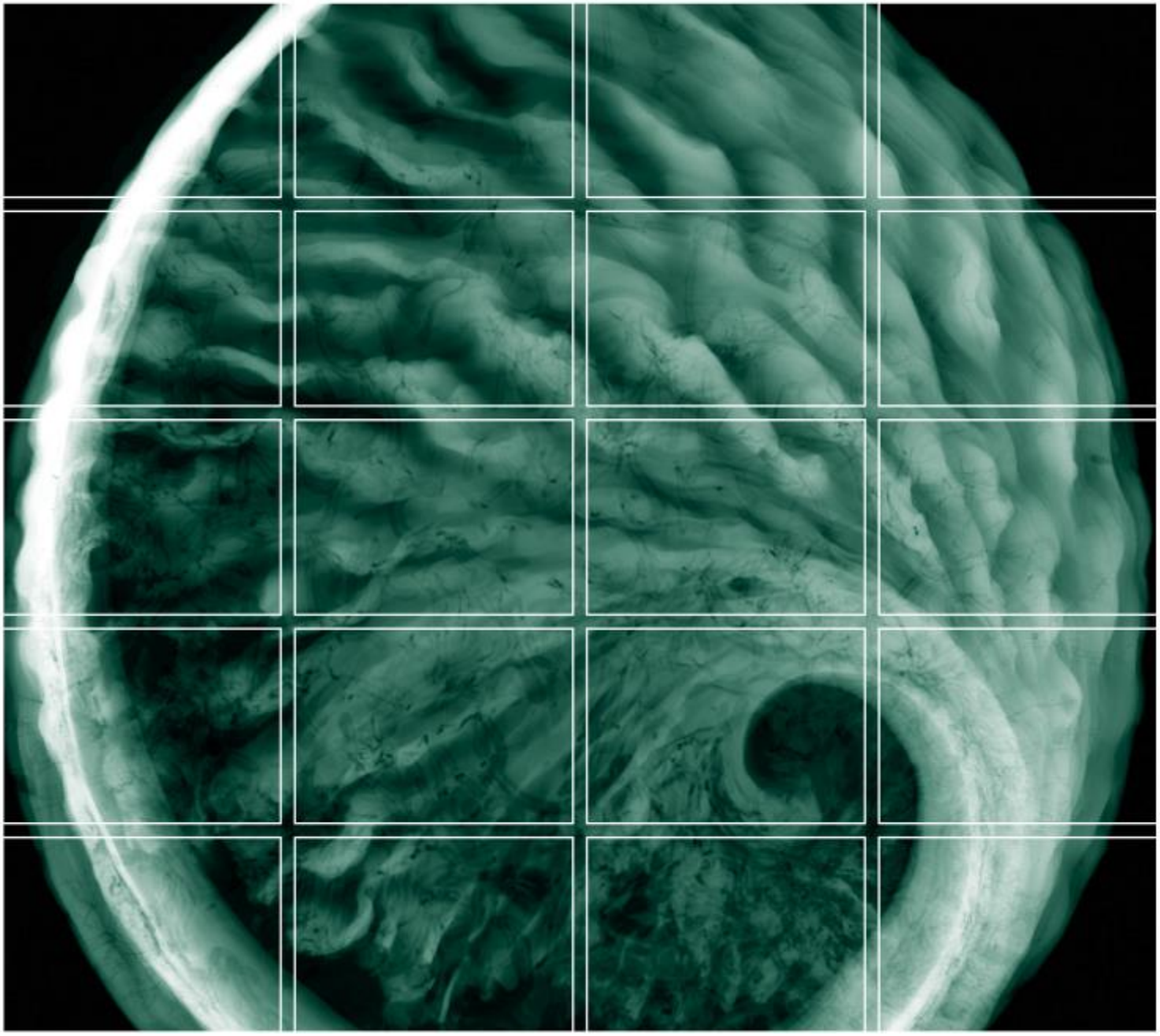

Biala Wind Farm Transmission Line Connection and Substation Upgrade

Submission to Upper Lachlan Shire Council in response to JRPP Deferral Notice

Newtricity Developments Biala Pty Ltd

April 2018

Figures Updated September 2018

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Document Control: 0178462 Biala Wind Farm Transmission Line Connection and Substation Upgrade				
			ERM Approval to Issue	
Version	**Revision**	**Author**	**Name**	**Date**
Final	01	Matthew Errington	Paul Douglass	06/04/18

Biala Wind Farm

Transmission Line Connection and Substation Upgrade

Submission to Upper Lachlan Shire Council in response to JRPP Deferral Notice

Prepared by:	*Matthew Errington*
Position:	*Project Manager*
Signed:	
Date:	*6 April 2018*
Approved by:	*Paul Douglass*
Position:	Partner
Signed:	
Date:	*6 April 2018*

Newtricity Developments Biala Pty Ltd

April 2018

0178462 Final

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LIST OF TABLES

LIST OF ANNEXES

1 INTRODUCTION

The Southern Joint Regional Planning Panel (JRPP) is considering a development application (DA) for the Biala Wind Farm Transmission Line Connection and Substation Upgrade Project (DA 122/2017) (Transmission Line DA). At the JRPP session held on 14 March 2018, the matter was deferred with a notice issued on 20 March 2018.

The Panel decision was to defer the determination of the proposal until additional information is provided to Upper Lachlan Shire Council (ULSC) for assessment including:

- Clarification of the extent to which the proposed development may impact on areas of environmental significance by way of:
    - Detailed locations of proposed trenches in those areas
    - Number of trees to be removed in those areas
    - Location of hollow bearing trees (HBTs) in those areas
    - Identification of items of Aboriginal significance in those areas
- Detailed location, design and potential environmental impacts of the temporary compounds and temporary creek crossings.

Upon receipt of this information, ULSC must prepare a supplementary report that includes:

- An assessment of the additional information;
- Clarification of the *Water Management Act 2000* approval requirements; and
- Assessment and recommendations in relation to the request for the amendment of the proposed conditions by the Applicant.

1.1 OVERVIEW OF SUBMISSION

Environmental Resources Management Australia Pty Ltd (ERM) was engaged by Newtricity Developments Biala Pty Ltd (Developments Biala) to prepare this submission to ULSC. ERM is an environmental consultancy with extensive experience in environmental impact assessment and planning approvals for renewable energy projects, including transmission lines and the preparation of the SoEE for the Transmission Line DA.

Marais Laying Technologies (Marais) was also engaged by Developments Biala to provide specialist underground cabling advice and contracting services. Marais are an international cable laying and trenching contractor who has worked on over 15 Australian renewable energy projects to date.

This submission provides the following additional information requested by the Panel:

- **Aboriginal Cultural Heritage –** summary of the work undertaken since the preparation of the Statement of Environmental Effects (SoEE) and proposed archaeological investigations required to obtain an Aboriginal Heritage Impact Permit (AHIP).
- **Detailed Design Development –** ERM and Marais undertook a site visit to confirm the transmission line alignment, with due consideration of environmental constraints and engineering/constructability matters. The process and outcomes are presented.
- **Vegetation Clearing Requirements –** Ground truthing and mapping of the proposed vegetation clearing areas was undertaken during the site visit. Details of the number of trees to be removed in these areas, including HBTs is presented.
- **Temporary Construction Compounds –** The locations and details of the proposed compounds to be utilised during construction are provided.
- **Temporary Creek Crossings –** Confirmation that no temporary creek crossings will be required during construction.
- **Water Quality and Hydrology at Gurrundah Creek –** Clarification of the potential short-term construction impacts and long-term hydrological impacts on Gurrundah Creek and nearby surface water features (known as Bannister Springs) is provided.
- **Clarification of the *Water Management Act 2000* Requirements –** The process for obtaining a Controlled Activity Approval under the Act is outlined.

Developments Biala has provided the information in this submission in response to the queries of the JRPP. Developments Biala believes the information provided addresses these queries and that the detail provided is equal to or above that normally available for a project at this stage of development.

1.2 ABORIGINAL CULTURAL HERITAGE

As part of the SoEE, an Aboriginal Cultural Heritage Due Diligence Assessment was prepared to identify any impacts that the proposed works may have on Aboriginal cultural heritage and to provide appropriate mitigation and management strategies.

One of the recommendations was to prepare an Aboriginal Cultural Heritage Assessment Report (ACHAR). ERM was engaged to prepare the ACHAR. An Aboriginal Community Consultation Workshop has been undertaken to clearly

understand the archaeology resource. The survey identified the following heritage items along the transmission line alignment (refer to *Figure 1* for their locations):

- Artefact scatters;
- Isolated finds;
- Scar trees; and
- Potential Archaeological Deposits (PADs) (near the Humes Creek crossing along the southern transmission line alignment option).

The locations of these heritage items has been used to inform the detailed design. The alignment has been modified wherever practicable to avoid such items. Refer to *Section 1.3* for further details.

An AHIP will be required to complete the cabling works in areas where archaeology has been identified. An application for an AHIP cannot be made until development consent has been granted (refer to *Applying for an Aboriginal Heritage Impact Permit: Guide for applicants*, OEH, 2011).

The process of applying for the AHIP will include Developments Biala conducting test excavations which will be used to finalise the ACHAR. The methodology for the excavations will be agreed with OEH. Developments Biala expects to be in a position to submit the AHIP in early July 2018.

1.3 DETAILED DESIGN DEVELOPMENT

1.3.1 Site Visit

A site visit was undertaken by a team made up of Tobias Scheid (ERM Ecologist) and Jonathan Quinton (Marais Project Manager) on 21 and 22 March 2018.

The SoEE previously submitted defines a 100 m wide corridor (the 'Project Area') within which the transmission line would be located. The SoEE identifies that the transmission line would require a 20 m wide 'disturbance area', within the 100 m wide corridor.

In order to accurately define the route of the proposed transmission line and allow more detailed assessment of its impact, the site visit involved defining the exact route of the 20 m disturbance area.

Over the two days, the team walked the entire length of the Project Area and selected the route of the 20 m disturbance area.

The team worked together using their environmental and engineering expertise to define an alignment which aimed to minimise environmental impact without

compromising constructability. The following constraints informed the process:

- **Endangered Ecological Community** (Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland EEC) - locations of the EECs were mapped during ERM's Ecology Assessment field work undertaken for the SoEE.
- **Individual trees along the alignment, including HBTs –** locations were marked with GPS units during the site visit, including the proposed vegetation clearing areas (refer to *Section 1.4* for the survey results).
- **Heritage items –** locations were mapped during ERM's archaeological survey undertaken in December 2017.
- **Constructability considerations –** ground conditions, topography and slope angle, horizontal directional drilling (HDD) methodology, creek crossings, road crossings and cable bending radius.

1.3.2 Detailed Design Alignment

The detailed design alignment followed the previous alignment for the majority of the route.

At the Humes Creek Crossing, the SoEE proposed two transmission line alignment options due to the complexity of design for HDD. During detailed design development, the northern alignment was confirmed as the preferred option to avoid impacts to the EEC and heritage sites which lie on the southern alignment option. HDD will also be easier at this new location due to more favourable topography and less drilling distance required (approximately 150 - 200 m). To the east of the Gurrundah Creek Crossing, due to the proximity to a non-involved landowners' property boundary, the alignment was modified by moving it slightly to the south. Impacts to the patch of EEC to the east of the creek and resulting vegetation clearing are unavoidable with either alignment option and further details are provided in *Section 1.4*.

1.3.3 Trenching Design

Marais has prepared typical cross-sections for general trenching, creek crossings and road crossings and also provided further details of the HDD methodology. Site visit photos taken at the Humes Creek Crossing and Gurrundah Creek Crossing are also provided. Please refer to *Annex A* for further details.

1.4 VEGETATION CLEARING REQUIREMENTS

The proposed vegetation clearing areas are shown in *Figures 2* to *5* and summarised in *Table 1* below.

Table 1 Vegetation Clearing Areas

Area ID	No. of Trees to be removed	Status and Type	No. of HBTs
1	2	Native, Eucalypts	0
2	6	Weed, Pines	0
3	14	Native, Eucalypts (11) Native, Acacia (3)	0
4	4	Weed, Pines	0
5	21	Native, Eucalypts (15) Native, Acacia (3) Weed, Hawthorn (3)	0
6	22	Native, Eucalypts (18) Native, Acacia (4)	0
7	15	Native, Eucalypts (12) Weed, Hawthorn (3)	0
8 (EEC)	29	Native, Eucalypts	11
Total	**113**	**-**	**11**

There are also three fallen HBTs trees located along the alignment which should be moved during construction and replaced once works are complete.

The detailed design alignment is not likely to result in a significant impact on any ecological community, population or threatened species listed under the biodiversity legislation. The Project has been designed to avoid potential impacts to ecological values as far as practical. Through implementation of the proposed mitigation measures in the SoEE, the Project is not anticipated to have any significant impact upon ecological values of the area and the overall environmental risk is considered to be low.

OEH have advised that offsetting under the new biodiversity offset scheme is not applicable to this development, but that Developments Biala could decide to opt in. Developments Biala is willing to discuss this with OEH, as part of the offsetting requirements for the wind farm development, which require offsetting arrangements to be put in place within 2 years of commencement of construction.

1.5 TEMPORARY CONSTRUCTION COMPOUNDS

1.5.1 Proposed Compound Locations

Developments Biala is seeking approval for two temporary construction compounds. The locations of the proposed temporary construction compounds were confirmed by ERM and Marais during the site visit and placed to minimise impacts on sensitive areas (refer to *Figure 6*):

- Preferred Compound 1 – Located on cleared land leased by Developments Biala and currently used for the storage of equipment.
- Alternative Compound 1 – Located to the west of the Gullen Range Wind Farm substation, in a paddock adjacent to Storriers Lane.
- Compound 2 – Located just east of the Humes Creek Crossing in a paddock.

The Preferred Compound 1 is located outside of the Project Area's 100 m wide corridor, but on a lot included in the DA. From an environmental perspective, this location has negligible impact as the land has been previously cleared. If the Preferred Compound 1 is not approved under this DA, then Developments Biala requests approval for the Alternative Compound 1 location (also negligible impact) which is located inside the Project Area's 100 m wide corridor.

Compound 2 is in a flat location adjacent to Humes creek which will require no tree clearing and has negligible environmental impact.

1.5.2 Compound Design

Each temporary construction compound will consist of the following temporary structures:

- Site Office;
- Lunch Room;
- Storage Container; and
- Toilet Block or Portaloo Toilet.

The following compound design information is provided in response to the matters raised in ULSC's Assessment Report.

Table 2 ***Compound Design Information***

Information	Response
The location of any proposed temporary construction compound buildings or works	Refer to *Section 1.5.1* and *Figure 6*
Floor plan drawings of any proposed temporary construction compound building showing layout, partitioning, room sizes and intended uses of each part of the building	Refer to *Annex B*
Elevation and section drawings showing heights and external materials of any temporary structures within the proposed temporary construction compounds	Refer to *Annex B*
Proposed temporary construction compound parking arrangements, entry and exit points for vehicles, and provision for movement of vehicles within the site	Refer to *Annex B*
Documentation specifying the live and dead loads any proposed temporary structure is designed to meet	• Site Office, Lunch Room & Storage Container – approximately 2.5 tonne empty • Toilet Block - approximately 2 tonne empty • Portaloo Toilet – approximately 170 kg empty
A list of any proposed fire safety measures to be provided in connection with the use of any proposed temporary structure	• Temporary structures will be built from fire resisting material in line with the ABC Standard • There will be at least 1.5 m distance between structures • All flammable materials will be stored a minimum of 5 m from structures • Each structure will be fitted with an appropriate fire extinguisher (including signage) • Exit signs will be installed in each structure • A water tank will be provided at each compound • A fire trailer will be available for the Project
Documentation describing any accredited building product or system in any proposed temporary structure, that is to be relied on for the purposes of section 79C (4) of the *Environmental Planning and Assessment Act 1979*	Refer to *Annex B*

Copies of any compliance certificates to be relied on in relation to any proposed temporary structure	Refer to *Annex B*

1.6 TEMPORARY CREEK CROSSINGS

The SoEE stated that temporary creek crossings may be required to support construction activities. During the site visit, Marais confirmed that no temporary creek crossings will be required during construction.

Although trenching equipment will need to cross over first and second order creeks during the trenching process (Gurrundah Creek and an unnamed first order tributary to Gurrundah Creek), there will be no requirement for temporary or permanent structures or causeways. No other plant, equipment or vehicles will be required to cross the creeks. At Humes Creek, HDD and other construction activities will be undertaken from access points on either side of the creek.

1.7 WATER QUALITY AND HYDROLOGY AT GURRUNDAH CREEK

At the JRPP session held on 14 March 2018, a non-involved landowner expressed concern at the potential short-term construction impacts and long-term hydrological impacts on Gurrundah Creek and nearby surface water features known as Bannister Springs.

As noted in WaterNSW's letter dated 11 January 2018 and ULSC's Assessment Report, the proposed development has been assessed as being able to achieve a neutral or beneficial effect on water quality, provided appropriate CoC are implemented. WaterNSW's letter proposed CoC which were included in ULSC's assessment report. ERM has undertaken further assessment work, which considers the detailed design alignment and additional design and constructability information provided by Marais. We confirm that through implementation of the proposed mitigation measures in the SoEE, the Project is not anticipated to have any significant impact on water quality and the overall environmental risk is considered to be low.

As noted at the JRPP session on 14 March 2018 and in the SoEE, Gurrundah Creek is an ephemeral watercourse (dry creek bed visible in photos taken on 11 March 2018 in Annex A) and Developments Biala will aim to schedule construction activities at this location when the creek is dry. Should this not occur, the sequence of construction activities outlined in the SoEE will mitigate any adverse impacts.

The Bannister Springs comprise two permanent surface water features located on the property approximately 15 m upslope from the detailed design alignment (refer to *Figure 5*). The source of water is unknown, but is likely to

be supplied by groundwater fed by Gurrundah Creek and/or the farm dams that have been constructed in the watercourse located approximately 100 m north-west and upslope of the springs.

The trenching works will occur downslope of the springs and therefore will not sever any potential source of groundwater/surface water feeding the springs. Trenching in areas such as this is standard construction practice. If the ground is found to be wet during trenching, stabilised backfill can be utilised to prevent erosion. Ideally the trench is installed when the creek bed is dry, but depending on weather conditions during the construction period this may not be possible. The SoEE provides a methodology for trenching (refer to *Section 4.5.3*), should it be unavoidable to conduct the trenching during a period where there is some water flow. In all cases, upon completion of the trenching works revegetation will be undertaken to match pre-disturbance conditions. Active management is required during the revegetation period to monitor for any erosion.

Given the localised, short-term nature of construction activities (trenching to a maximum depth of only 1.4 m) and downslope location from the springs, the Project will not have any significant impact on the hydrology of the local area.

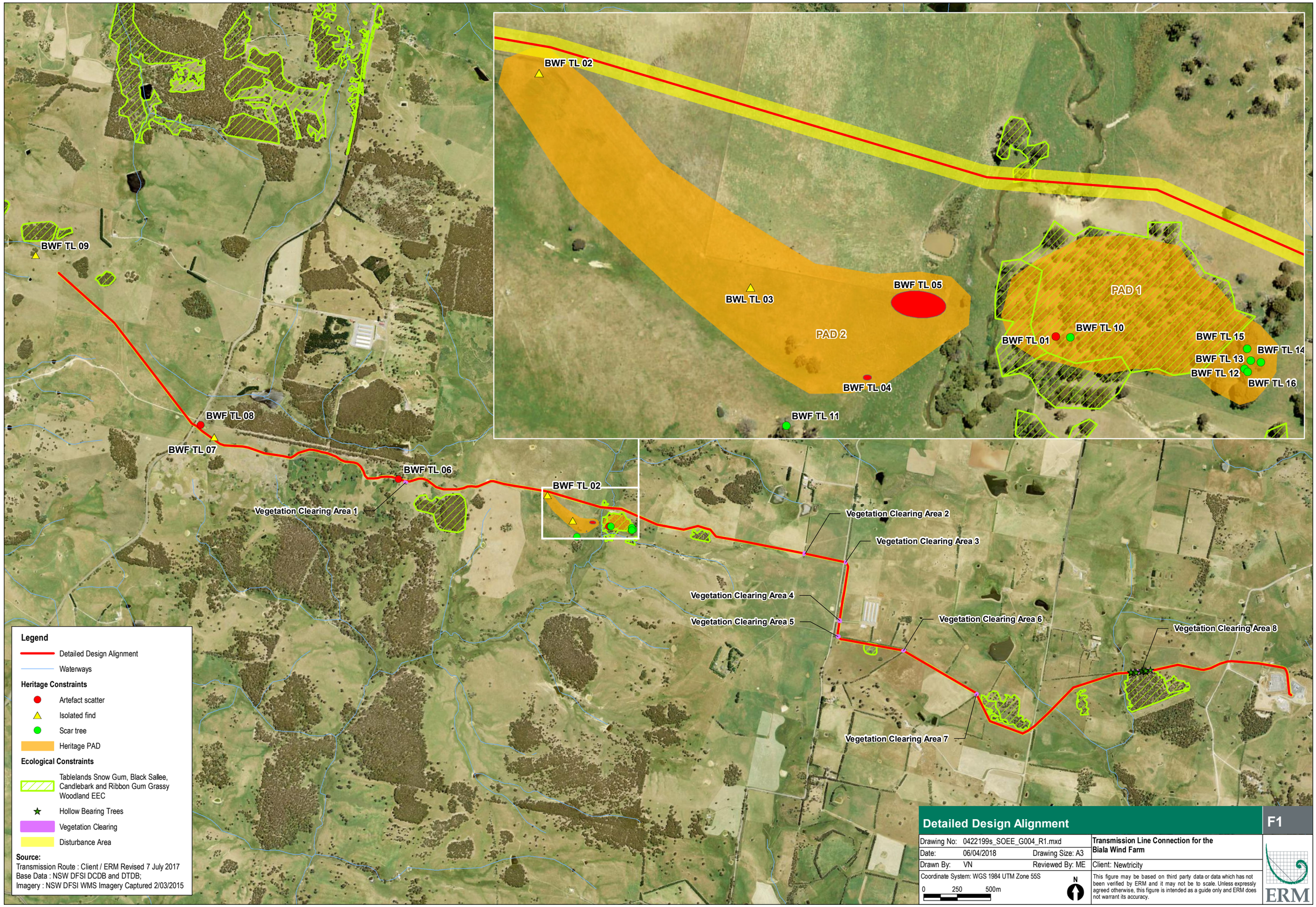
1.8 CLARIFICATION OF THE WATER MANAGEMENT ACT 2000 REQUIREMENTS

As noted in WaterNSW's letter dated 11 January 2018 and ULSC's Assessment Report, water quality mitigation measures shall be to the satisfaction of ULSC and consistent with any requirements for Controlled Activity Approval under the Water Management Act 2000.

The SoEE states that Section 91(2) of the Act requires a Controlled Activity Approval be obtained for activities in, on or under waterfront land, defined as land within 40 m of a river, lake or estuary. Given that transmission line crosses Humes Creek, Gurrundah Creek and an unnamed tributary to Gurrundah Creek, a Controlled Activity Approval will be required.

Development consent is required prior to applying to the Department of Industry (DI, formerly DPI Water) for a Controlled Activity Approval (refer to *Guidelines for laying pipes and cables in watercourses on waterfront land*, DPI Water, 2012). Once the construction contractor has been appointed, they will be responsible for seeking approval.

Figures



Detailed Design Alignment

F1

Drawing No:	0422199s_SOEE_G004_R1.mxd		Transmission Line Connection for the Biala Wind Farm
Date:	06/04/2018	Drawing Size: A3	
Drawn By:	VN	Reviewed By: ME	Client: Newtricity

Coordinate System: WGS 1984 UTM Zone 55S

0 250 500m

N

ERM

Detailed Design Alignment

Heritage Constraints

- Artefact scatter
- Isolated find
- Scar tree
- Heritage PAD

Ecological Constraints

- Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland EEC
- Hollow Bearing Trees
- Vegetation Clearing
- Disturbance Area

Vegetation Clearing Areas

F2

Drawing No:	0422199s_SOEE_G005_R1.mxd		**Transmission Line Connection for the Biala Wind Farm**
Date:	24/09/2018	Drawing Size: A4	
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Coordinate System: GDA 1994 MGA Zone 55

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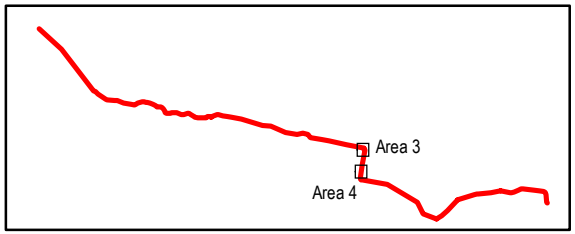
N

ERM



Detailed Design Alignment

Heritage Constraints

- Artefact scatter
- Isolated find
- Scar tree
- Heritage PAD

Ecological Constraints

- Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland EEC
- Hollow Bearing Trees
- Vegetation Clearing
- Disturbance Area

Vegetation Clearing Areas

F3

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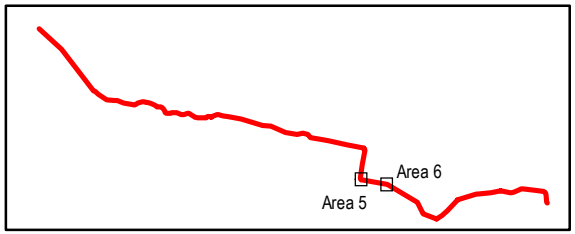
Date:	06/04/2018	Drawing Size: A4	Client: Newtricity
Drawn By:	VN	Reviewed By: ME	

Coordinate System: GDA 1994 MGA Zone 55

0 20 40m

N

ERM



Detailed Design Alignment

Heritage Constraints

- Artefact scatter
- Isolated find
- Scar tree
- Heritage PAD

Ecological Constraints

- Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland EEC
- Hollow Bearing Trees
- Vegetation Clearing
- Disturbance Area

Vegetation Clearing Areas

F4

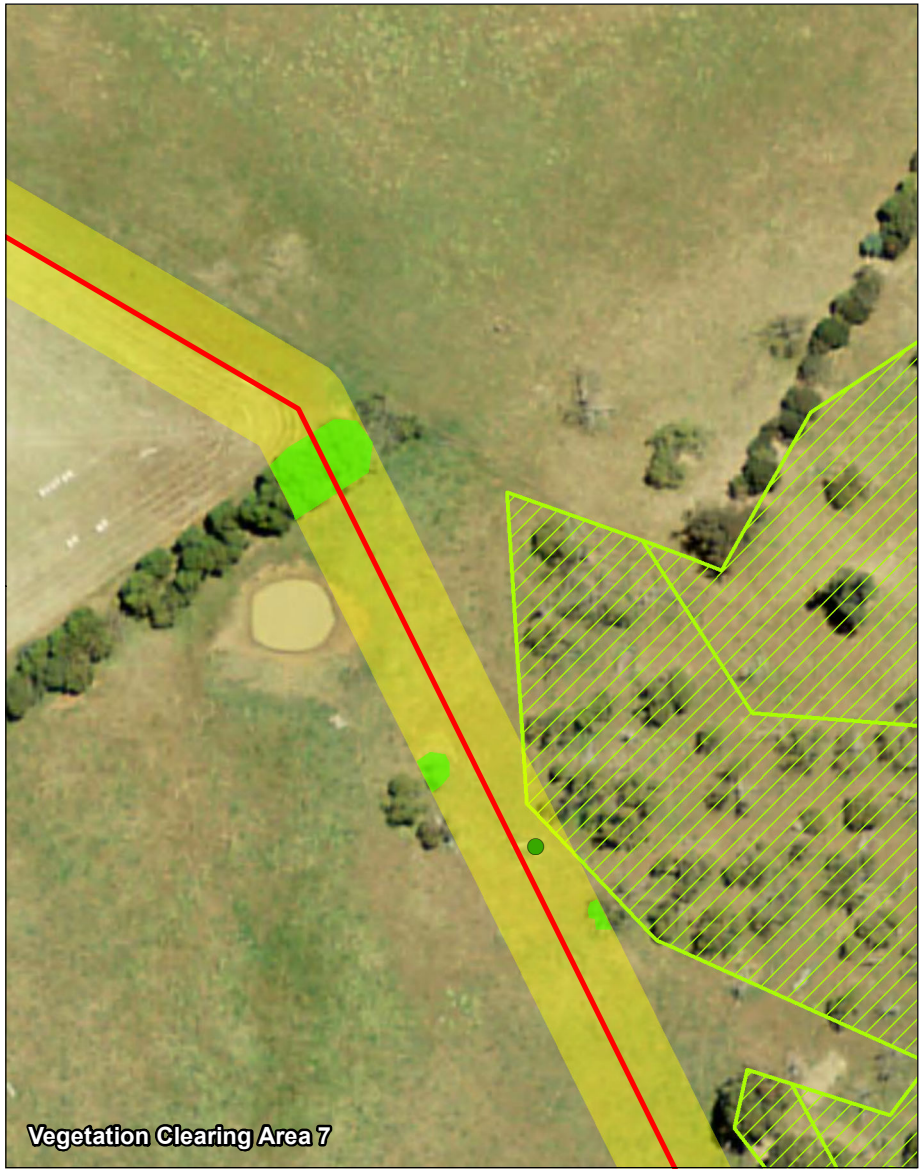
Drawing No:	0422199s_SOEE_G007_R1.mxd		**Transmission Line Connection for the Biala Wind Farm**
Date:	06/04/2018	Drawing Size: A4	Client: Newtricity
Drawn By:	VN	Reviewed By: ME	

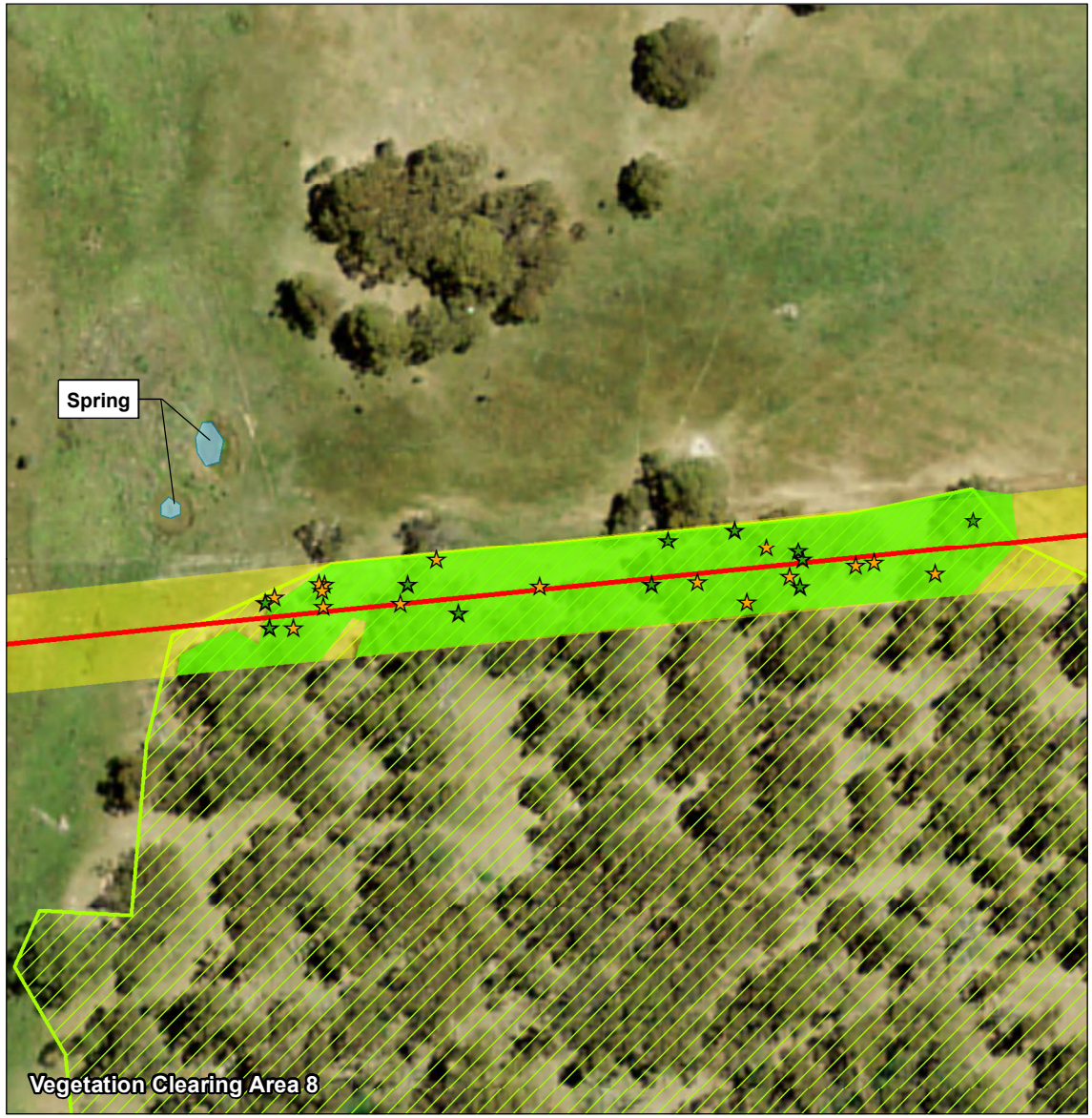
Coordinate System: GDA 1994 MGA Zone 55

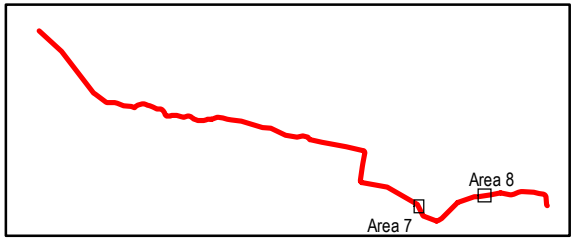
0 20 40m

N

ERM







Detailed Design Alignment

Heritage Constraints

- Artefact scatter
- Isolated find
- Scar tree
- Heritage PAD
- Spring

Ecological Constraints

- Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland EEC
- Vegetation Clearing
- Disturbance Area
- Hollow Bearing Trees
- Trees to be removed
- Fallen Tree to be moved

Vegetation Clearing Areas

F5

Drawing No:	0422199s_SOEE_G008_R1.mxd		**Transmission Line Connection for the Biala Wind Farm**
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Drawn By:	VN	Reviewed By: ME	

Coordinate System: GDA 1994 MGA Zone 55

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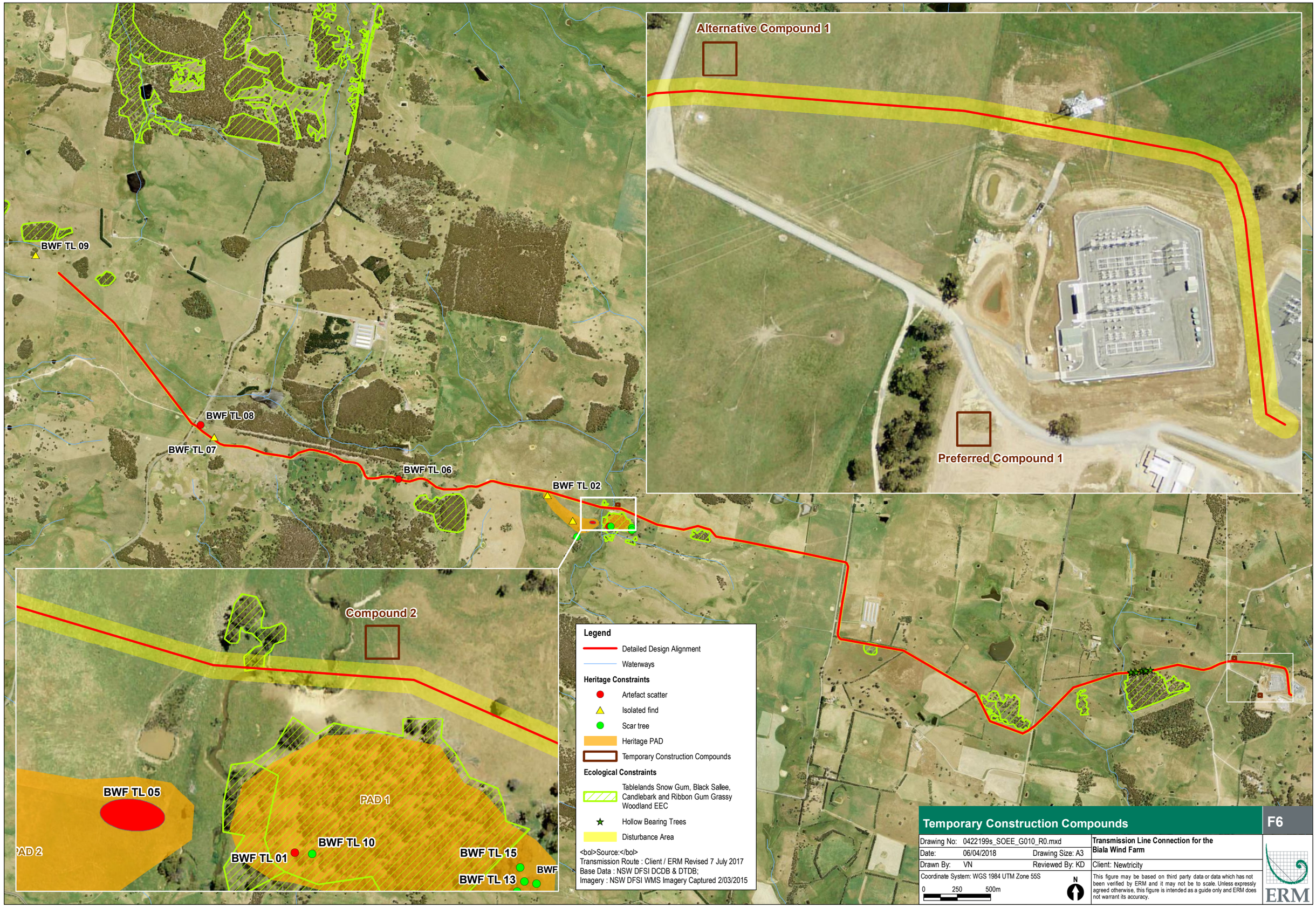
N

ERM



Temporary Construction Compounds

F6

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Coordinate System: WGS 1984 UTM Zone 55S

0 250 500m

N

ERM

WATTLE CREEK
RANGE ROAD
RANGE ROAD
LONG GULLY
LEARYS LANE
BANNISTER LANE
HUMES CREEK
SAWPIT CREEK
GRABBEN GULLEN ROAD
PRICES LANE
GURRUNDAH CREEK
STORRIERS LANE
RYANS CREEK
GURRUNDAH ROAD
HEFFERNANS CREEK

Legend

- Detailed Design Alignment
- Disturbance Area
- Project Area (Corridor)

Source:
Transmission Route : Client / ERM Revised 4 April 2018
Base Data : NSW DFSI DCDB & DTDB;

Proposed Project

F7

Drawing No:	0178462m_TLI_G018_R0.mxd		Transmission Line Connection for the Biala Wind Farm
Date:	25/09/2018	Drawing Size: A3	
Drawn By:	GR / GC	Reviewed By: PD	Client: Newtricity

Coordinate System: GDA 1994 MGA Zone 55

0 200 400 600 m

N

ERM

Annex A

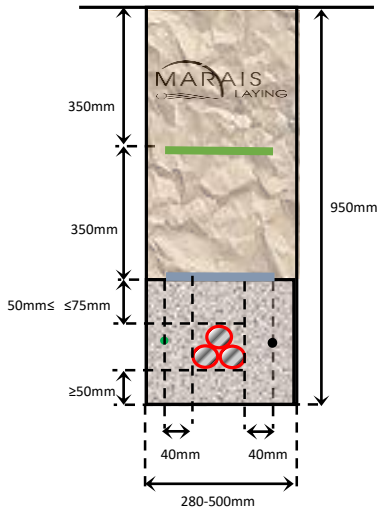
Trenching Design Information

Marais Laying Technologies

Typical Trench Cross Sections

Renewables projects

MARAIS LAYING TECHNOLOGIES TYPICAL TRENCH CROSS SECTION 1
1xtri core or 3x single core, 33kV Cable per Trench
Standard TR sand bedding 1.2Km/W



: Clean Backfill free of Sharp materials and objects > 25mm

: Sand Bedding, TR ≤ 1.2K.m/W

: Power Cable, 1 x tri core or 3 x single core

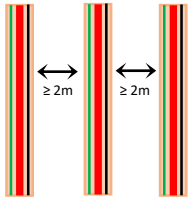
: Earth Cable

: Fiber Optic Cable

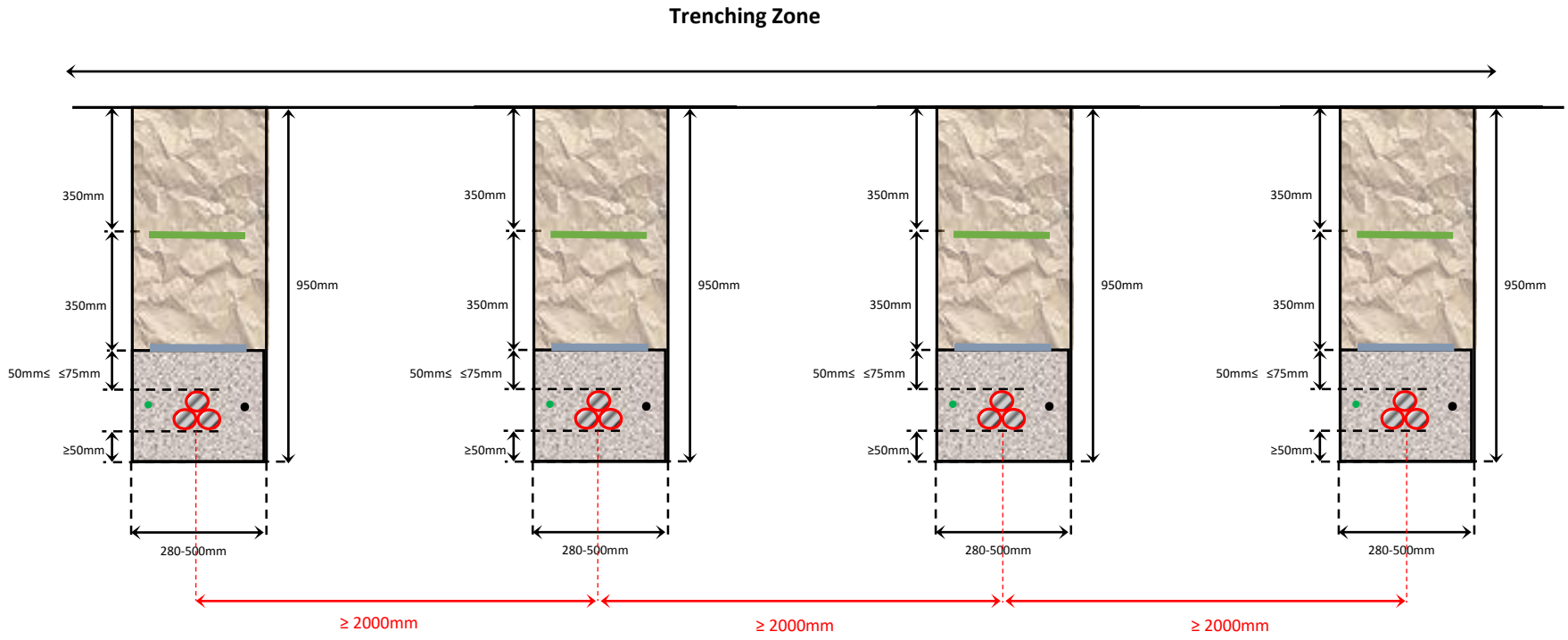
: Cable Protection Cover (AS 4702-2000)

: Warning Tape / Non-detectable marker tape

Minimum adequate separation between parallel trenches :



TRANSMISSION LINE TYPICAL CROSS SECTION
1xtri core or 3x single core, 33kV Cable per Trench
Standard TR sand bedding 1.2Km/W



: Clean Backfill free of Sharp materials and objects > 25mm

: Sand Bedding, TR ≤ 1.2K.m/W

: Power Cable, 1 x tri core or 3 x single core

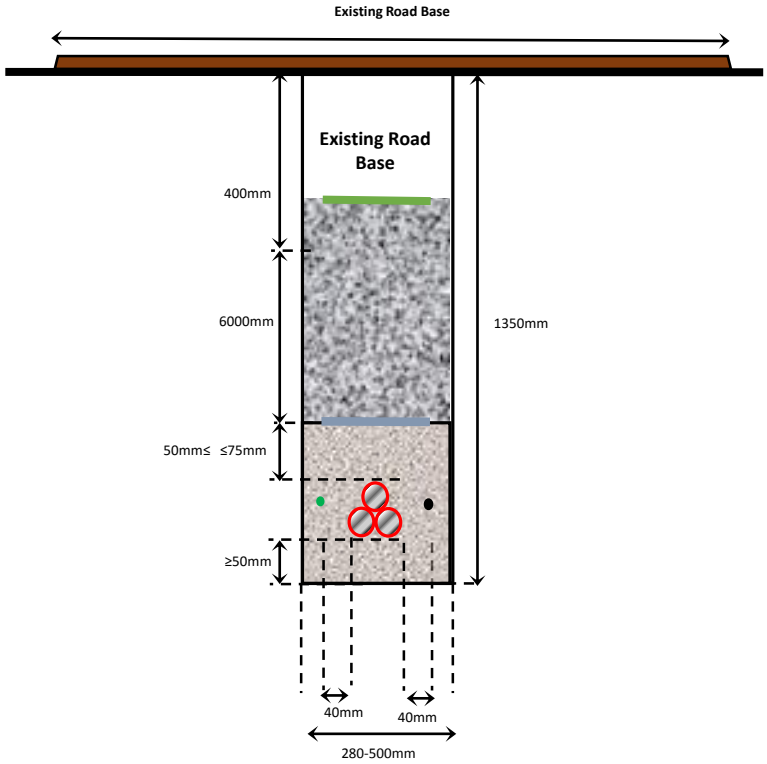
: Earth Cable

: Fiber Optic Cable

: Cable Protection Cover (AS 4702-2000)

: Warning Tape / Non-detectable marker tape

MARAIS LAYING TECHNOLOGIES ACCESS ROAD CROSS SECTION
1x tri core or 3x single core, 33kV Cable per Trench
Standard TR sand bedding 1.2Km/W



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: Sand Bedding, TR ≤ 1.2K.m/W

: Power Cable, 1 x tri core or 3 x single core

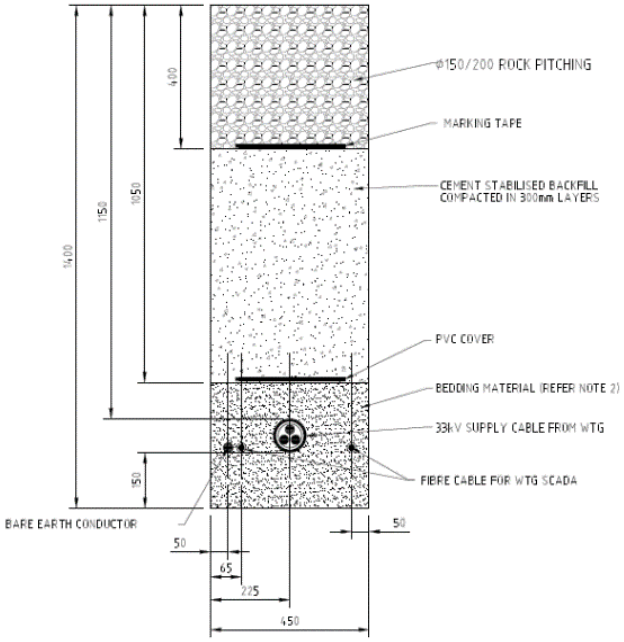
: Earth Cable

: Fiber Optic Cable

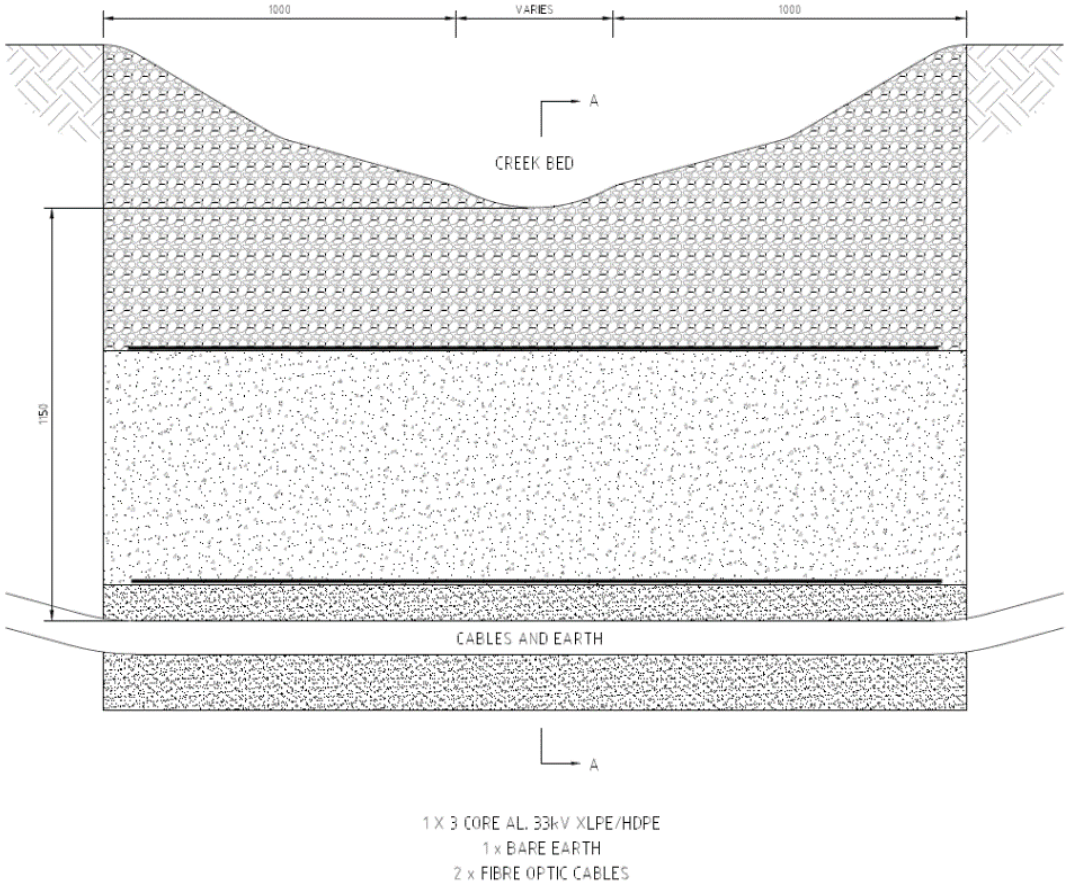
: Cable Protection Cover (AS 4702-2000)

: Warning Tape / Non-detectable marker tape

Trench cross section for a creek crossing:

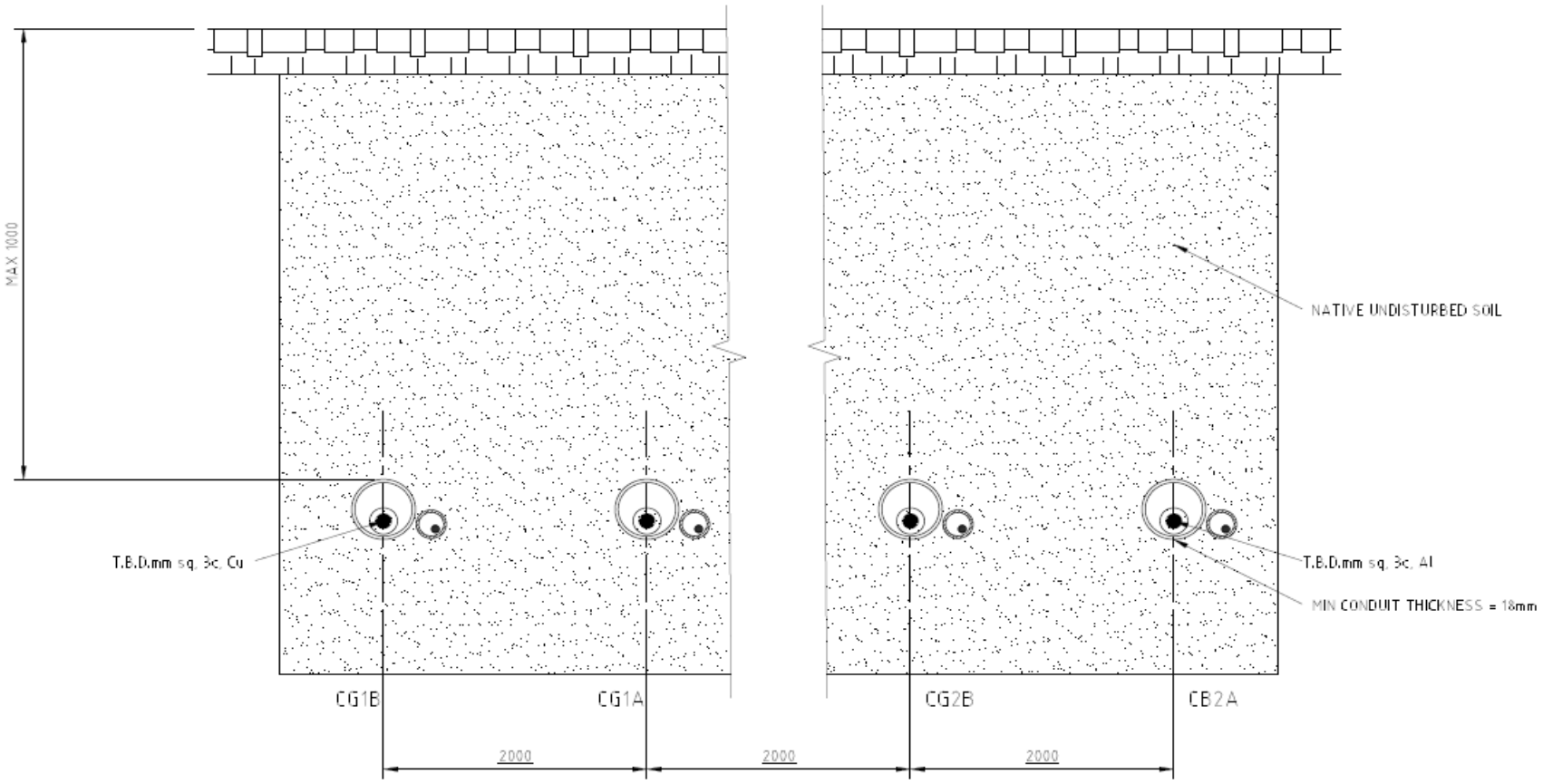


DETAIL F
TYPICAL CROSS SECTION A-A



SECTION A-A
TYPICAL WINDFARM MV CABLE CREEK CROSSING

HDD cross section for road crossing:



DETAIL C
TYPICAL DIRECT BORE OF ROAD
CROSS SECTION

VI. HDD Methodology – Mitra Drilling and Construction

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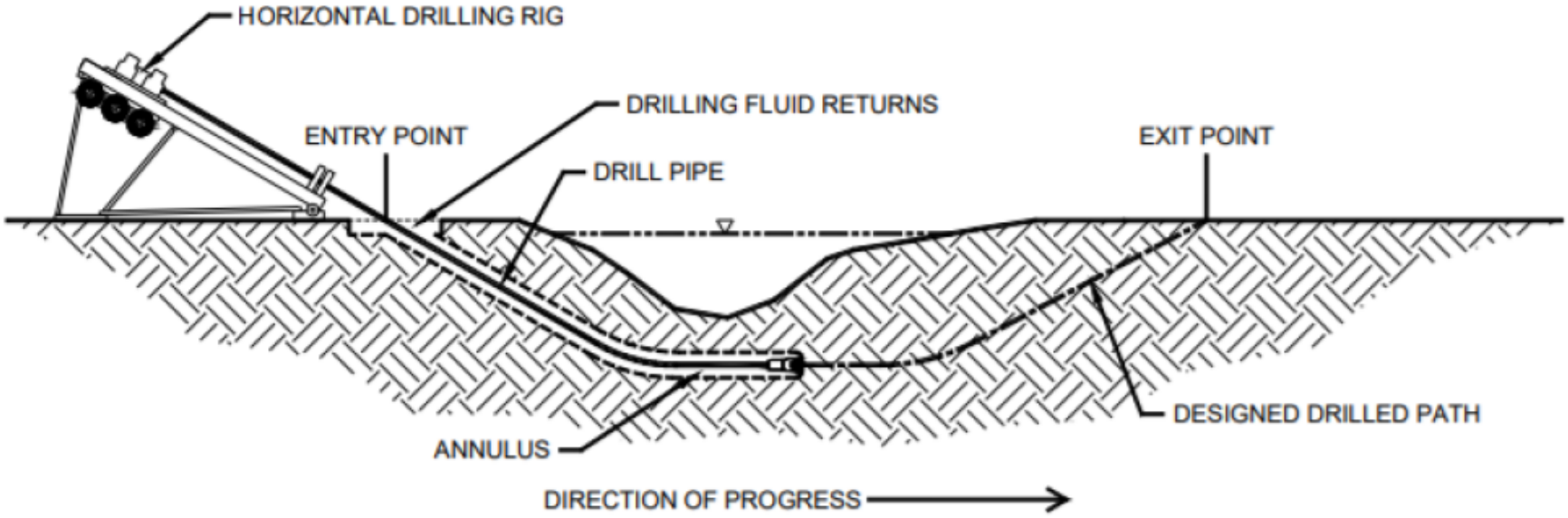
The Horizontal Directional Drilling Process

The tools and techniques used in the horizontal directional drilling (HDD) process are an outgrowth of the oil well drilling industry. The components of a horizontal drilling rig used for pipeline construction are like those of an oil well drilling rig with the major exception being that a horizontal drilling rig is equipped with an inclined ramp as opposed to a vertical mast. HDD pilot hole operations are not unlike those involved in drilling a directional oil well. Drill pipe and downhole tools are generally interchangeable and drilling fluid is used throughout the operation to transport drilled spoil, reduce friction, stabilize the hole, etc. Because of these similarities, the process is generally referred to as drilling as opposed to boring. Installation of a pipeline by HDD is generally accomplished in three stages as illustrated in Figure 1. The first stage consists of directionally drilling a small diameter pilot hole along a designed directional path. The second stage involves enlarging this pilot hole to a diameter suitable for installation of the pipeline. The third stage consists of pulling the pipeline back into the enlarged hole.

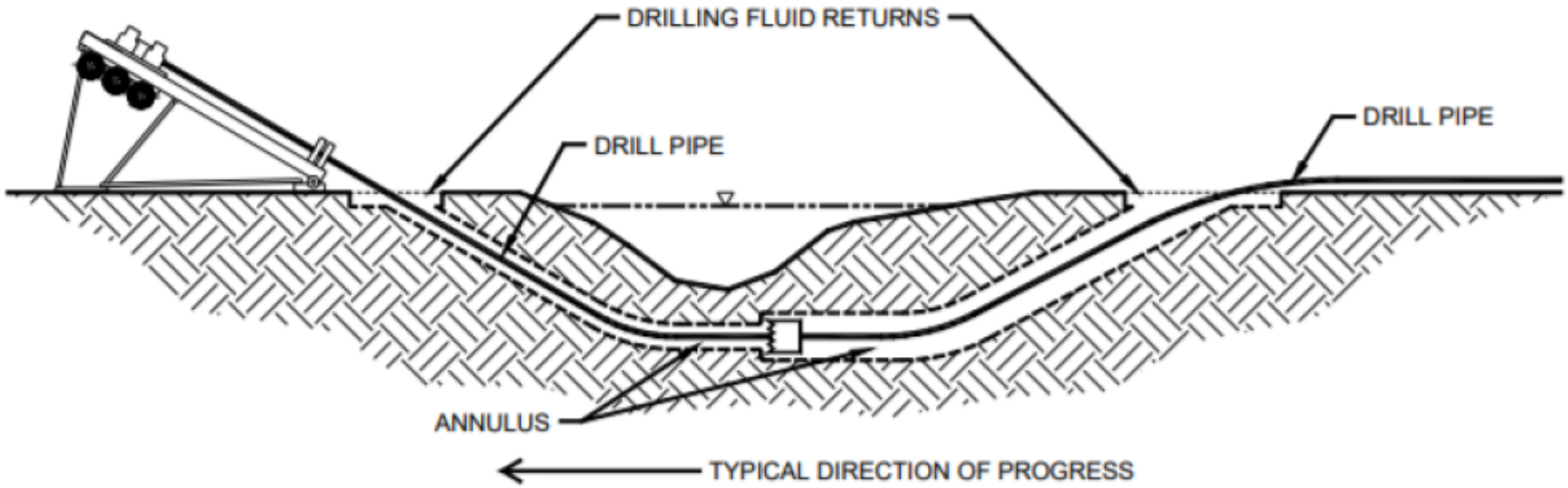
Pilot Hole Directional Drilling

Pilot hole directional control is achieved by using a non-rotating drill string with an asymmetrical leading edge. The asymmetry of the leading edge creates a steering bias while the non-rotating aspect of the drill string allows the steering bias to be held in a specific position while drilling. If a change in direction is required, the drill string is rolled so that the direction of bias is the same as the desired change in direction. The direction of bias is referred to as the tool face. Straight progress may be achieved by drilling with a series of offsetting tool face positions. The drill string may also be continually rotated where directional control is not required. Leading edge asymmetry can be accomplished by several methods. Typically, the leading edge will have an angular offset created by a bent sub or bent motor housing. This is illustrated schematically in Figure 2. It is common in soft soils to achieve drilling progress by hydraulic cutting with a jet nozzle. In this case, the direction of flow from the nozzle can be offset from the central axis of the drill string thereby creating a steering bias. This may be accomplished by blocking selected nozzles on a standard roller cone bit or by custom fabricating a jet deflection bit. If hard spots are encountered, the drill string may be rotated to drill without directional control until the hard spot has been penetrated.

PILOT HOLE **(TYPICAL)**



PREREAMING (TYPICAL)



PULLBACK (TYPICAL)

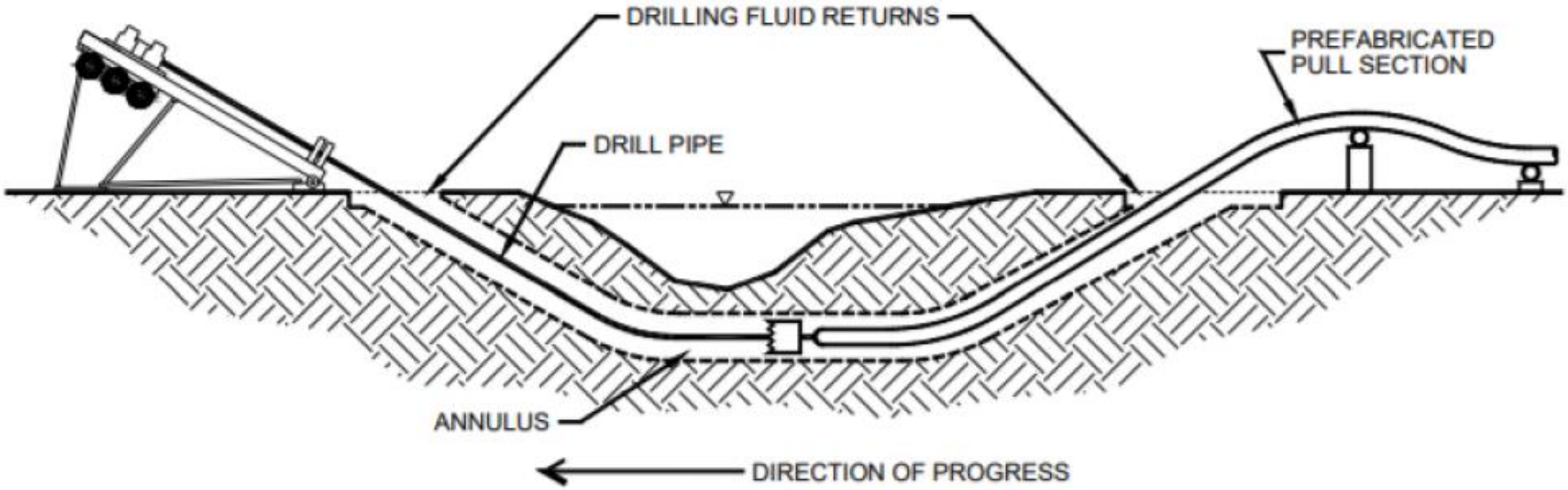


Figure 1
The HDD Process

Downhole Motors

Downhole mechanical cutting action required for harder soils is provided by downhole hydraulic motors. Downhole hydraulic motors, commonly referred to as mud motors, convert hydraulic energy from drilling mud pumped from the surface to mechanical energy at the bit. This allows for bit rotation without drill string rotation. There are two basic types of mud motors; positive displacement and turbine. Positive displacement motors are typically used in HDD applications. Basically, a positive displacement mud motor consists of a spiral-shaped stator containing a sinusoidal shaped rotor. Mud flow through the stator imparts rotation to the rotor which is in turn connected through a linkage to the bit. In some cases, a larger diameter wash pipe may be rotated concentrically over the non-rotating steerable drill string. This serves to prevent sticking of the steerable string and allows its tool face to be freely oriented. It also maintains the pilot hole if it becomes necessary to withdraw the steerable string.

Downhole Surveying

The actual path of the pilot hole is monitored during drilling by taking periodic readings of the inclination and azimuth of the leading edge. Readings are taken with an instrument, commonly referred to as a probe, inserted in a drill collar as close as possible to the drill bit. Transmission of downhole probe survey readings to the surface is generally accomplished through a wire running inside the drill string. These readings, in conjunction with measurements of the distance drilled since the last survey, are used to calculate the horizontal and vertical coordinates along the pilot hole relative to the initial entry point on the surface. Azimuth readings are taken from the earth's magnetic field and are subject to interference from downhole tools, drill pipe, and magnetic fields created by adjacent structures. Therefore, the probe must be inserted in a non-magnetic collar and positioned in the string so that it is adequately isolated from downhole tools and drill pipe. The combination of bit, mud motor (if used), subs, survey probe, and non-magnetic collars is referred to as the Bottom Hole Assembly or BHA. A typical bottom hole assembly is shown as Figure 2.

Surface Monitoring

The pilot hole path may also be tracked using a surface monitoring system. Surface monitoring systems determine the location of the probe downhole by taking measurements from a grid or point on the surface. An example of this is the TruTracker System. This system uses a surface coil of known location to induce a magnetic field. The probe senses its location relative to this induced magnetic field and communicates this information to the surface. This is shown schematically in Figure 3

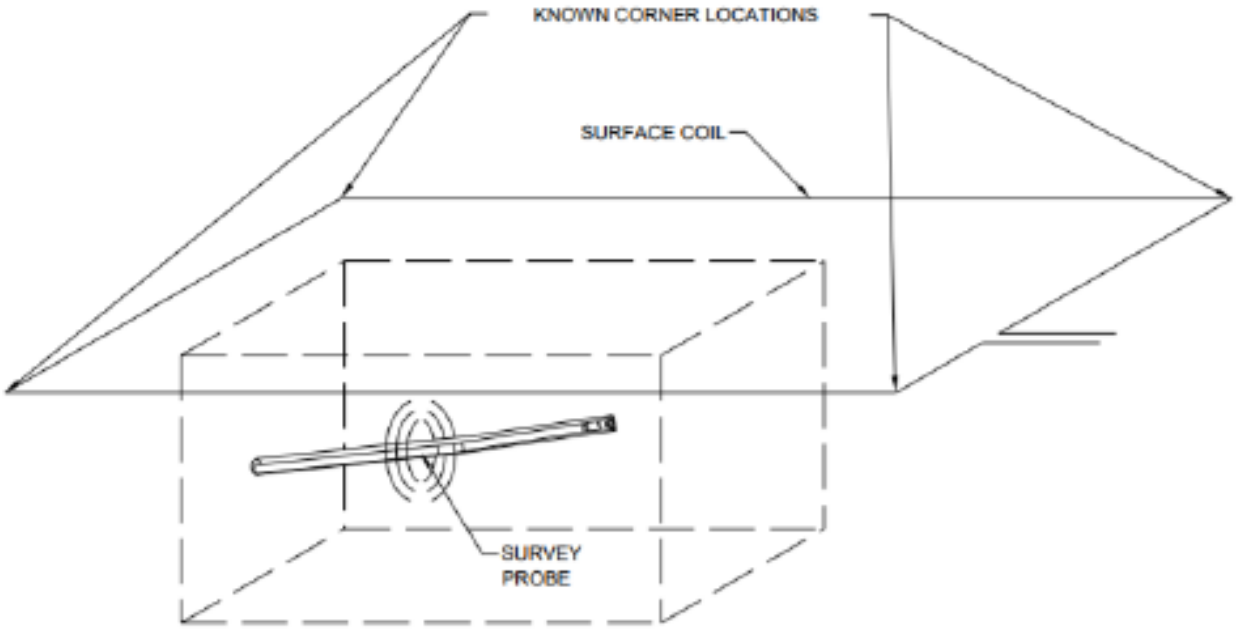


Figure 3
TruTracker Surface Monitoring System

Reaming & Pullback

Enlarging the pilot hole is accomplished using either pre-reaming passes prior to pipe installation or simultaneously during pipe installation. Reaming tools typically consist of a circular array of cutters and drilling fluid jets and are often custom made by contractors for a particular hole size or type of soil.

Pre-reaming

Most contractors will opt to pre-ream a pilot hole before attempting to install pipe. For a pre-reaming pass, reamers attached to the drill string at the exit point are rotated and drawn to the drilling rig thus enlarging the pilot hole. Drill pipe is added behind the reamers as they progress toward the drill rig. This insures that a string of pipe is always maintained in the drilled hole. It is also possible to ream away from the drill rig. In this case, reamers fitted into the drill string at the rig are rotated and thrust away from it.

Pullback

Pipe installation is accomplished by attaching the prefabricated pipeline pull section behind a reaming assembly at the exit point and pulling the reaming assembly and pull section back to the drilling rig. This is undertaken after completion of pre-reaming or, for smaller diameter lines in soft soils, directly after completion of the pilot hole. A swivel is utilized to connect the pull section to the leading reaming assembly to minimize torsion transmitted to the pipe. The pull section is supported using some combination of roller stands, pipe handling equipment, or a flotation ditch to minimize tension and prevent damage to the pipe.

Buoyancy Control

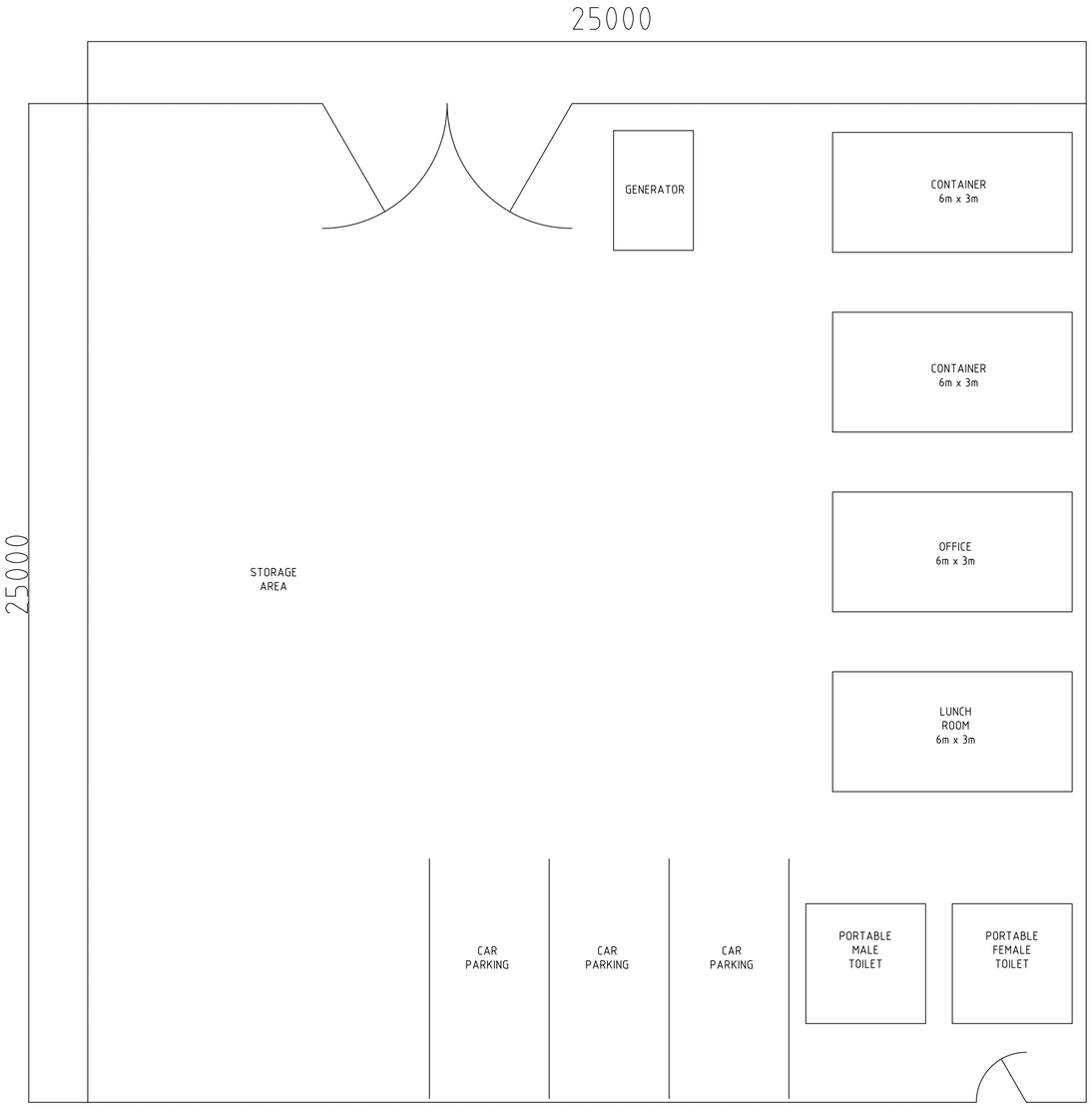
Uplift forces resulting from the buoyancy of larger diameter lines can be very substantial. High pulling forces may be required to overcome drag resulting from buoyancy uplift. Therefore, contractors will often implement measures to control the buoyancy of pipe 30 inches or over in diameter. The most common method of controlling buoyancy is to fill the pipe with water as it enters the hole. This requires an internal fill line to discharge water at the leading edge of the pull section (after the breakover point). An airline may also be required to break the vacuum which may form at the leading edge as the pull section is pulled up to the rig. The amount of water placed in the pipe is controlled to provide the most advantageous distribution of buoyant forces. Some contractors may choose to establish a constant buoyancy. This can be accomplished by inserting a smaller diameter line into the pull section and filling the smaller line with water. The smaller line is sized to hold the volume of water required per lineal foot to offset the uplift forces.

Humes Creek Crossing

Gurrundah Creek Crossing

Annex B

Temporary Construction Compound Design Information



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-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
A	ISSUED FOR TENDER	JL	BSH	-	03/18

REVISIONS

CONSOLIDATED POWER PROJECTS
A QUANTA SERVICES COMPANY

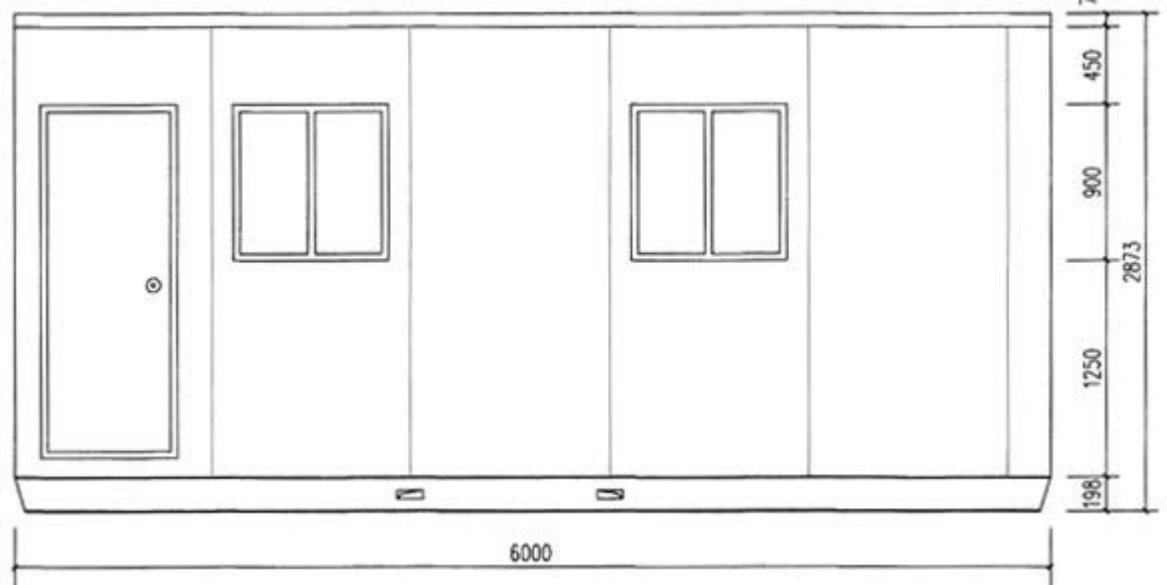
PROJECT

DRAWING TITLE

BIALA WIND FARM
PROPOSED SITE COMPOUND
AT BIALA SUBSTATION

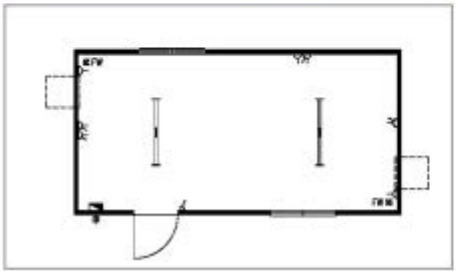
DRAWN	J.LEONARD	21/03/2018	A1 SCALE N.T.S.	PROJECT No. 10967
DESIGN	B.STUART-HILL	21/03/2018	DRAWING No. 10967(T)-P-2003	
APPVD	-	-	A1	SHEET No. 1 / REV A

DIMENSIONS IN MILLILMETRES DO NOT SCALE


450
900
1250
198
2873
6000

Offices
6m x 3m

- Single entry door
- 2 windows with security grills
- 2 twin 1200mm 40 Watt fluorescent lights
- 4 double 10 Amp GPO's
- 2 single 10 Amp GPO's
- Electrical distribution board



OPTIONAL INCLUSIONS	Plan bench, bar fridge, filing cabinet, notice board, white board, blinds, carpet, additional furniture, locking bar to entry door, dry chemical powder fire extinguisher.
STANDARD INCLUSIONS	1 office desk, 1 swivel chair, 2 visitors chairs, 1 wall mounted r/c air conditioner.

Lunch Rooms
6m x 3m (18 person)

- Single entry door
- 2 windows with security grills
- 2 twin 1200mm 40 Watt fluorescent lights
- 4 double 10 Amp GPO's
- 2 single 10 Amp GPO's
- Electrical distribution board

OPTIONAL INCLUSIONS	Large fridge, fire extinguisher, water cooler, locking bar to entry door.

Storage Containers
6m x 2.4m & 12m x 2.4m

- Standard steel container
- Double entry doors
- Locking box
- Timber floor
- Plumbers container also available with an extra boot for 6m pipe

MODEL/SIZE	6m x 2.4m Storage Container.
	6m x 2.4m Plumbers Container.
	12m x 2.4m Storage Container.

FEATURED EQUIPMENT - Toilet Block 6.0Mx3.0M - M/F

Toilet Blocks

Toilet Blocks

SUBMIT ENQUIRY

DOWNLOAD BROCHURE

DESCRIPTION

Toilet Block Hire :
Various designs are available to suit projects and events, including tank mounted or sewer connect units. Ask your local branch about servicing options. Specific details refer to 6m x 3m Sewer Connect Male Toilet package. Other sizes are available.

Standard Inclusions:
- 4 WC Cubicles with toilet roll holder and coat hook
- 1200mm stainless steel urinals
- 1 Paper towel dispenser
- 8 Hand basins with mirror and cold water

Optional Inclusions:
- Electric Hot Water
- Waste Holding Tank
- Fresh water holding rank and pressure pump

SUITABLE FOR

Worksites, Events,Temporary to Long Term Requirements

Toilet Blocks
3.6m x 2.4m

Sewer Connect

- Single entry door
- 2 high light windows
- 1 twin 1200mm 40 Watt fluorescent light
- 1 single 10 Amp GPO
- Exhaust fan
- Electrical distribution board

OPTIONAL INCLUSIONS	Electric hot water service connected to basins, waste holding tank to suit, fresh water holding tank c/w pressure pump.

Environment Policy

Coates Hire operates in the equipment rental/hire industry in a wide variety of markets, including oil and gas, civil engineering, residential and non-residential construction, industrial services and maintenance, mining and resources, commercial and manufacturing, government and events.

Coates Hire's vision is to be a market leader promoting environmentally sustainable practices by supporting our customers and guiding our suppliers to achieve excellence in environmental practices and management.

Coates Hire is committed to protect the environment, prevent pollution and will continuously develop, maintain and improve our environmental management system in line with best practice across our global operations, in order to:

- provide the appropriate resources to manage implement and control our environmental activities and minimise our environmental footprint
- comply with all relevant environmental legislation, and applicable standards, codes and guidelines
- ensure managers, supervisors, employees, suppliers and contactors are aware of their responsibilities as defined within the Coates Hire Environmental Management System
- establish environmental objectives and targets
- measure, monitor and report environmental performance to enable regular management review and provide for continuous improvement; and
- annually review and revise the environmental management system and this policy and communicate it to employees via the intranet, training programs and notice boards and to all other interested parties via the Coates Hire website.

As the Chief Executive Officer, I am responsible for the implementation of the Coates Hire Management System and the behavioural change necessary to ensure the commitments made in this policy are being met.

The Board is responsible for establishing and overseeing the Company's commitment to environmental management in accordance with this policy and for monitoring the performance of the Company with respect to its implementation.

bsi. ISO 9001 Quality Management FS 648130 | ISO 14001 Environmental Management EMS 648129 | OHSAS 18001 Occupational Health & Safety Management OHS 648128 | AS/NZS 4801 Occupational Health & Safety Management OHS 648127

Jeff Fraser
Chief Executive Officer

Quality Policy

Coates Hire operates in the equipment rental/hire industry in a wide variety of markets, including oil and gas, civil engineering, residential and non-residential construction, industrial services and maintenance, mining and resources, commercial and manufacturing, government and events.

Our mission is to be recognised by our customers, peers and ourselves as the leader in the markets we serve and to operate injury and accident free.

We focus on context of company and interested party's needs. We aim to exceed our customer's expectations by providing only the highest quality products and services to help build a better future. We achieve this through our safety, environmental, quality management system and teamwork.

The quality policy provides a framework for setting and reviewing quality objectives. Our company objectives and targets are prescribed in our Business Plan, with objectives for individual jobs being to perform the work to the satisfaction of our customers and in accordance with any contractual requirements and legal obligations.

Coates Hire is committed to:

- maintaining certification to ISO9001 and continually improving our business processes and systems
- complying with statutory obligations, specifications and codes of practice relevant to quality management
- exceling in fleet availability, utilisation and quality
- providing staff with ongoing training and development opportunities; and
- identifying, reporting, investigating and resolving all non-conformities and taking action to prevent recurrence.

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bsi.	ISO 9001 Quality Management	ISO 14001 Environmental Management	OHSAS 18001 Occupational Health & Safety Management	AS/NZS 4801 Occupational Health & Safety Management
	FS 648130	EMS 648129	OHS 648128	OHS 648127

Jeff Fraser
Chief Executive Officer

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