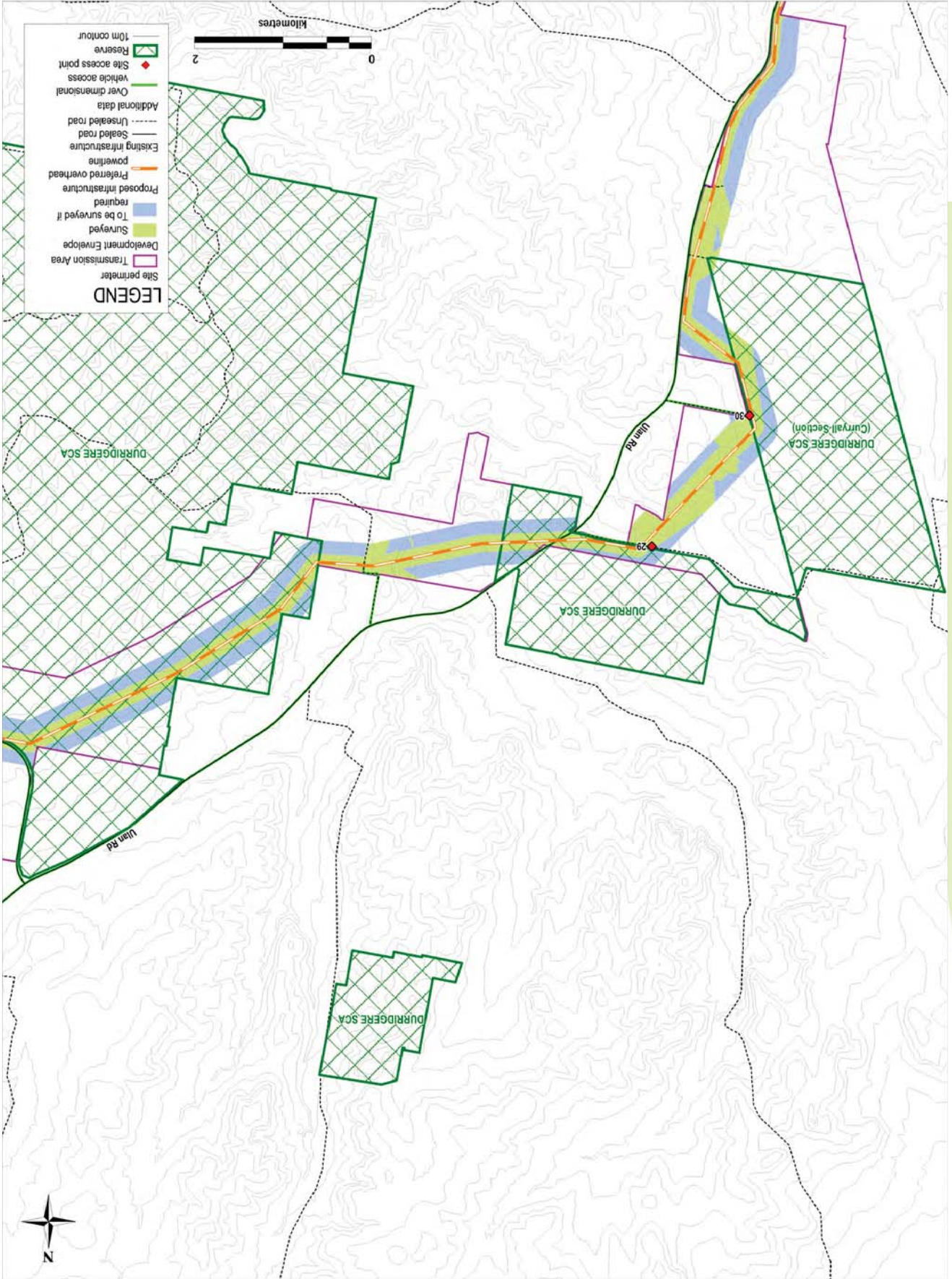


Figure 6-25 Proposed Development Envelope – Map 6

Figure 6-26 Proposed Development Envelope – Map 7



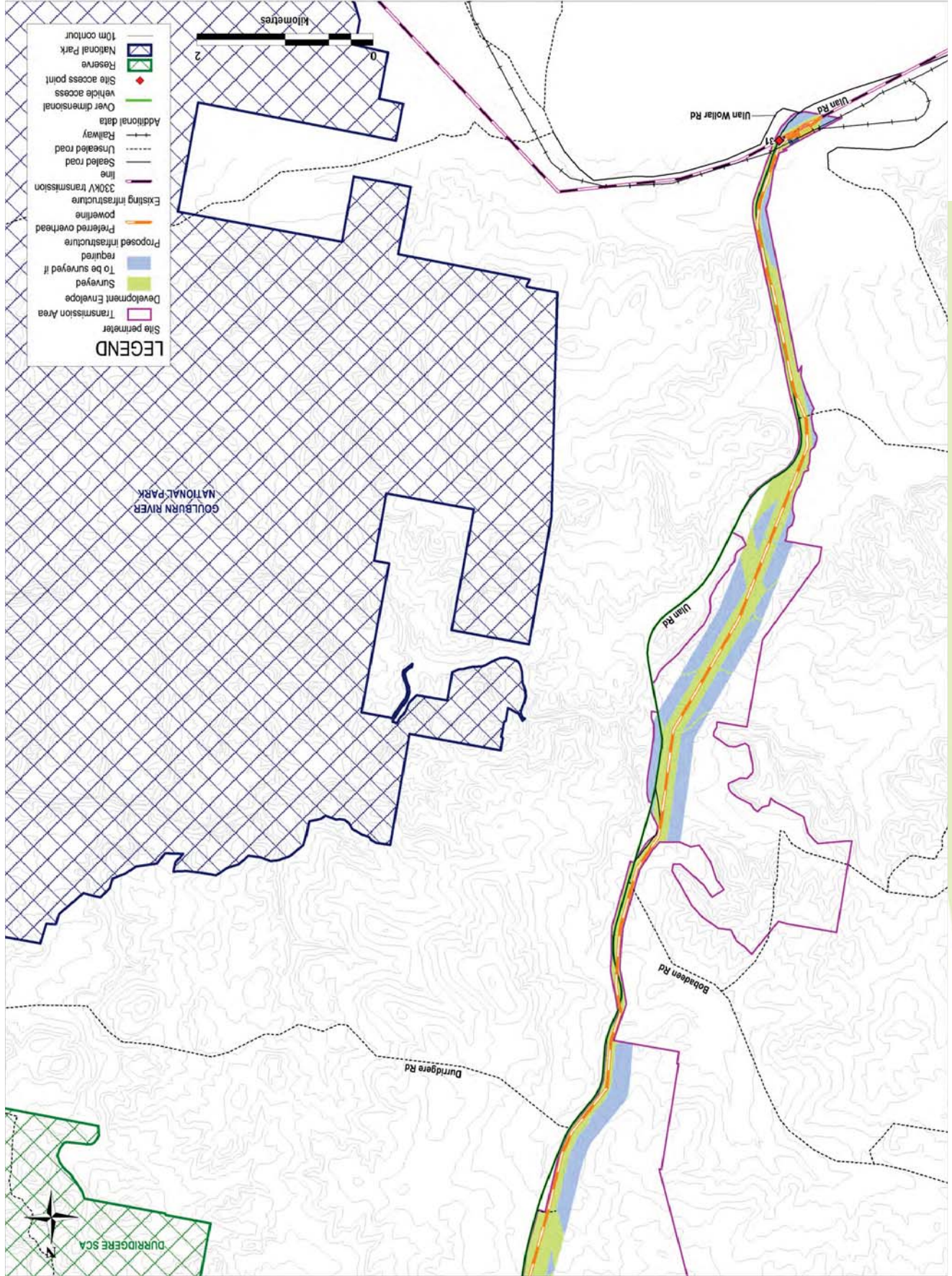


Figure 6-27 Proposed Development Envelope - Map 8

6.4 Revised site disturbance area

The proposed wind farm requires the construction of a number of elements including turbines, turbine foundations, underground and overhead powerlines, substations, control buildings and access roads on the site.

During the construction activities additional areas of the site would be impacted to provide construction compounds, concrete batching plants and storage areas. These areas would be rehabilitated and restored following the completion of the construction program.

Table 6-8 presents the estimated maximum area of the site to be impacted by the project based on the revised layout assuming it is built to its fullest extent. If the project is built in stages the impact area of the initial stages would be less than this estimated maximum impact. The batch plant and construction compound impacts are temporary impacts during the construction phase only.

In calculating the impact area required to construct the revised project it is noted:

- ▶ Revised calculations for new overhead powerlines (both 33kV and 330kV) in pasture areas assume an impact area equivalent to a new track (4m) which would run underneath the line. Where the powerline passes through woodland it is assumed that the full easement width would need to be cleared.
- ▶ Collection substations are generally assumed to be 200 x 200m but topographic constraints have altered the dimensions of some substations bringing down the overall footprint from 16 ha to 13.63 ha for this component.
- ▶ Construction compounds again vary across the site depending on the availability of suitable flat land; the largest one being 300 x 300m and the smallest being 200 x 100m.
- ▶ Underground reticulation is generally assumed to be within the impact area of new tracks and turbine foundations. Where the proposed underground reticulation diverges from the road it has been calculated separately.

Table 6-8 Estimated development footprint and site disturbance areas

Project Components	Approx. width (m)	Approx. Maximum Length (m)	Maximum Quantity	Total Maximum Area (ha)
Permanent Infrastructure:				
Turbine Footing	25	25	282	17.88
Crane Hardstand	22	40	282	24.73
New access tracks	15	274,100	1	391.12
Underground reticulation (outside of tracks)	2	9,029	1	1.61
Overhead reticulation cabling (33kV)	25	46,730	1	34.67
Overhead Powerline (330kV)	60	31,810	1	192.76
New tracks for overhead reticulation connectivity (33kV)	4	46,730	1	17.90
New tracks for transmission connectivity (330kV)	4	56,450	1	19.53
Connection Substation	165	85	1	1.41
Collection Substations	200	200	4	13.63
Operations and Maintenance facilities and Control Building	100	100	1	1.0
Temporary Infrastructure:				
Concrete batch plants	100	100	4	4.13
Construction compounds, staging and storage areas	Up to 300	Up to 300	6	32.45
Total				752.82

6.5 Offset Strategy

The initial biodiversity offset strategy has been refined following consultation with OEH. The updated offset strategy has used the NSW Framework for Biodiversity Assessment (FBA 2016) to calculate the offset requirement and then demonstrate the adequacy of the proposed offsets.

Offset Requirements

In lieu of actual plot data from the site, plot data was derived from benchmark data on the OEH vegetation data base. The median range of the lower and upper benchmarks has been used unless otherwise justified. This approach is considered conservative, with the actual offsets required expected to be below those estimated in this offset strategy.

The final offset requirement is proposed to be calculated using field collected plot data, and would be based on the final impact areas derived from civil construction drawings (not yet available). This will provide a further incentive throughout the detailed design stage to minimise the clearing impacts of the works and thereby reduce the offset requirement.

The offset requirements have been calculated on the basis that the entire project is built. Where the project is built in stages, the reduced impact area of initial stages means a reduced offset area is required for those initial stages. The impact area and resulting offset requirement will be determined for each stage prior to commencement of construction of that stage.

The impact area figures have changed slightly (an addition of 7.8 ha) since the preparation of the Offset Strategy. However, the offset calculations have not been re-done as the process used in preparation of the offset requirement was precautionary and the additional 7.8 ha would not have a material impact to the preliminary offset calculations. A commitment to undertake the final Biobanking calculations based on the approved construction footprint and field data remains and would address any discrepancies.

A summary of biodiversity offset requirements for the project are shown in the table below.

Table 6-9 Estimated Biodiversity Offset Requirements

Entity requiring offsets	Maximum Credit requirement	Maximum Offset area required (ha)
Ecosystem credits		
Northern section ecosystem credit subtotal (Central West Catchment Management Authority - CWCMA)	10,910	1,173
Southern section ecosystem credit subtotal (Hunter Rivers Catchment Management Authority - HRCMA)	19,622	2,163
TOTAL:	30,532	3,336
Species credits		
Northern section species credit subtotal (CWCMA)	912	152
Southern section species credit subtotal (HRCMA)	2,887	468
TOTAL:	3,799	620

Note that the area of land required is not cumulative and an offset area may concurrently satisfy ecosystem and threatened species requirements.

Candidate Sites

With a general preference to secure offset areas within the project boundary, involved landowners within the project boundary are able to be involved in the offset package rather than involving a third party or external site. As they already own the land upon which the site is located, no purchase of a BioBanking site is required.

Mapping and surveys undertaken to date suggest that there is vegetation within the site boundary that is representative of that being cleared and therefore offers a like for like offset. It is noted that some additional sites outside the project boundary have also been identified as they offer strategic benefits for connectivity to existing reserves. These include areas adjacent to existing reserves or protected areas identified in consultation with OEH.

Based on the preliminary assessment of likely credit requirements, ten candidate offset sites have been so far identified, totaling 3,025 ha. These landowners have been approached and are amenable to further investigation and to having suitable areas managed for conservation in perpetuity. As such, all of the candidate sites so far considered are feasible to include within the offset package for the project.

Implementation

It is proposed that the project's offsets requirement should accurately reflect the project's final impact on biodiversity and not be based on concept drawings, as are currently available. This is particularly important for wind farm projects where the detailed design phase can require adjustments to access tracks and turbine locations. Additionally, this will provide a further incentive throughout the detailed design stage to minimise the clearing impacts of the works and thereby reduce the offset requirement.

The offset plan will be guided by the Biodiversity Offset Strategy (Appendix C) and is summarised as follows:

1. Determine final credit requirement using the FBA in consultation with OEH using final construction drawings.
2. Select final suite of offset sites including accurate calculation of credits.
3. Develop detailed management actions in consultation with landowners.
4. Verify actual post construction impact area.
5. Formally secure offset sites.