

Appendix 3

Infrastructure and resource assessment:

Infrastructure & Resource Assessment

21-261– Valley of the Winds Wind Farm

Prepared for:



icubed consulting

Doc Reference: 21-261-VWWF-Infrastructure & Resource Assessment[C]

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Released By	Nick Canto
Job Number	21-261
Date	28/02/2024
Document Name	21-261-VWWF-Infrastructure & Resource Assessment[C]
Version	C

Document Revision History

Version	Revision History	Date	Author History
A	Issued to client – draft	17/09/2021	Marcus Palmer
B	Revision Issued to client – final	29/09/2021	Marcus Palmer
C	Revision Issued to client – final based on comments received	28/02/2024	Blake Henry

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1 Introduction

The proposed Valley of the Winds Wind Farm (the Project) is located in the Warrumbungle Shire Council in New South Wales, approximately 110 kilometres east of Dubbo, between the townships of Coolah, Uarbry and Leadville; refer to Figure 1. The Project is in the early stages of feasibility assessment; however, it is anticipated that it may comprise up to 131 Wind Turbine Generators (WTGs) situated in three primary clusters, with an installed capacity of 812MW. ACEN Renewables are undertaking project planning focussed on the design and layout of the project to establish the windfarms feasibility and constructability moving forward.

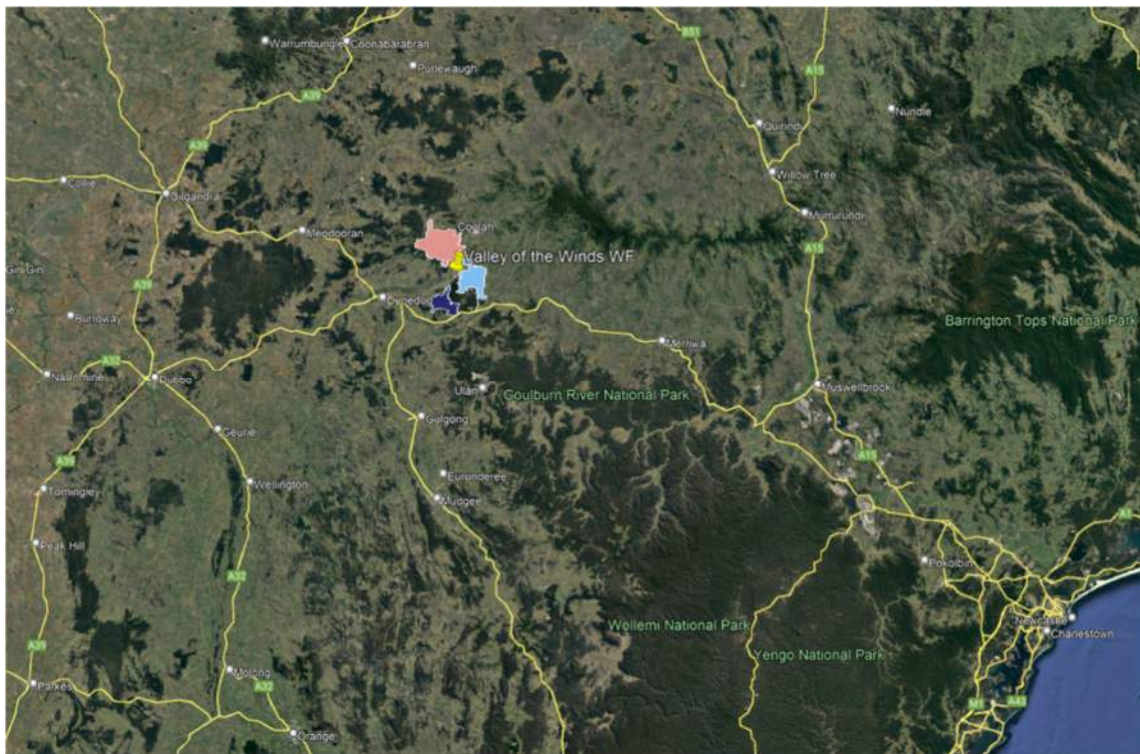


Figure 1: Valley of the Winds Wind Farm Location

icubed consulting has been commissioned to provide preliminary engineering services to assist with project planning. This report specifically provides information on the local infrastructure and resources relevant to a wind farm project for consideration during this preliminary phase of studies by ACEN Renewables. The WTG coordinates have been made available during this design phase of the project. The involved landowners and subsequent project boundary have also been provided by ACEN Renewables. Cadastral data has been obtained from NSW Spatial Services. Given the early stage of the project we will be limited to providing a high-level desktop review to confirm if there is an absence of resource/s available locally, and a general picture of where relevant resources are located in relation to the WF project area. In addition to this resource and infrastructure review, the report will establish estimated material quantities relevant to the construction phase in order to assist with construction planning. This study also includes the assessment of site geology and native waterways within the project boundary.



2 Hydrology

A review has been completed on the catchments and watercourses across the subject site. The Valley of the Winds Wind Farm project boundary consists of many watercourses that will require careful planning to ensure that internal infrastructure routes are optimized throughout site and causeway crossings are preferably minimised. There are six (6) named creeks and a river that run throughout the project, including:

- Bowenbong Creek
- Wallambriwang Creek
- Miangulliah Creek
- Deep Creek
- Cainbil Creek
- Moreton Bay Creek
- Coolaburragundy River

It is noted that multiple other minor water causeways connect to each of these six major creeks and a river listed above. By their nature, these creeks and river are expected to have flows during and after rainfall events. This presents a potential hazard in the form of localised inundation during and after rain events, as well as isolation of WTGs for short periods of time. It is recommended that a flood plain assessment be conducted during the next phase of studies.

2.1 Fishways

A review has been carried out on available fishery mapping data obtained from the NSW Department of Primary Industries. The assessment below on available fishery information is to be read in conjunction with the hydrology data provided in Section 2 above. Based on sampling and investigations conducted by the NSW government, the freshwater fish community health in waterways surrounding the development area are currently classed as poor or very poor.

There are two threatened species of fish located within the project boundary, the Southern Purple Spotted Gudgeon and the Eel-Tailed Catfish. The creeks that are known Southern Purple Spotted Gudgeon habitat are highlighted in purple in the Figure 2 below, and the river that is a known Eel-tailed Catfish habitat is highlighted in Blue in the Figure 3 below, along with the project boundary and proposed turbine locations. As illustrated, this Southern Purple Spotted Gudgeon habitat does amount to a large extent of waterways throughout the project.

It is anticipated that adequate fish passage requirements will need to be considered in the design of any waterway crossings required for windfarm infrastructure located within the threatened fish habitat. This would amount to specialised fish crossing culverts which satisfy necessary up-stream and down-stream requirements. Environmental approval for this aspect should be considered a project condition and carefully considered in future design phases of the project.

For the purposes of this report, we recommend that any proposed waterway crossing with mapped threatened species will require a fish passage designed in accordance with *“Why do fish need to cross the road? Fish passage requirements for waterway crossings”* prepared by Sarah Fairfull and Grant Witheridge. During the detailed design stage, there is also potential for the proposed waterway crossings to be reviewed by a Fish Passage Specialist to confirm if a fish passage is required at those individual locations.

It is noted that the available mapping only shows threatened species of freshwater fish. If fish passages are required, the above fishery elements are not all-inclusive, as non-threatened species may need to be considered as well.

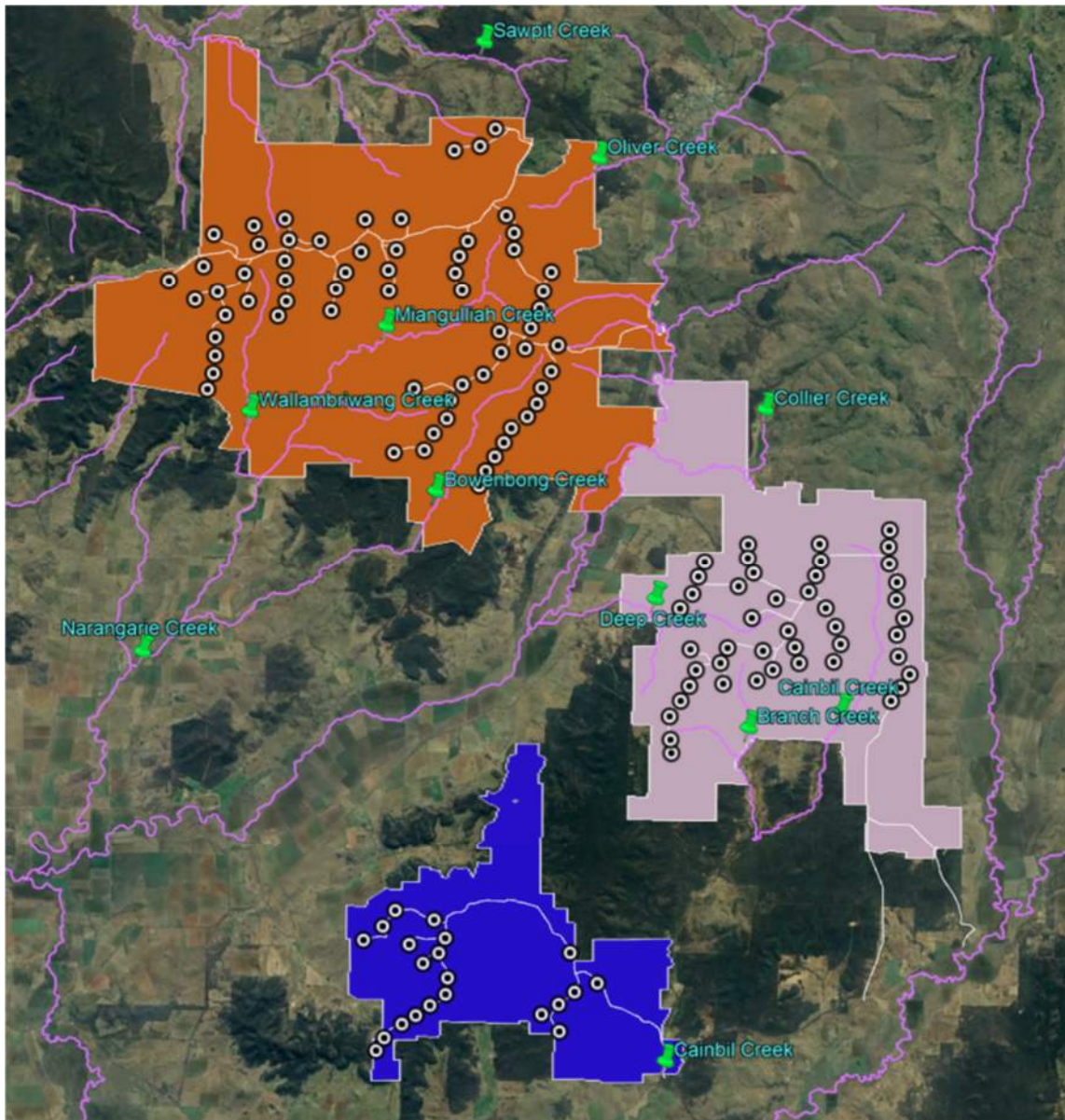


Figure 2: Project Boundary, Waterways and Southern Purple Spotted Gudgeon Habitat

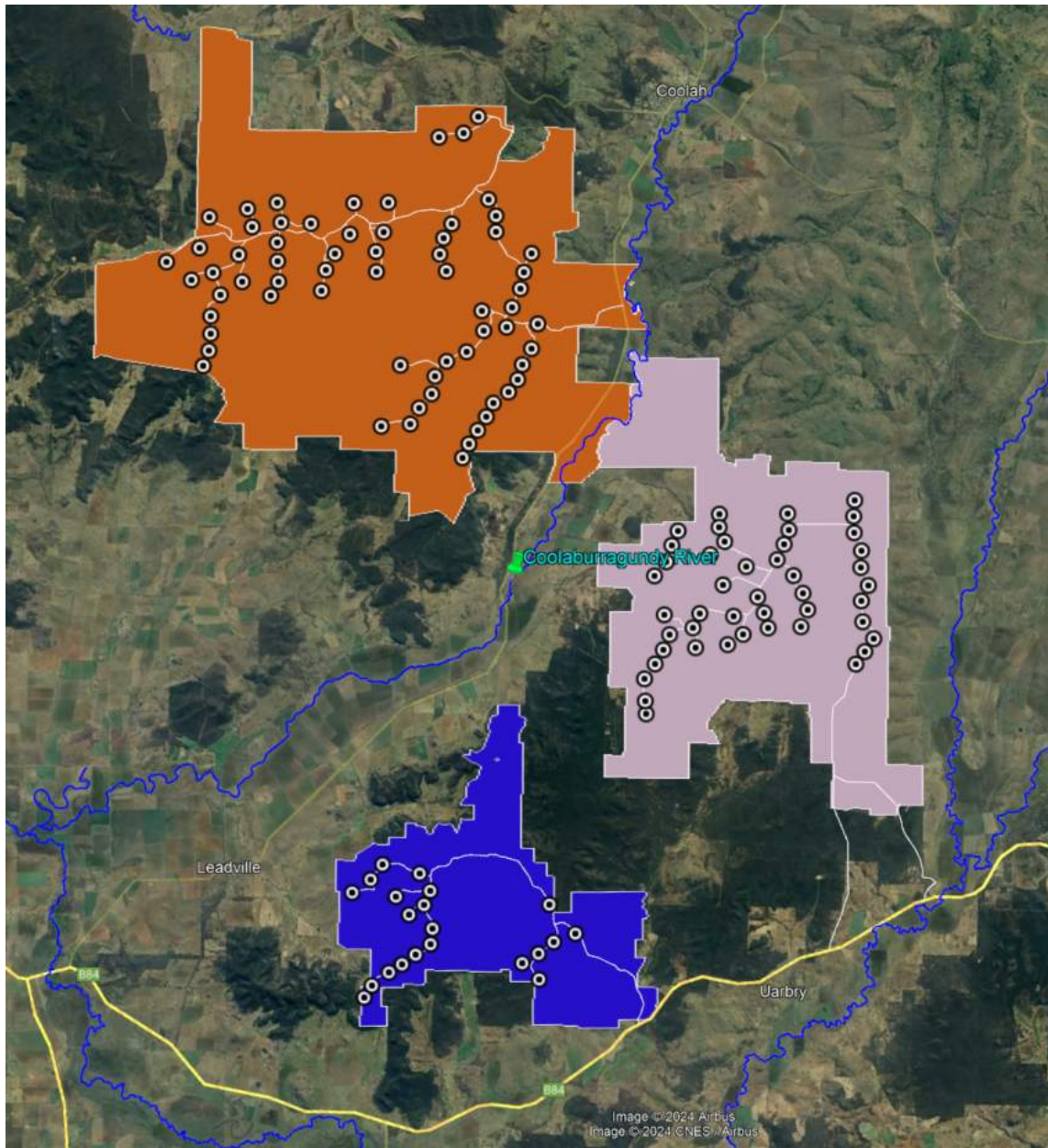


Figure 3: Project Boundary, Waterways and Eel-Tailed Catfish Habitat



3 Site Geology

A review of the rock and soil formation over the site has been carried out to assess construction impacts on the proposed project boundary. Analysed data has been obtained through the AGSON Geoscience Portal. These maps provide the underlying geotechnical formations beneath the Valley of the Winds Wind Farm project site.

From these geological profiling maps, it is anticipated that the site will predominately be made up of the following formation type:

- Mixed sediment volcanic rocks, comprising **basalt, dolerite** and their weathered derivatives.

This is further illustrated in Figure 4 and Table 1 below, which depict the geological profile and rock definitions respectively.

The anticipated formation is similar to other wind farm projects in the inner NSW region. In our experience it is unlikely that the rock mass will be of a quality which will render the viable use of rock anchors. It is more likely that the foundations will comprise of a conventional gravity pad type footing.

Rock breaking techniques should be anticipated throughout site, with potential for blasting, dependant on rock strength when considering the native basalt. Allowance for overbreak of rock in foundations due to rock breaking or blasting activities should be considered, and this may impact the quantity of blinding and dental concrete used in preparation works for the WTG footings. Reuse of the broken rock will be to the benefit of the project and can be used to stabilise drains and for other sediment and erosion control purposes. There may also be an opportunity to crush some of the excavated basalt material into a road base to be used in the construction of the access tracks and crane hardstands for the project.

As depicted in Figure 4 below, there are some sedimentary rock types on the fringes of the main plateaus, consisting of sandstones and shales. Care will need to be taken in the vicinity of contact zones between the newer volcanics and the older sedimentary rock types as these locations can have zones of deeply weathered and low strength material. Additionally, turbines near the edges of these contact zones should be carefully assessed to establish the presence of ash layers and other deleterious materials which may have been deposited prior to the placement of the lava formation which subsequently cooled to form the observed rock types.

While it is recommended that geotechnical testing and reporting be completed at later stages of the projects design phases, the information available by the NSW government indicates that the projects geological profile will be appropriate for the needs of a windfarm. An invasive investigation of the site ground conditions has not been completed as part of this scope.

The project boundary and proposed turbine locations have been overlaid on available geological maps in Figure 4 below.

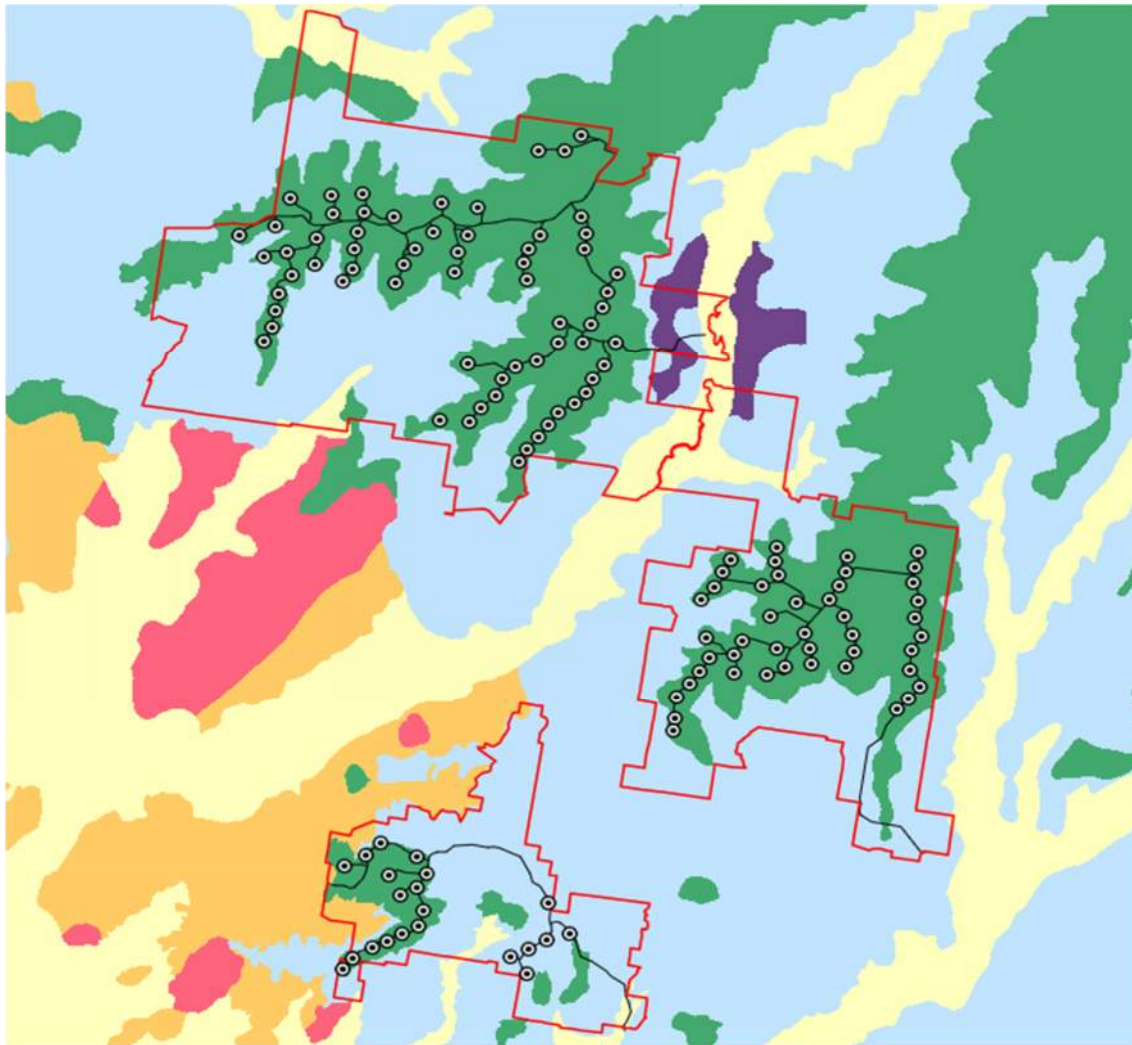








Figure 4: Geological Profile of Project Site Boundary

Table 1: Geological Mapping Legend

Reference	Description
Identified within site boundary	
	Liverpool Range Volcanics Basalt, dolerite, polymictic conglomerate, quartzose sandstone, shale bole, gravel, siltstone, carbonaceous claystone.
	Pilliga Sandstone Medium to very coarse grained, well sorted, angular to subangular quartzose sandstone and conglomerate. Minor interbeds of mudstone, siltstone and fine grained sandstone and coal. Common carbonaceous fragments and iron staining. Rare lithic fragments.
	Glenrowan Intrusives Sills and dykes of alkali dolerite and micro-syenodolerite.
	Tannabutta Group Rhyolite to dacite lava, volcanic sandstone and autoclastics, shale, black mudstone, lithic and quartz sandstone, slate, volcanic conglomerate, limestone and limestone breccia, allochthonous basalt blocks; rare latitic to trachytic lava
	Alluvium Channel and flood plain alluvium; gravel, sand, silt, clay; may be locally calcreted
In Close Proximity to Site	
	Gulong Granite Leucocratic medium- to coarse-grained porphyritic megacrystic granite, minor aplite phases, minor quartz monzonite

4 Topography

ELVIS contours detailing elevation information at 5m intervals has been obtained to assess the topography within the proposed site boundary. The image below depicts 'heatmapping' of the grades of the natural surface level across the proposed project boundary. The full sketch of the existing slopes heatmap data is included within Appendix A for further clarity.

The heatmapping shows that the WTGs generally follow the ridgelines across the project site. In particular, the Mount Hope (Coolah) Cluster WTGs are positioned along a prominent ridgeline with grades exceeding 20% down each side of the elevated WTG locations. While the proposed access track alignment looks to follow the ridgeline such that earthworks avoid steep grades where practicable, this area of the project may require significant earthworks to ensure adequate flat surfaces for delivery and construction. Large cut to fill quantities should be expected to minimise track gradients to allow for OSOM deliveries at these locations. Whilst both the Leadville and Girragulang (Uarbry) Clusters have generally less prominent ridgelines with shallower grades, a number of WTGs are still positioned adjacent topography exceeding grades of 20%, particularly along the western side of both clusters. Such locations may require significant earthworks and additional micrositing of WTG locations in order to limit earthworks footprint.

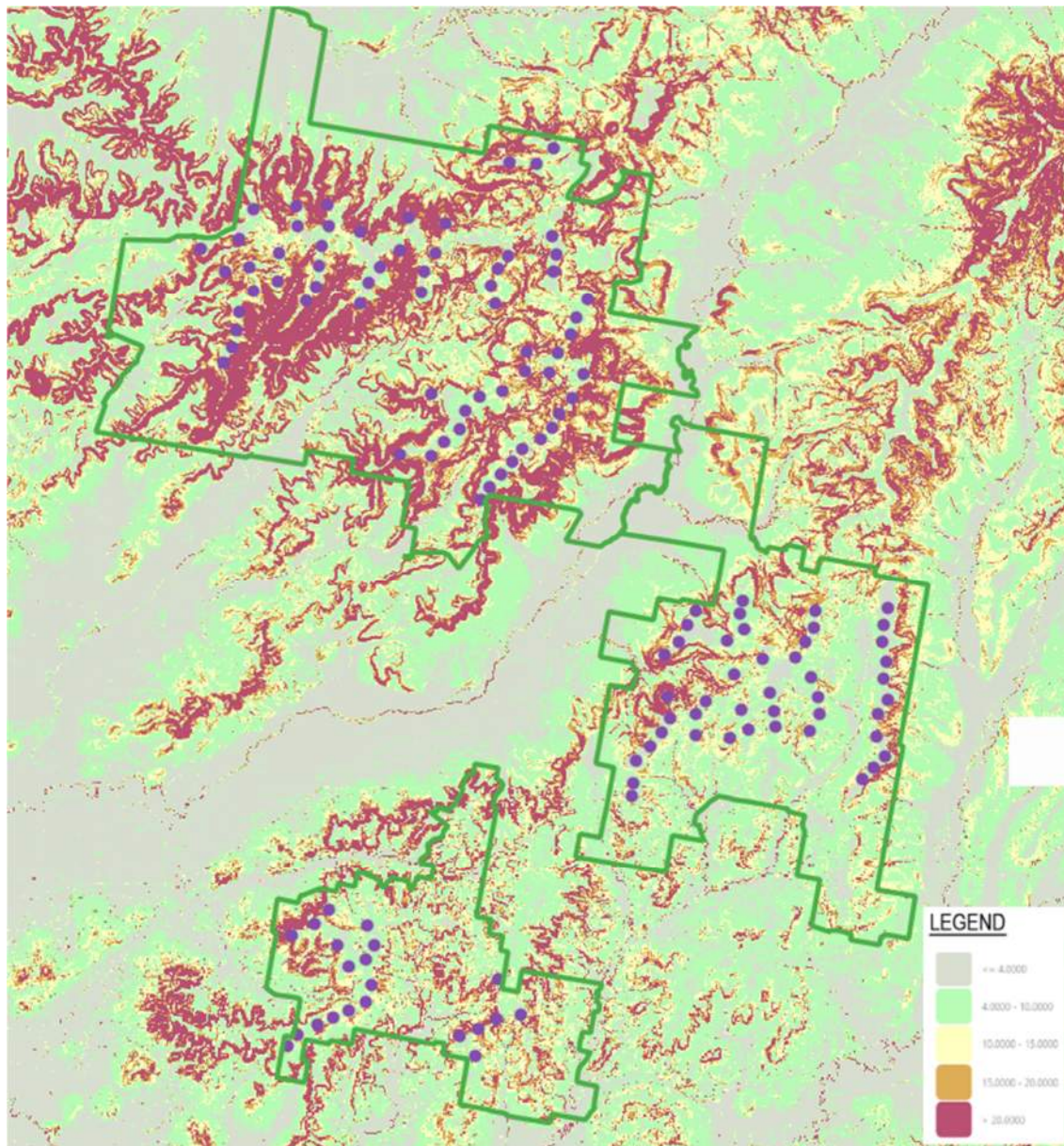


Figure 5: Heatmapping of surface grades from 5m contours.



5 Material Quantities

Preliminary estimated quantities for the construction of the civil components of the project have been assessed in order to establish likely demand for sourcing and hauling. In particular, pavement material demand for the access tracks, crane hardstands and various site benches (site compound, substation etc.) has been assessed. Material demand for the WTG footing construction has also been assessed based on preliminary concepts of likely footing size.

Considering a project of this scale, methods for limiting the extent of material/utility will be crucial to limiting the development's impact on the surrounding area during the construction phase. The ability to utilise the geological formation within the site boundary for fill and pavement construction presents an opportunity for reducing haulage (and resulting wear) on the local road network, as well as the ability to limit material costs associated with the civil infrastructure construction.

Similarly, methods for limiting water usage during the construction phase may be utilised, including reducing the need for dust suppression of access tracks and concrete batching with recycled water.

The following section of this report details the preliminary estimated quantities for the project construction and presents methods for optimising the project's material demand.

5.1 Earthworks Pavement Material

The following section of the report details assumed geometry for access tracks, hardstands and ancillary pads within the project and provides estimates for anticipated pavement demand. Opportunity for on site quarry establishment is discussed in order to limit the extent of material sourcing requirements from outside of the site.

5.1.1 Access Tracks & Hardstands

The quantity assessments for the access tracks and crane hardstands are based on the proposed dimensions detailed in the typical drawings *VOWWF-TYP-001[A] – Typical Access Track Details* and *VOWWF-TYP-003[A] – Typical Hardstand Details*. These drawings are appended within Appendix C.

The preliminary layout of the access track network contains approximately 127.5km of road length, servicing the 131 hardstands at each WTG location. Noting the limited availability of geotechnical information within the site at the time of writing, a pavement course thickness of 200mm has been assumed for all access tracks and hardstand formations.

While final parameters for the material properties will be confirmed during the detailed design phase, it is anticipated that the pavement course will be made up of a Class 3 crushed rock base course or similar.

The following table provides a summary of the geometrical assumptions associated with the pavement quantity estimates for the access track and hardstand construction.

**Table 2: Access Track and Hardstand Geometrical Parameters**

Access Track	
Total Track Length	127.5km
Track Width	6m
Pavement Thickness	200mm
Hardstands	
No. of Hardstands	131
Pavement Area/Hardstand	3,580m ²
Pavement Thickness	200mm

5.1.2 Ancillary Pads

Ancillary pad construction for supporting infrastructure/services within the project also need to be considered when establishing earthworks pavement material demand. In particular, this section of the report will assess the requirements for construction compound, batch plant, O&M and substation facility benches.

Due to the vast layout of the project site and the likely simultaneous operation of workforces within multiple site locations, these pads will generally need to be positioned in each of the three site clusters to support construction.

The preliminary site layout plan provided by ACEN Renewables designates both a construction compound and substation bench area within each of the site clusters. Additionally, allowance should be made for a single O&M bench in order to service the site during operation.

Due to the distance between the WTGs in each cluster, it is anticipated that a Concrete Batch Plant will need to be operating within each area at some point during the construction phase. The anticipated size of the WTG footings, as well as the likely temperatures during pours in summer months, requires management of the hauling time of the agitators such that a high supply rate can be maintained during a footing pour. Additional information relating to batch plant requirements is provided in Section 5.2.4. An allowance for 3 batch plants has been included in the quantities assessment.

The following table details the number and the assumed dimensions for the Ancillary Pads anticipated to be built during the construction phase as listed in the document *21-161 – Design Criteria – Rev 01*. As noted in Section 5.1.1, a pavement thickness of 200mm has been assumed throughout the project at this stage.

Table 3: Ancillary Pad Dimensions and Parameters

Bench	Quantity	Dimensions	Pavement Thickness
Construction Compound	3	200m x 100m	200mm
Concrete Batch Plant	3	100m x 100m	200mm
Internal Substation	4	<i>Varies</i>	200mm
O+M Compound	1	100m x 100m	200mm
Laydown Area	3	100m x 100m	200mm

5.1.3 Pavement Material Quantity Estimates

Using the above information as the basis for the assessment, overall crushed rock pavement demand for the construction phase of the project has been estimated as outlined in the below table.

As well as an assessment of volume (m³), the overall tonnage of gravel (t), as well as the water demand during placement (kL) has been assessed. A density of 2.1t/m³ has been assumed for the gravel. Water demand for pavement construction has been assumed at 7.5% of total material volume (not including dust suppression). Water requirements will be discussed further in Section 5.3 of the report.

Table 4: Pavement Material Quantity Estimates

Infrastructure	Quantity (m ³)	Water (kL)	Gravel Mass (t)
Access Tracks	152,980	11,474	321,258
WTG Hardstands	93,796	7,035	196,972
Substation Benches	59,427	4,457	124,796
O&M Facilities Bench	2,000	150	4,200
Concrete Batch Plant Benches	6,000	450	12,600
Construction Compound Benches	12,000	900	25,200
Total	326,203	24,465	685,026

Additional information relating to this quantity assessment is provided within Appendix B.

Noting the significant amount of crushed rock outlined in the above assessment, opportunities to limit the extent of how much of this will need to be imported should be investigated. Sourcing material from within site will help to limit the extent of haulage on local roads and limit the project's susceptibility to supply issues from external quarries.

5.1.4 On Site Quarry for Pavement Production

As noted within Section 3, the project site's underlying geological formation comprises mixed sediment volcanic rocks, predominately basalt. This formation presents the opportunity to establish a hard rock quarry for the production of pavement material for utilisation on the project's civil infrastructure.

Ideally, a suitable area would be identified in each of the three site clusters in order to limit haulage. Areas of land in the 7-8Ha range should be explored in detail to ascertain whether the underlying conditions are suitable for pavement construction.

A crushing circuit within the quarry would be utilised to produce a well graded -20 stone for road pavement material. A typical mobile quarry setup for this production would comprise of a jaw and cone, as well as 3 screen decks in order to achieve grading. Multiple circuits across the three clusters would be required to service the anticipated pavement demand of >300,000m³.

Figure 6 demonstrates the typical scale and operation of an onsite quarry.



Figure 6: Crushing Circuit within On-Site Quarry.

Current known geotechnical information means that any locating of potential site quarry locations is preliminary and subject to further investigation. However, the following images depict locations within each cluster that may be suitable for further consideration. Each location is positioned within the confines of volcanic rock as depicted in Section 3 and is positioned in an area close to proposed track infrastructure. Effort has been made to suggest a location that is topographically suitable for quarry operation and construction whilst remaining on the plateaus containing volcanic rock.

Alternatively, the fringes of the plateaus consist of a more 'soft rock' geology such as sandstones and shales. This may also produce a suitable pavement if the cementation is well developed. However, these types of materials are likely to be more slippery and deteriorate over time.



Figure 7: Leadville Cluster proposed quarry location (-32.021821, 149.596043)

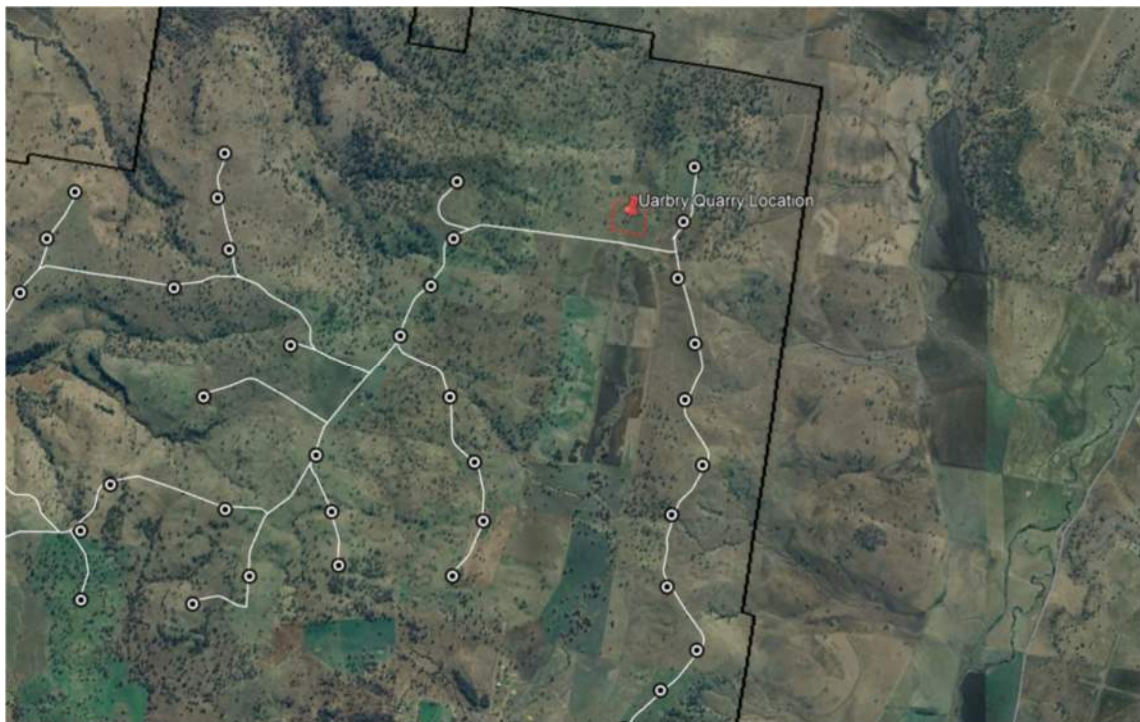


Figure 8: Girragulang (Uarbry) Cluster proposed quarry location (-31.943047, 149.751186)

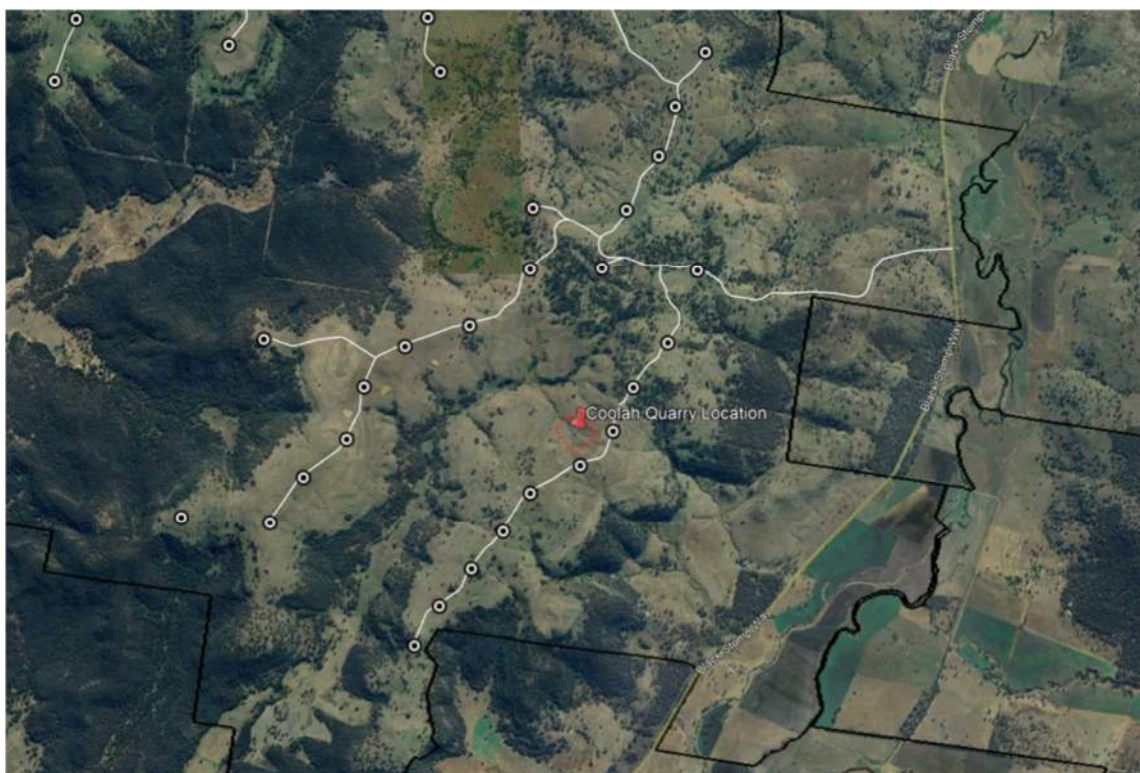


Figure 9: Mount Hope (Coolah) Cluster proposed quarry location (-31.895495, 149.653034)

In addition to the above commentary regarding quarry construction, the site topography will likely lead to WTG locations where significant cut will be required in order to comply with vertical geometry requirements of the approaching access track. In such locations, the resultant material harvested from lowering the turbine may be utilised for material production. In particular, a mobile crushing unit may produce -100 shot rock material for use in fill formations or as erosion control. This process will help to balance cut/fill requirements across the site and reduce the need for importing oversize rock.



5.2 WTG Footing Construction Materials

A significant proportion of material demand for the wind farm development will be the construction of the WTG concrete footings. Noting the constituents for concrete production, footing construction will require importation of a significant amount of cement, aggregates, sand, and water. The following section details estimated material requirements based on an assumed footing dimension and concrete mix design.

5.2.1 Assumed Footing Dimensions

Considering the likely tower size and geotechnical conditions of the site, the parameters in the table below have been assumed for assessing material demand associated with WTG footing construction. It is anticipated that the footing plinth would be constructed from 40MPa low heat concrete, and the remainder of the footing from 32MPa concrete. 15MPa blinding concrete would be utilised to form a level finish at the excavation base.

Table 5: Assumed WTG footing dimensions for quantity assessment.

WTG Footing Component	Concrete Grade	Volume
Footing Plinth	40MPa	60m ³
Footing Pad	32MPa	890m ³
Steel Reinforcement	-	154 (tonnes)
Blinding	15MPa	100m ³

5.2.2 Assumed Mix Design

The presumed concrete mix design is consistent with quantities utilised in previous WTG footing construction. The figures in the table below detail the kilograms of each constituent within one cubic metre of concrete production. Due to the footing size, the use of low heat concrete will be required to manage concrete temperatures during the curing process. As such, Fly Ash has been included for the purposes of this assessment. The final blend of cementitious content shall be proposed by the project's concrete supplier. Opportunities for reduction of concrete demand, such as the use of high-density concrete, should be investigated with the concrete supplier prior to commencement of the final footing design.

Table 6: Assumed proportion of mix design constituents (kg/m³)

Concrete Grade	GP Cement (kg)	Fly Ash (kg)	Aggregate (kg)	Sand (kg)	Water (L)
S32	220	90	1030	860	170
S40	260	120	1050	760	175
N15	165	45	1110	1070	175

5.2.3 WTG Footing Quantity Estimates

Assuming the above information regarding the assumed WTG footing dimensions and concrete mix design, preliminary quantities have been established for the 131 WTGs proposed for the project. The table below details the material demand for each of the constituents associated with concrete production, as well as for steel reinforcement quantities.

Table 7: WTG Footing Quantity Estimates for Wind Farm

	GP Cement (t)	Fly Ash (t)	Aggregate (t)	Sand (t)	Water (kL)
S32 Concrete	25,650	10,493	120,088	100,267	19,820
S40 Concrete	2,044	943	8,174	5,974	1,376
N15 Blinding Concrete	2,162	590	14,541	14,017	2,293
TOTALS	29,855	12,026	142,803	120,258	23,488
Steel Reinforcement	20,174t				



Additional information relating to this quantity assessment is provided within Appendix B.

5.2.4 Batch Plant Requirements

It is anticipated that a concrete batch plant would be situated within each of the three clusters. Assuming >900m³ of concrete is to be placed in a single continuous pour for each footing, the time between the WTG hardstand and the batch plant will need to be limited such that an appropriate pour rate can be maintained. Hence, the distance between the batch plant compound and furthest WTG hardstand should be limited as much as practicable.

Between WTG footing pours (assuming 3 per week), blinding pours, and other incidental concreting, it is anticipated that weekly concrete demand will exceed 3,000m³ during the peak of the project for each batch plant. With 7m³ agitator trucks, this is over 400 vehicle movement across the week. Delivery vehicles for replenishing stockpiles, as well as constant vehicle movement on the bench during pours between stockpiles and batching should also be considered when assessing overall throughput for disturbance.

To ensure footing pours can be completed within a single working shift, output from the batching plant should be approximately 130m³/hour. Flexible operating hours (24 hour operation) of the batching plant for concrete pours will be required in order to complete footing construction during warmer months. As detailed further in Section 9, the site's climatic conditions will require concreting to be complete outside of typical site operating hours in order to manage concrete temperatures.

5.2.5 Cable Trench Bedding Sand

Another significant component of material demand for the construction phase of the project is the bedding sand associated with cable trench construction. Sand is utilised along the length of the electrical reticulation, and preliminary quantities for material demand have been determined using the electrical reticulation lengths provided by ACEN Renewables.

The following table details the assumed dimensions for cable trench bedding and provides an estimated quantity for sand requirement:

Table 8: Cable Trench Bedding Sand Estimate

	Cable Length (m)	Bedding Width (m)	Bedding Depth (m)	Sand (m ³)
Cable Bedding Sand	254,967	0.50	0.35	44,619

5.3 Water Demand

Significant water demand across all aspects of the civil construction associated with the project will require detailed planning in order to ensure sufficient supply. As detailed below, required water quality is activity dependent, and multiple sources from both within the project site and from local town supplies will be required.

5.3.1 Quantity Assessment

The following table details the anticipated water demand associated with the construction phase of the project. In particular, water associated with earthworks pavement construction (including dust suppression, WTG footing construction (as noted in Section 5.2.3), and workforce demand at construction compounds.

The following assumptions have been made regarding the project water demand:



Pavement Construction:

- 7.5% water application per m³ pavement placement

Dust Suppression:

- 2.5L/m²/day
- Assume 45 km in use at any time, 8m application width
- Assume 78 weeks construction, 6 days per week

Construction compound:

- 40L/day per person
- Average 200 full time personnel for 78 weeks

Noting the above, the following quantities have been established for water demand:

Table 9: Water Demand for Pavement Construction

	Pavement Quantity (m ³)	Water Application (%)	Water (kL)
Pavement Construction	489,304	7.5	24,465

Table 10: Water Demand for Dust Suppression

	Track Use (m)	Width (m)	Duration (days)	Rate (kL/m ² /day)	Water (kL)
Dust Suppression	45,000	8m	468	0.0025	421,200*

Table 11: Potable Water Demand for Construction Compounds

	Workforce	Demand (L/day)	Duration (days)	Water (kL) (Potable)
Construction Compound	200	40	468	3,774

In addition to the above water quantities, the water demand for WTG footing construction is estimated as **23,488kL** as noted in Section 5.2.3.

** The potential water demand for dust suppression has considerable variability depending on the climatic conditions in the lead up to and during construction. During periods of low rainfall, water demand can be considerably higher and consideration should be given to use of alternative dust surfactants such as polymers or magnesium chloride.*

5.3.2 Dust Suppression

As detailed above, water demand for dust suppression is significant, estimated to be 421,200kL for the project duration. Water quality for this means is unimportant and effort should be made to source much of the dust suppression water from within site. Further detail regarding water sourcing is noted in Section 6 of this report.

Limiting water demand through application of other dust suppression methods should be investigated during the project planning phase. The application of dust suppression chemicals on the unsealed road pavement may be a feasible approach to limiting water demand. Products can be applied following construction that form a temporary 'crust' over the finished surface, binding the fines content of the pavement as a temporary solution for dust.

Another approach to managing dust suppression requirements is by simply managing the construction works such that vehicle movements are limited to specific areas of the site as much as is feasibly practical. Limiting vehicle movement outside of the current construction zone will ensure the extent of track used that requires

dust suppression is reduced. Particular focus on optimising this approach should be given during construction phase programming.

5.3.3 Concrete Batching – Recycled Water

The current estimate for water use associated with WTG footing construction is 23,488kL as detailed in Section 5.2.3. The quality standards for concrete construction is greater than that associated with earthworks construction, and water will need to be source from outside of site for this purpose.

One approach for reducing this water demand is through the use of recycled water from within the batch plant, such as from the wash down of agitator trucks following concreting. This approach needs to be closely managed to ensure that quality remains suitable. If implemented appropriately, recycling water presents an opportunity to supply 5-10% of the overall water demand associated with WTG footing construction. Further discussions should be help with the nominated concrete supplier to understand how this may be successfully implemented on the project.

5.4 Disturbance Allowance

When considering disturbance extents for earthworks construction, allowance should be made for buffer zones beyond the typical construction zone of the formation. Allowance should be made for the following practical purposes:

- Implementation of sediment and erosion control measures,
- Efficient circulation of earthmoving plant,
- Temporary storage of topsoil materials, close to final placement position,
- Underground cable alignments, where terrain permits,
- Drainage inlet and outlet controls.

The following sketch has been prepared to demonstrate suitable buffers zones associated with earthworks formation construction:

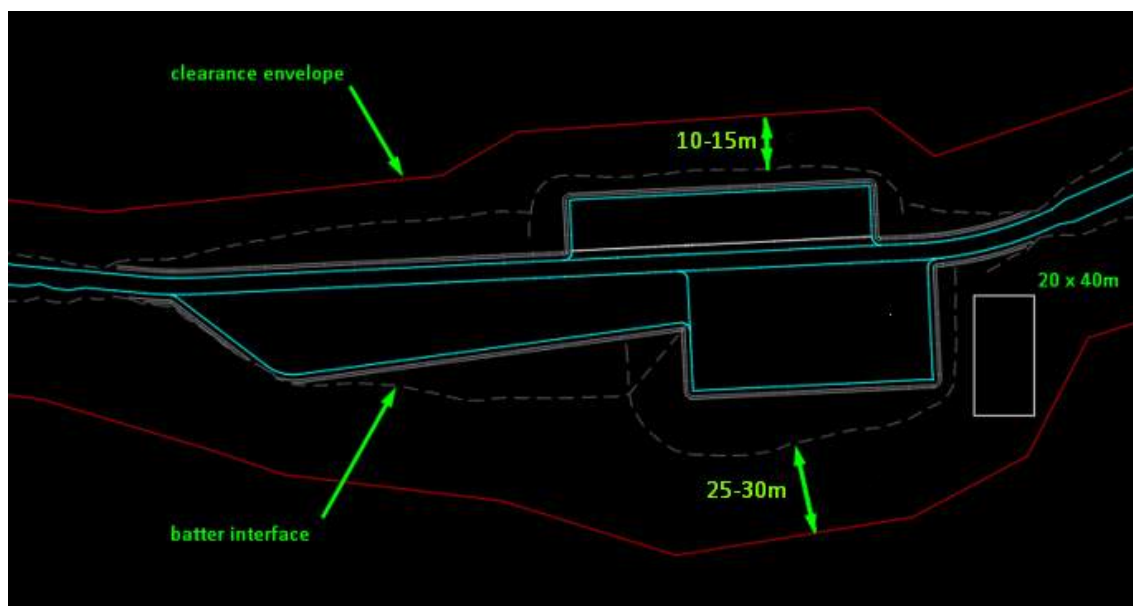


Figure 10: Clearance envelope sketch with indicative buffer zones.

5.5 Importance of Accurate Input Data

When establishing earthworks quantities during the design phase of civil infrastructure, it is critical that accurate LiDAR input data, as well as detailed survey where practicable, is utilised. The accuracy of earthworks quantities is dependent on the establishment of suitable existing surface levels in order to establish a basis for cut/fill as well as finished earthworks surfaces. Inaccurate information will impact the estimated costs of construction, as well as impact factors such as establishing finished surface levels for flood immunity or conformance with geometrical criteria.

The below screenshots provide a comparison of the vertical disparity between contours at a 1m interval against contours at 5m intervals as obtained from the ELVIS website. Note that in some locations, the difference in contour intervals demonstrates a vertical disparity upwards of 1m when determining existing surface level. It is strongly recommended that accurate LiDAR information is obtained for the entire site boundary as soon as possible in order to ensure appropriate levels are utilised for future design work.

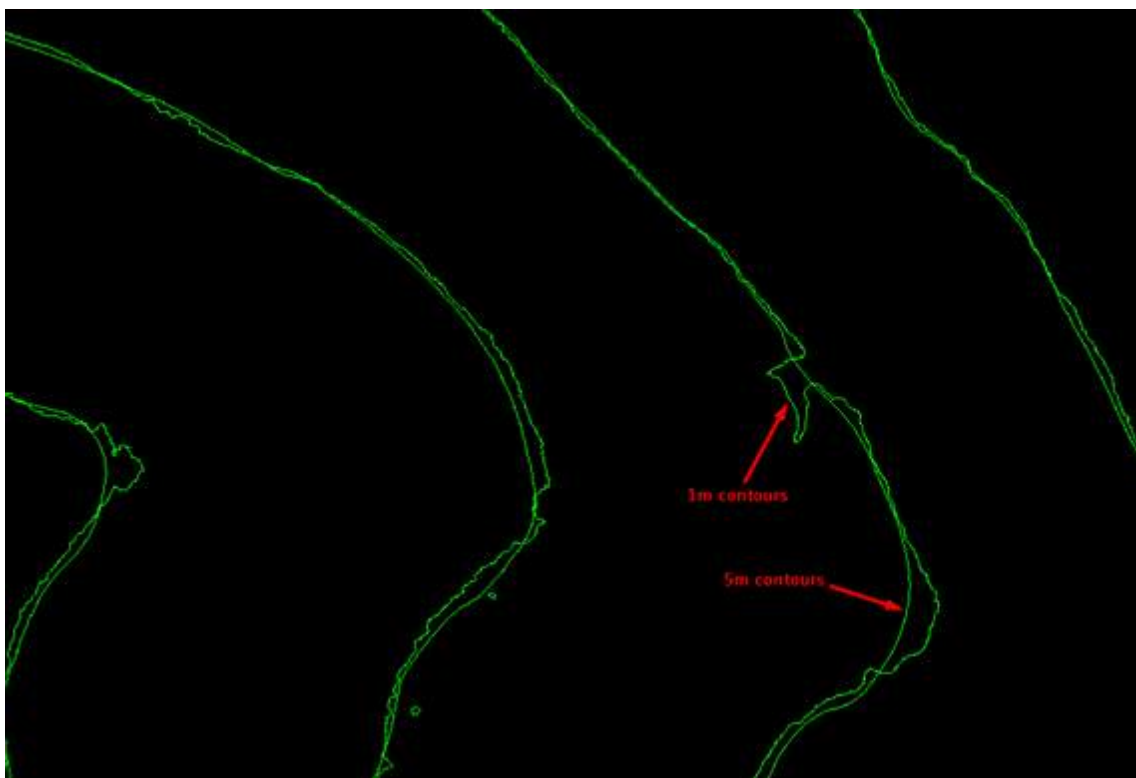


Figure 11: Plan view comparison of 1m and 5m contour lines from ELVIS data

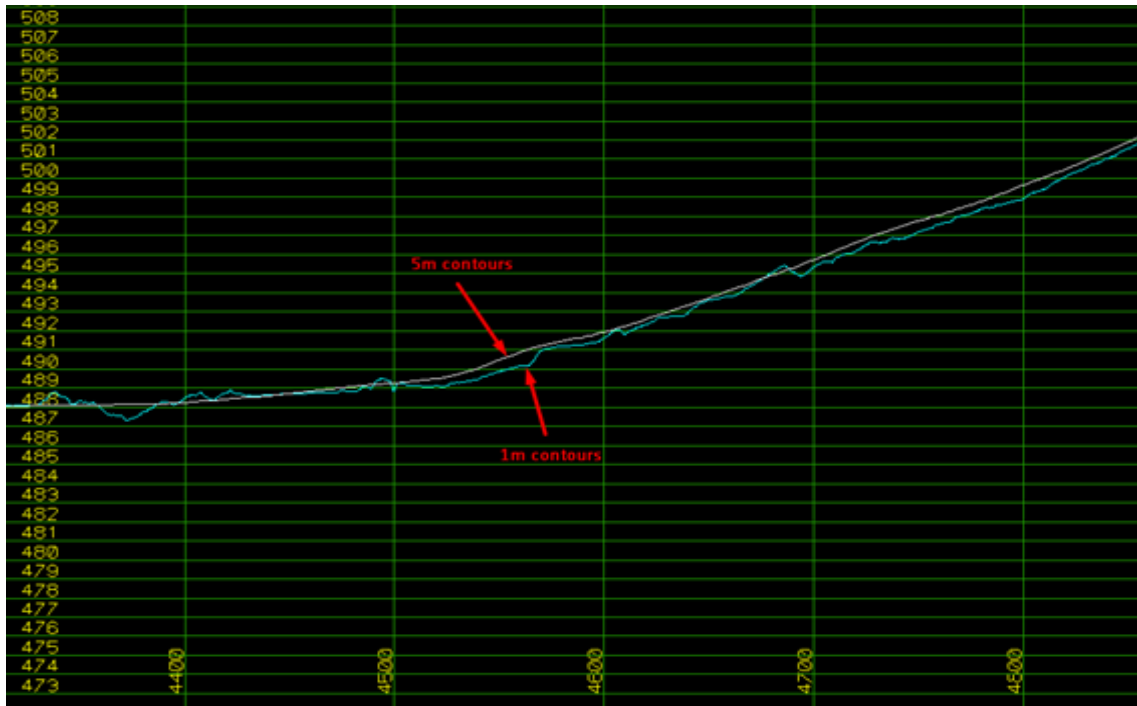


Figure 12: Elevation view comparison of 1m and 5m contour lines from ELVIS data

6 Material Sourcing

6.1 Sourcing of Aggregates

Given the large amount of WTG's and expanse of involved land, it is anticipated that large quantities of aggregates will be required for the construction of the Valley of the Winds Wind Farm. Generally, windfarm projects require large haul of aggregates for use in the concrete for concrete footings, in the road base for the internal access tracks and crane hardstands, and in drainage networks for sediment and erosion controls.

As noted in Section 5.1.4, the geological conditions of the site appear to be suited to the development of an on-site quarry and this should be investigated further as a source for production of pavement material associated with access track and hardstand construction. Aggregates associated with concrete production require a higher quality material and it is anticipated that these will need to be sourced from established quarries within the local region.

There are multiple quarries in the Dubbo area and surrounds that could be used as a source of aggregates for use in concrete, as well as in road base for the project where necessary. The particulars for these quarries include:

- Holcim Quarry Dubbo: Sheraton Rd, Dubbo NSW 2830
- Boral Quarries: LOT 29 Spring Ridge Rd, Gulgong NSW 2852
- Regional Group Quarries: 20 Sheraton Rd, Dubbo NSW 2830
- Dubbo Hard Rock Quarries: 10R Lagoon Creek Rd, Minore NSW 2830
- Tallawonga Pit: 218 Tallawonga Road, Elong Elong, NSW 2831 (Privately owned Quarry)

Considering these quarries and the infrastructure supporting these quarries in townships that are in close proximity to the project's boundary, the Valley of the Winds Wind Farm is considered to be in an optimal location for sourcing of Aggregates.

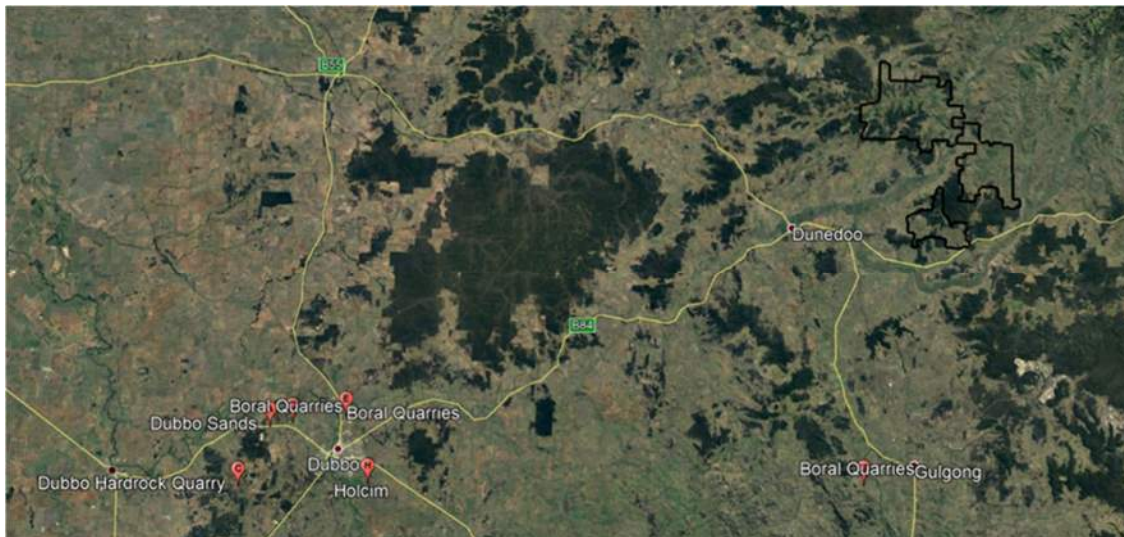


Figure 13: Aggregate Sourcing Options Native to Site



6.2 Sourcing of Sands

Large quantities of sand will be required for the construction of the wind farm, for use in the concrete for the footings and as bedding sand for the cable trenches, as noted in Section 5.2. There are several quarries nearby that could potentially supply sand for the uses described. These include the quarries highlighted in Section 6.1, in addition to:

- Dubbo Sands: 22L Rawsonville Rd, Rawsonville NSW 2830
- Refer Quarries in Section 5.1

Considering these quarries and the infrastructure supporting these quarries in townships that are in close proximity to the project's boundary, the Valley of the Winds Wind Farm is considered to be in an optimal location for sourcing of sands. It would be appropriate to conduct some degree of testing of these materials to ensure that they meet the electrical performance criteria for thermal bedding sands.

6.3 Sourcing of Water

The construction of the windfarm will require large quantities of water, either potable or non-potable, dependant on the purpose.

Water associated with earthworks construction and dust suppression can be non-potable, and effort should be made to source water from within the site boundary as much as practicable. Access to participating landowner's dams should be investigated through early discussion with the appropriate stakeholders. In addition to this approach, opportunities for the construction of new dams within the site boundary or the production of temporary catchments should be investigated.

The closest town to the project location with a potable water source available is Coolah. Alternatively, there are several water filling stations in Dubbo, and Cope that could better supply the quantities needed for the project. Other potable water sources in the region include Binnaway, Dunedoo and Mendooran.

Sourcing of water for the Valley of the Winds Wind Farm is considered an achievable construction outcome, though particular focus on reducing water demand as discussed in Section 5.3 should be given due to the dry climactic conditions of the region.



7 Access

7.1 OSOM Delivery Vehicles

Based on the preliminary internal access track layout provided by ACEN Renewables, access for oversize over mass (OSOM) vehicles to the development is anticipated to be through a minimum of (3) different site entry points to the different clusters of Wind Turbine Generators. Two entrances are anticipated to the southern clusters (Leadville and GIRRAGULANG/UARBRY) from the Golden Hwy. Access to the Mount Hope (Coolah) Cluster will occur through Black Stump Way. The port of arrival for the tower components in Australia is yet to be confirmed, though it is anticipated that the Port of Newcastle would be most appropriate.

As part of the preliminary studies for Valley of the Winds Wind Farm, icubed completed a joint site visit with ACEN Renewables and Report 21-136 *Valley of the Winds Wind Farm Site Visit Report May 2021* was completed from the visit. The information outlined in the observation report should be read in conjunction with this section of the report.

7.1.1 Leadville and GIRRAGULANG (UARBRY) Cluster Site Entries

The site entrances for the Leadville and GIRRAGULANG (UARBRY) WTG clusters are expected to be straight off the Golden Highway. As this is a major road, little to no geometric or pavement upgrades are anticipated to allow for OSOM access to the wind farm. This highway has been successfully utilised for other recent wind farm developments, though tower delivery components are of a different size so additional assessment of the route is required. The final location and design of these entrances will be subject to complying SISD checks and approval from Transport for New South Wales (TfNSW).

7.1.2 Mount Hope (Coolah) Cluster Site Entry

The site entrance for the Mount Hope (Coolah) Cluster is expected to be from Black Stump Way. While a sealed road, widening and pavement upgrade of the shoulder appears likely to be required in order to facilitate the entry of the OSOM vehicles, depending on the entry point. The most likely route to this cluster will be through turning right off Golden Highway and approaching northeast along Black Stump Way. There is significant widening at this intersection, and a desktop study suggests minimal works may be required for OSOM passage through this location. While much of Black Stump Way follows a relatively straight alignment, final location of the site entry point will be subject to SISD checks.

7.2 Workforce Accommodation

Valley of the Winds Wind Farm will require a relatively large workforce to complete the construction works in a timely manner. The project site covers a large area, where multiple site access points may be required to cater for the segregated civil clusters. For the purpose of this transport study, a central location of the project has been selected as the East Entry of Wardens Rd. This point has been considered from nearby town centres Coolah, Gulgong and Mudgee. Refer figures below illustrating the most direct route from each. It is recommended that early council engagement be conducted by ACEN Renewables to confirm that travelling via the proposed routes is acceptable, with consideration to the anticipated volume of Light Vehicle traffic during construction.

If travel routes differ from the depicted figures below or the site entry point is located at an alternative point, and either of which increases the total travel time to site entry above 1 hour, then an on-site camp should be considered.

During this stage of preliminary site investigation, the Valley of the Winds site appears accessible from townships Coolah, Gulgong and Mudgee, as travel time to central site location is less than 1 hour for each.

The existing infrastructure in these townships are considered adequate in housing the workforce necessary to build the project.

Table 12: Workforce Accommodation and Travel Summary

Workforce Accommodating Town	Travel Time (mins)	Travel Distance (km)
Dunedoo	12	16
Coolah	22	29
Gulgong	35	52
Mudgee	59	82

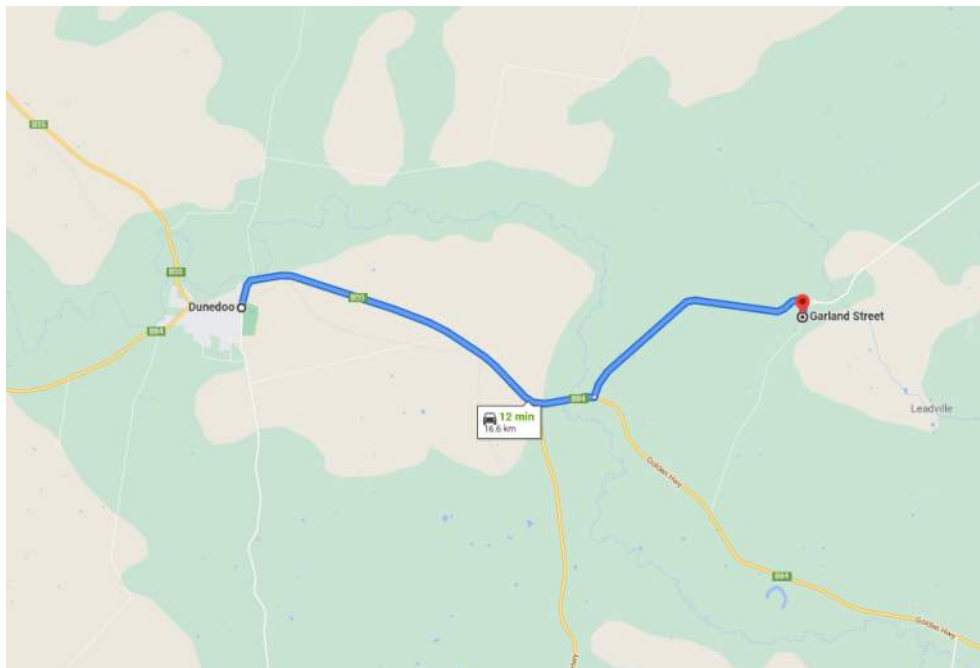


Figure 14: Travel Summary from Dunedoo to VVWF

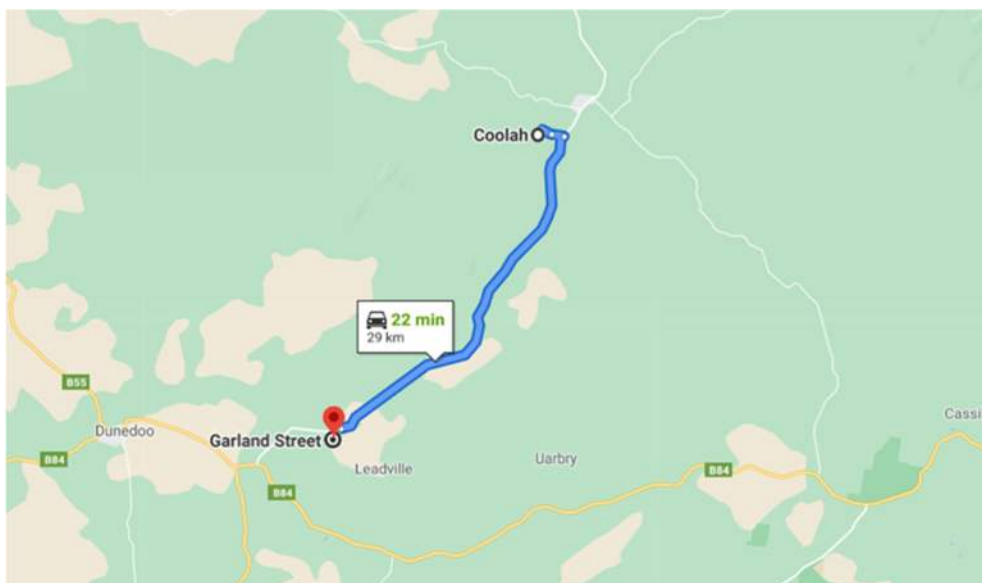


Figure 15: Travel Summary from Coolah to VVWF

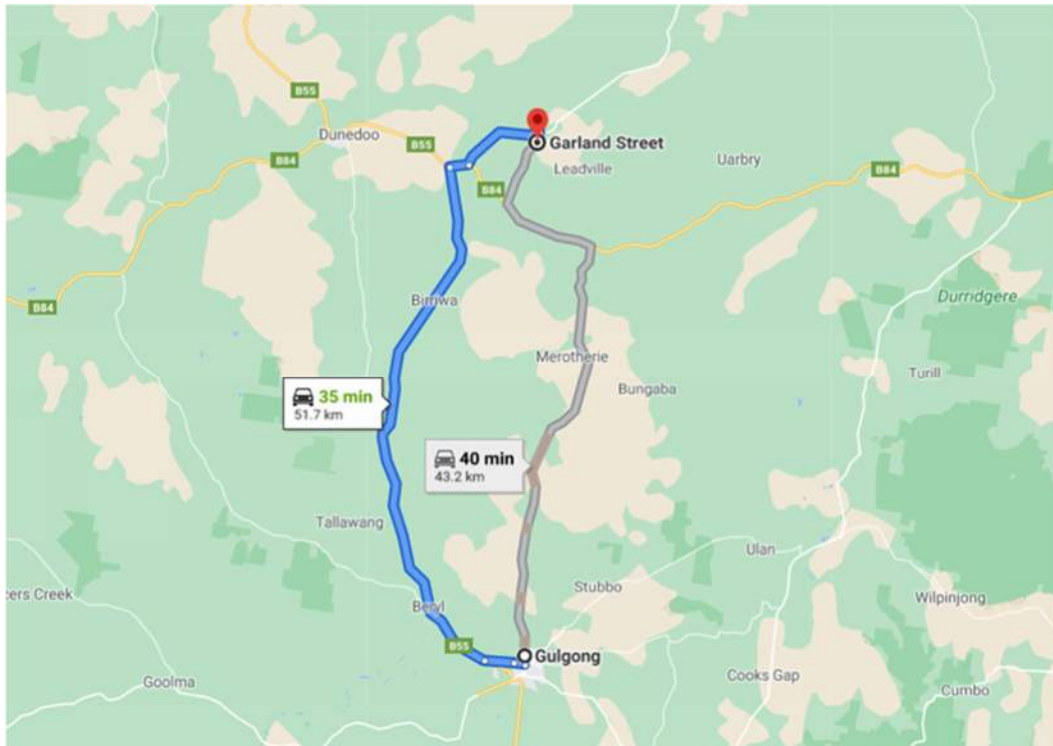


Figure 16: Travel Summary from Gulgong to VVWF

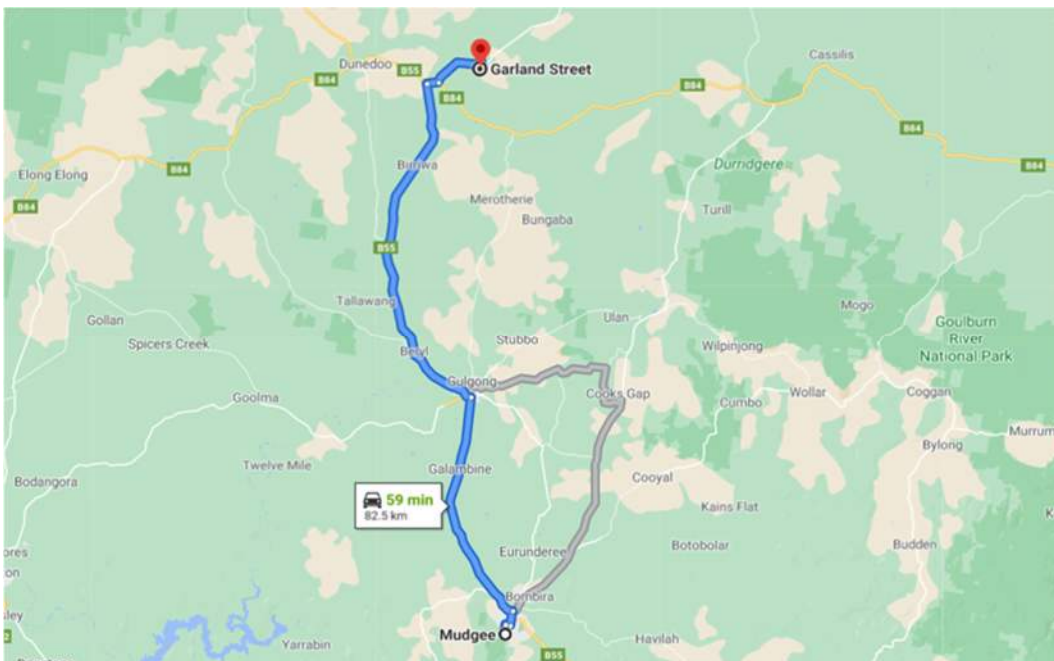


Figure 17: Travel Summary from Mudgee to VVWF

8 Utilities

8.1 Trigonometrical Station

A review of the Asia-Pacific Reference Frame (APREF) mapping by Geoscience Australia indicates that there is no Trig Station/s present on the subject site, which could have served as physical reference points for further assessments or could have posed as an issue to the siting of WTG and balance of plant (BoP) infrastructure.

8.2 Microwave Links

A review of the Australian Communications and Media Authority (ACMA) mapping indicates that there is one Telstra tower within the project boundary. There are 6 ACMA Site Markers, as listed below and depicted in Figure 18. Which are located in and approximately less than 500 metres outside the site boundary.

- CR-4 Site 2 km NW WOODVALE NSW 2844
- Telstra Customer Lot 50, DP 754977, Bong Road COOLAH NSW 2844
- NBN Co Site "Sierra Downs", Wardens Road LEADVILLE NSW 2844
- Telstra Radio Terminal Broombee via COOLAH NSW 2843
- Telstra Site, Near 36 Blue Springs Road Uarbry NSW
- ViaSat Earth Station, Intersection of Blue Springs Road & Golden Highway Uarbry NSW

It is noted that other ACMA Site Markers were identified further from the project boundary in Coolah and Dunedoo.

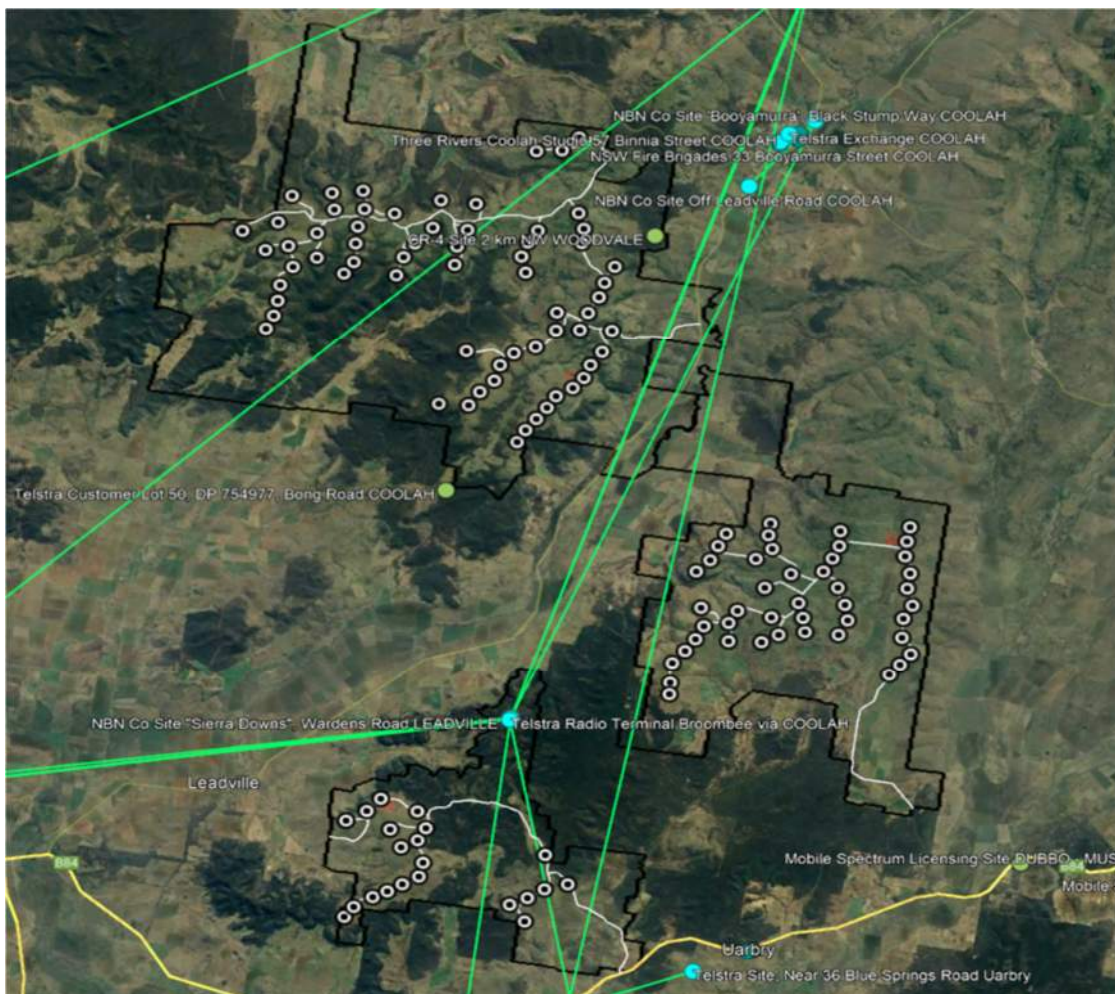


Figure 18: ACMA Site Markers

It is recommended that further mapping into the precise location of these links' Fresnel zones is determined so that WTG locations do not obstruct these links, when a finalised WTG layout is complete. Further calculations into the permitted disturbance of this Fresnel zone are also recommended to better determine the allowed disruption.

8.3 Mobile Phone and Internet Network Coverage

5G reception is only available on Telstra's network in nearby town centres: Coolah, Gulgong, and Mudgee. Significant portions of the site presently do not have mobile network coverage, even with external antennas. Repeaters could possibly be installed on temporary or permanent meteorological masts to improve network coverage. Construction internet may be derived via extension of Telstra's existing network in the area, temporary satellite link or local microwave link.

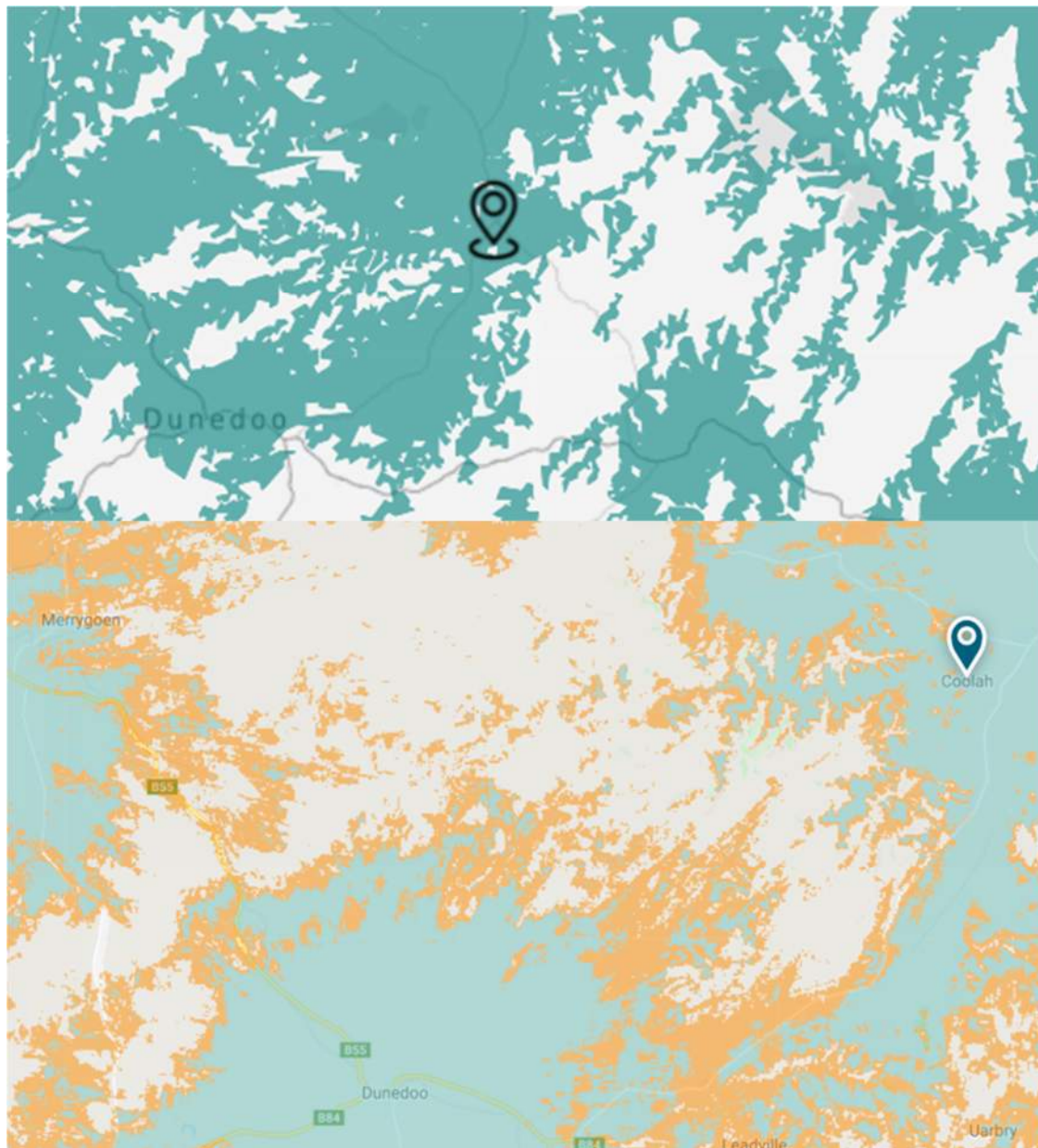


Figure 19: Existing coverage without external antenna Telstra 3G (top) Optus 3G (bottom)

8.4 Dial Before You Dig

A Dial Before You Dig (DBYD) application has been carried out on the site, generally for the entire project area. The following utilities were identified:

- An APA high pressure gas transmission pipeline partially through the Centre North extent of the project site along Leadville Rd (Black Stump Way) (refer Figure 20).
- Minor electrical services running across the site.
- Telecommunications services identified and inclusive of buried optic fibre cables adjacent to or in close proximity to Mt Hope Rd, Mianguilliah, Black Stump Way, Girragulang Rd, Collier Rd, Orana Rd, Moorefield Rd, Tongy Lane, Wardens Rd, Melrose Rd, Golden Hwy and Cainbil Creek.

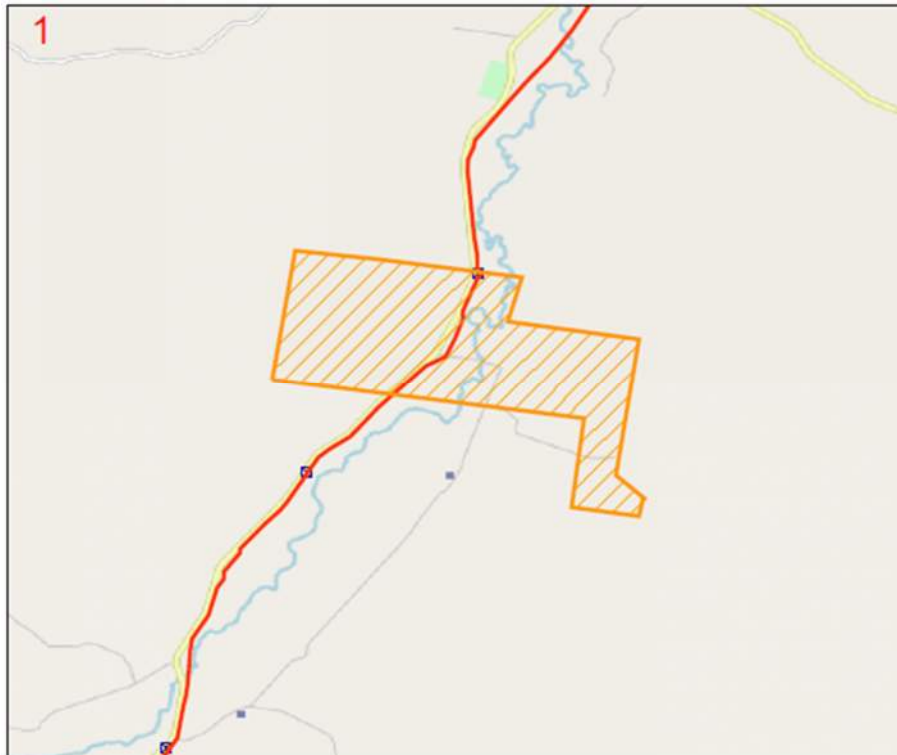


Figure 20: APA line at Centre North of Site

The available documentation has been reviewed and it is expected that existing services will generally not impact the layout of the proposed development access points. The APA high pressure gas transmission pipeline identified at the Centre north of site is not in close proximity to any turbines.

Where work is required within 3m of an APA group gas alignment or where explosives are used, within 30m, an Authority to Work Request is required to be submitted minimum of five business days before commencing work. Access track crossings require APA group approval; approved designs typically incorporate concrete slabbing.

A conductive and inductive transfer study may need to be completed to determine the extent of interference between the wind farm infrastructure and the gas pipeline, telecommunications assets, water assets and electricity assets where wind farm infrastructure is planned to be installed within

proximity. Any interference study concerning gas assets should consider pipeline cathodic protection systems.



Further investigations will need to be completed during detailed design.

An accredited service provider (ASP) will need to be engaged where relocation of existing above ground or underground electricity services is necessary. Due to the lengthy approval process, it is suggested that engagement commence with an ASP in parallel with project detailed design.

Refer Appendix D for obtained DBYD records.

9 Climate

9.1 Temperature Data

A review of climate data from the Bureau of Meteorology (BOM) stations at Coonabarabran Airport AWS (064017), Gulgong Post Office and Dunedoo Post Office (064009) indicates that the daily average maximum temperatures will range from 14 degrees Celsius (°C) in winter to 31°C in the summer months. Extreme heat events where the temperature would exceed 40°C may occur, though the 90th percentile data indicates that maximum temperatures are unlikely to exceed 36°C.

Minimum temperatures will typically range from 5°C in the winter months to 18°C the summer months. Typical summer maximum temperatures will be in the range of 29°C to 38°C. Figure 21 below details the daily maximum temperature ranges for the 10th and 90th percentiles, giving guidance on the typical expected maximum temperatures. Figure 21 illustrates likely minimum temperature ranges.

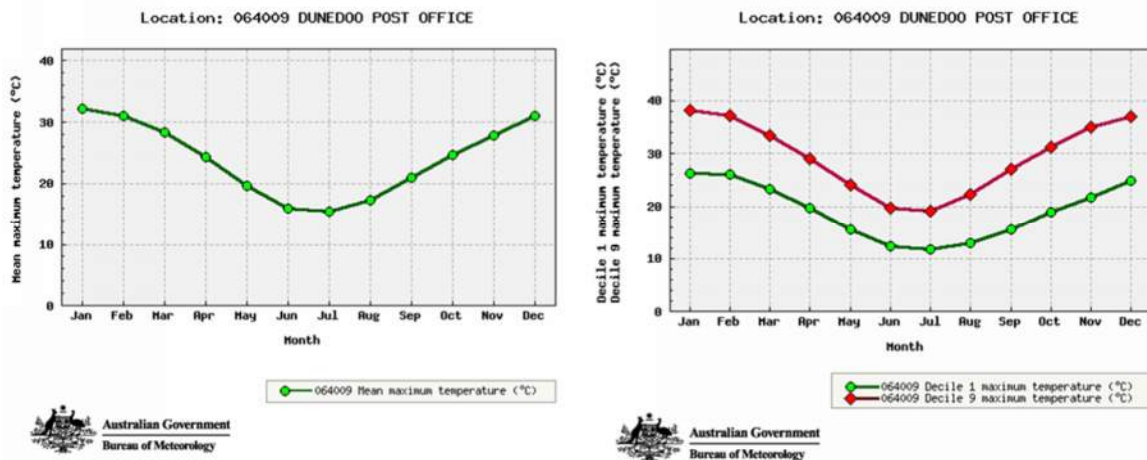


Figure 21: Mean maximum temperature and percentile data - Dunedoo Post Office

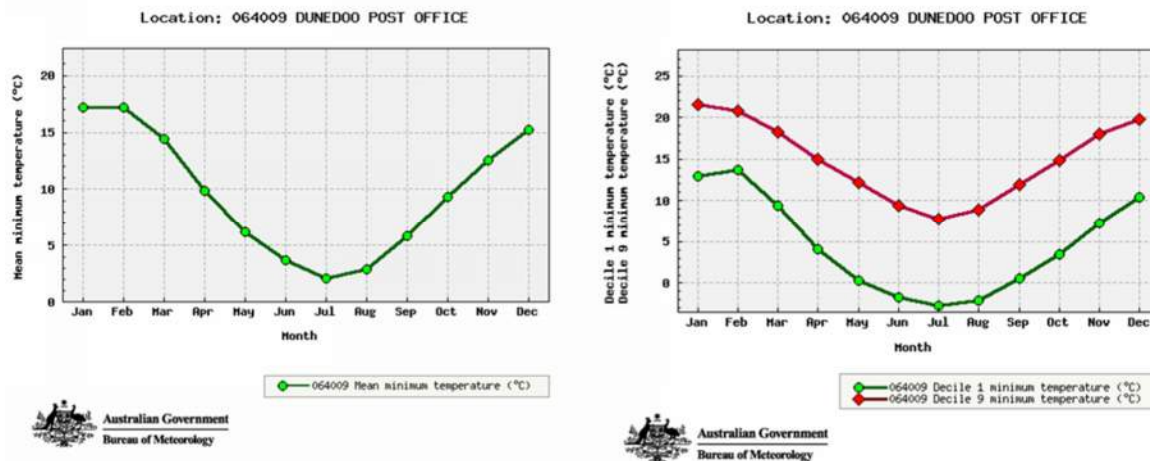


Figure 22: Mean minimum temperature and percentile data - Dunedoo Post Office

Some freezing (sub-zero) weather can be expected on the site during construction, particularly in the months of May to September. The Dunedoo Post Office is located at approximately 388 m above sea level. Elevated sections of the proposed wind farm site can reasonably expect minimum temperatures 1-2°C lower than reported at Dunedoo Post Office, due to increased elevation.

9.2 Major Weather Patterns

The site is located approximately 220km inland and at a latitude that is not conducive to be impacted by tropical cyclones. This noted, the tracks of some tropical cyclones and the remnant rain bearing low pressure systems have travelled inland to areas near the site. At the distance from the coast and the latitude, major weather patterns could be expected to bring heavy rainfall and moderate to strong winds.

9.3 Average Rainfall Intensity Data

Average annual rainfall at Dunedoo Post Office is 612mm (108 years of data), and 649.5mm (136 years of Data) at Gulgong Post Office with the summer months typically having heavier falls. Predicted average rainfall intensity data sourced from the Bureau of Meteorology (BOM) is presented in Figure 23 below, indicating that the maximum daily rainfall event experienced at the subject site would be expected to be in the order of 140-150mm with weekly maximums in the order of 80 - 250mm.



Duration	Annual Exceedance Probability (AEP)						
	63.2%	50%#	20%*	10%	5%	2%	1%
1 min	1.86	2.08	2.80	3.30	3.80	4.49	5.03
2 min	3.11	3.49	4.70	5.54	6.36	7.42	8.23
3 min	4.31	4.83	6.51	7.67	8.82	10.3	11.4
4 min	5.39	6.04	8.14	9.59	11.0	12.9	14.4
5 min	6.35	7.12	9.58	11.3	13.0	15.3	17.0
10 min	9.91	11.1	14.9	17.6	20.3	24.0	27.0
15 min	12.2	13.7	18.5	21.8	25.1	29.8	33.4
20 min	14.0	15.6	21.0	24.8	28.7	33.9	38.1
25 min	15.3	17.1	23.1	27.2	31.4	37.2	41.7
30 min	16.4	18.4	24.7	29.2	33.7	39.8	44.6
45 min	18.9	21.2	28.5	33.6	38.8	45.7	51.1
1 hour	20.7	23.2	31.3	36.8	42.4	49.9	55.7
1.5 hour	23.4	26.3	35.4	41.6	47.9	56.1	62.5
2 hour	25.5	28.6	38.5	45.3	52.0	60.9	67.8
3 hour	28.8	32.3	43.5	51.1	58.6	68.6	76.2
4.5 hour	32.6	36.6	49.2	57.8	66.2	77.6	86.3
6 hour	35.7	40.1	53.8	63.2	72.4	85.0	94.8
9 hour	40.6	45.5	61.1	71.8	82.5	97.2	109
12 hour	44.4	49.7	66.8	78.7	90.6	107	120
18 hour	50.2	56.1	75.5	89.3	103	123	139
24 hour	54.4	60.9	82.1	97.4	113	135	153
30 hour	57.7	64.5	87.2	104	121	145	165
36 hour	60.4	67.5	91.4	109	128	154	175
48 hour	64.4	72.0	97.9	117	138	167	191
72 hour	69.7	78.0	107	129	152	185	212
96 hour	73.1	82.0	113	136	161	196	226
120 hour	75.8	85.2	117	142	168	205	235
144 hour	78.1	87.9	122	147	174	211	242
168 hour	80.2	90.5	125	151	178	217	248

Figure 23: Average Rainfall Intensity Data Over Subject Site

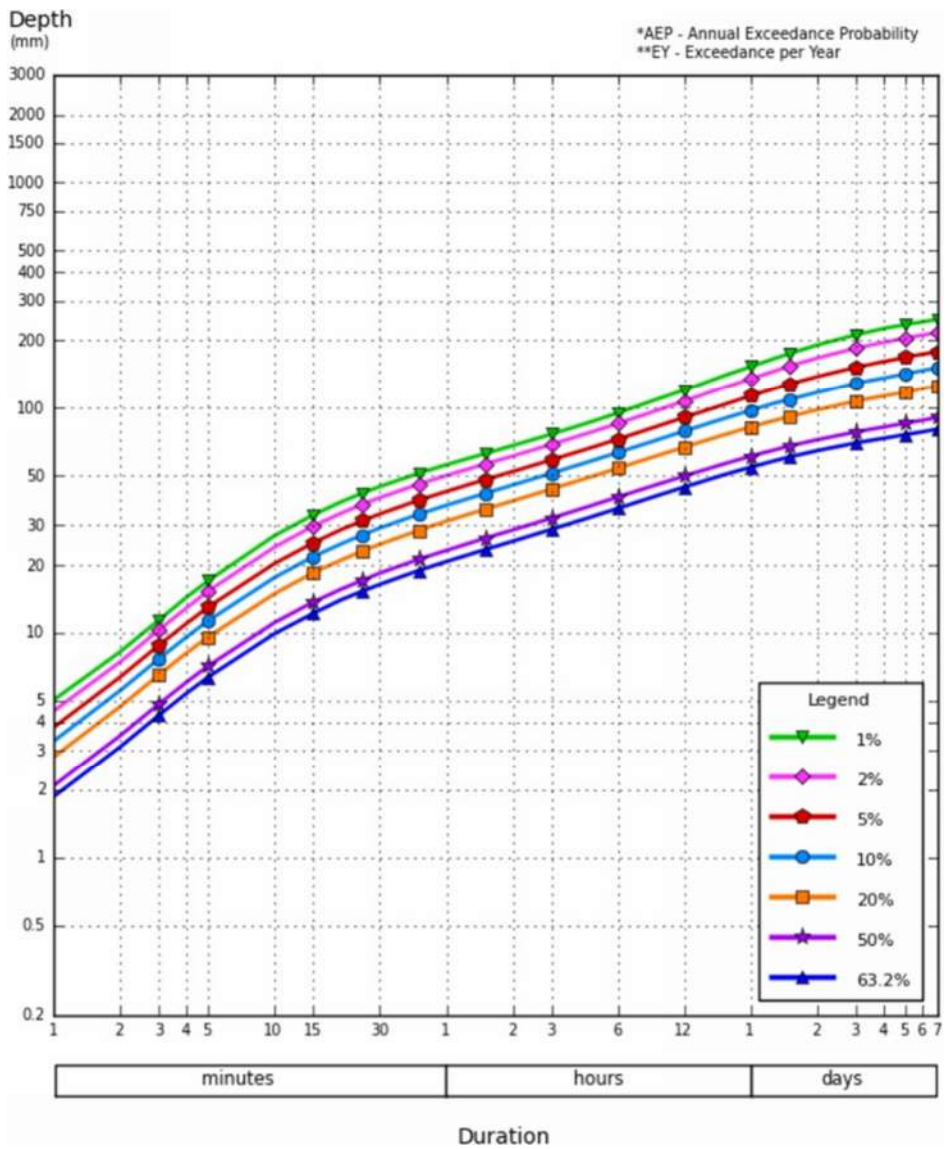


Figure 24: Average Rainfall Intensity Data Over Subject Site

Historical rainfall data indicates that the site is most likely to be impacted by short term moderate intensity rainfall as the result of inland low-pressure systems or thunderstorms. The mean number of rain days is relatively low meaning that prolonged heavy rainfall that would lead to extensive project delays is unlikely. Prudent design to convey waters from tracks and roadways, and appropriate sediment and erosion control measures will assist in minimising project delays from rain events.



10 Conclusion

icubed consulting has been commissioned to provide preliminary engineering services to assist with project planning. This report specifically provides information on the local infrastructure and resources relevant to a wind farm project, and for consideration during this phase of studies by ACEN Renewables.

Due to the nearby infrastructure in the Dubbo region and other nearby townships, the Valley of the Winds Wind Farm has multiple sourcing options for Aggregates (concrete and pavement), Sand (concrete and bedding material) and Water (potable and non-potable). Furthermore, the nearby towns of Dunedoo, Coolah, Gulgong and Mudgee appear to have enough existing infrastructure to cater for the workforce necessary to build the project. Travel from a central point in site to these towns is also considered adequate. However, if total travel time increases above an hour each way due to designated road usage or sub-optimal site access point, then consideration of a local camp may be required. It is recommended that necessary local council authorities and other relevant stakeholders are negotiated with as soon as practical to confirm access for light traffic volumes to the project.

From assessing the local waterways in the region that intersect with the project boundary, seven main waterways were identified and should be considered during the design phase of the project. It is assumed that causeway crossings will be necessary at internal access roads to allow for passage to the internal infrastructure. It has been identified that the habitats of threatened fish species Southern Purple Spotted Gudgeon and Eel-Tailed Catfish are native in these creeks and this must be considered in the project design phase. Specialised culvert crossings will have to be defined at the causeways with appropriate environmental requirements involved in design.

The site geology is as anticipated for the region and suitable for windfarm construction. While it is recommended that future geotechnical studies occur throughout site, the data available from the NSW government suggests that the native geological formations are satisfactory for gravity type footings. Further to this, the potential of an on-site quarry/crusher is a possible constructability advantage, pending more site specific geotechnical tests.

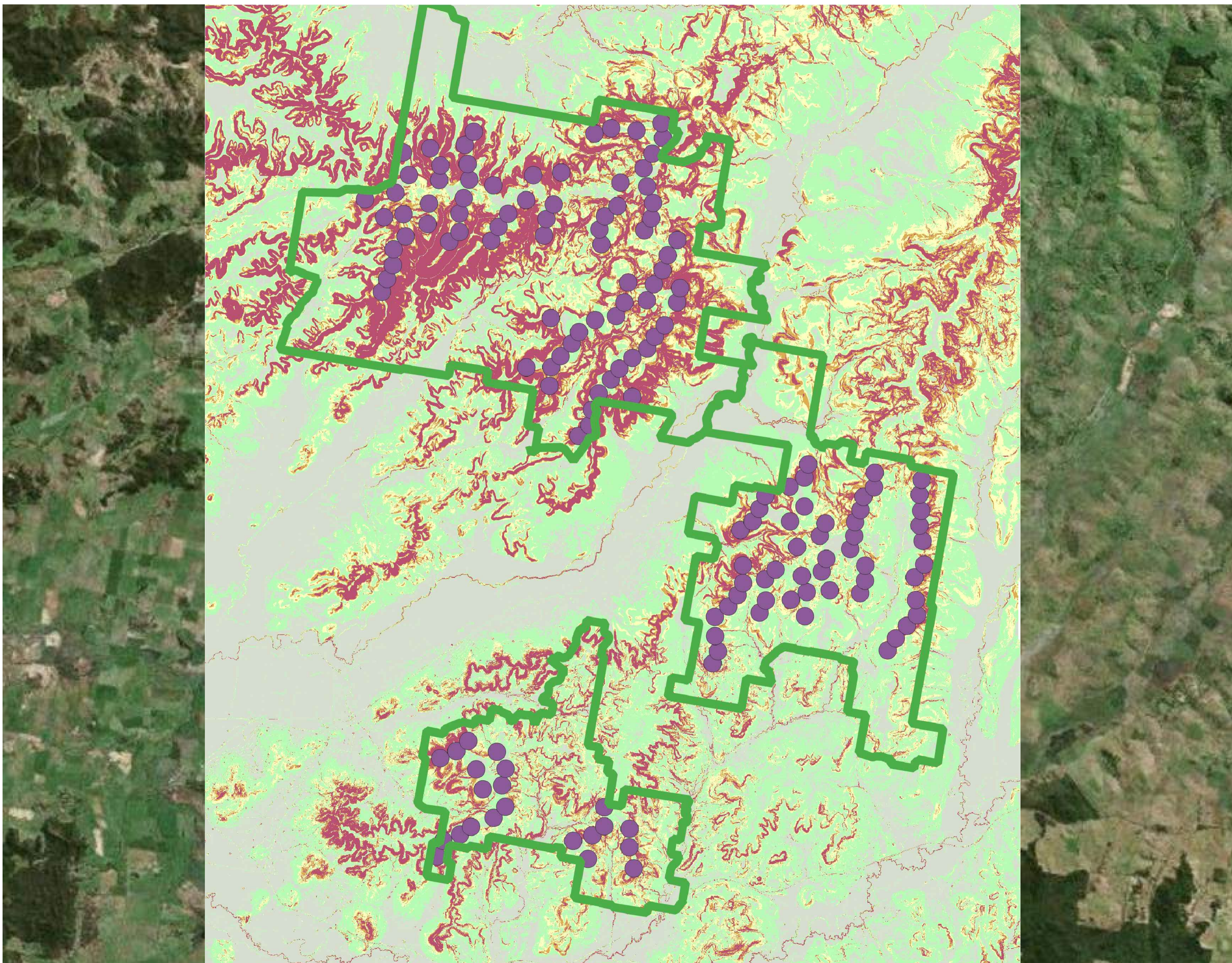
During this preliminary phase of investigation, icubed believe the project has all the necessary capabilities to be built effectively with the infrastructure currently surrounding the project.

Further to the above, it is recommended that the project elements be discussed with the relevant Authorities to confirm their minimum requirements, and that the following studies / design be carried out to further reduce the projects risks:








- Detailed survey in the vicinity of the proposed development (WTGs locations and access roads);
- Geotechnical Study for the WTG and access roads;
- Detailed internal access track layout in 2D and 3D;
- Detailed flood study report;
- More investigation and inspection of local external road access; and
- Review of ecological inputs regarding protected vegetation.



Appendix A – Existing Slopes Heatmap Sketch



LEGEND

-  PROJECT BOUNDARY
-  INDICATIVE WTG LOCATION 19/08/2021
- SLOPE HEATMAP**
 -  <= 4%
 -  4 - 10 %
 -  10 - 15%
 -  15 - 20%
 -  > 20%

SLOPE HEATMAP
SCALE NTS



21-261 VALLEY OF THE WINDS WF
EXISTING SLOPES HEATMAP
SK01 - C.H. 20210917



Appendix B – Schedule of Quantities

21-261 - Valley of the Winds Wind Farm
Preliminary Civil Works Quantities - Revision [4] 20240213

Total Road Length	127483.5 m
Road Width	6 m
Average Zone of Disturbance	12 m
Pavement Thickness	0.2 m
Number of Hardstands	131
Hardstand size	3580 sq.m
Pavement Thickness	0.2 m
Gravel Density	2.1 t/cu.m
Water Application Rate	0.075 %/cu.m

Schedule of Quantities

Item Description	Unit	Quantity	Number	Total	Water	Gravel
		m ³		m ³	kL	tonnes
Section 1 - Pavements						
Access Track - 127.5km						
1.1 Road base 200mm thick crushed rock material	m ³	152,980	1	152,980	11,474	321,258
WTG Hardstands - 131 Pads: 3580m²						
1.2 Road base 200mm thick crushed rock material	m ³	716	131	93,796	7,035	196,972
Internal Substation Bench - 4 pads: size varies						
1.3 Road base 200mm thick crushed rock material	m ³	varies	4	59,427	4,457	124,796
O&M Facilities Bench - 100m x 100m						
1.4 Road base 200mm thick crushed rock material	m ³	2,000	1	2,000	150	4,200
Concrete Batching Plant - 3 Pads: 100m x 100m						
1.5 Road base 200mm thick crushed rock material	m ³	2,000	3	6,000	450	12,600
Construction Compound - 3 Pads: 200m x 100m						
1.6 Road base 200mm thick crushed rock material	m ³	4,000	3	12,000	900	25,200
TOTALS				326,203	24,465	685,026

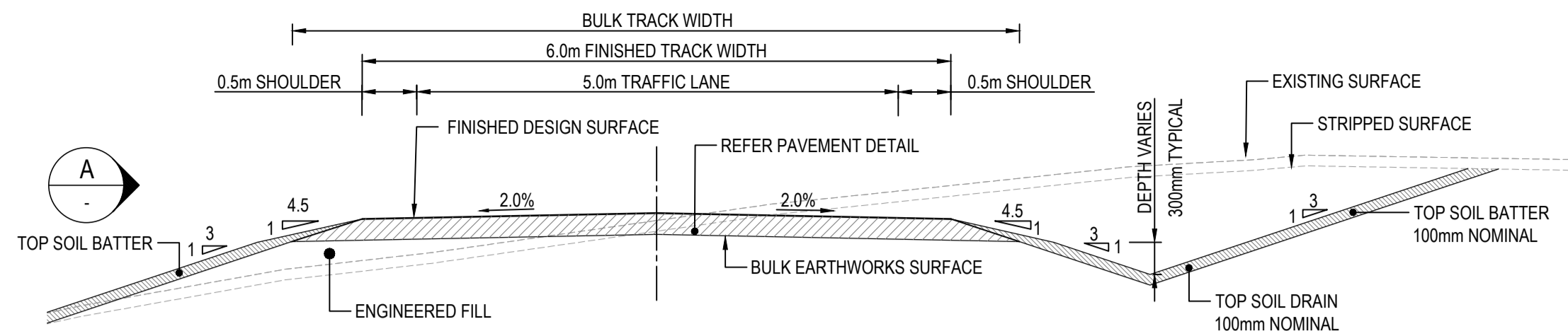
Item Description	Unit	Quantity	Number	Total	GP Cement	Fly Ash	20mm Agg	14mm Agg	Sand	Water
					t	t	t	t	t	kL
Section 2 - WTG Foundations										
2.1 S32 Concrete	m ³	890	131	116,590	25,650	10,493	74,035	46,053	100,267	19,820
2.2 S40 Concrete	m ³	60	131	7,860	2,044	943	5,030	3,144	5,974	1,376
2.3 N15 Blinding Concrete	m ³	100	131	13,100	2,162	590	7,271	7,271	14,017	2,293
TOTALS					29,855	12,026	86,336	56,468	120,258	23,488
2.4 Steel Reinforcement	t	154	131	20,174						

Item Description	Unit	Demand	Duration	Water
		L/day	Days	kL
Section 3 - Water Demand (excl Pavement & WTG Footings)				
Dust Suppression				
3.1 Assume 45km track length at once, 8m application width application rate 2.5L/m ² /day, 78 week	kL	900,000	468	421,200
Construction Compound				
3.2 Assume 200 person workforce, 40L/day/person, 78 week duration	kL	8,000	468	3,744

Item Description	Unit	Length	Width	Depth	Total
Section 4 - Cable Trenching					
4.1 Bedding Sand	m ³	254,967	0.5	0.35	44,619

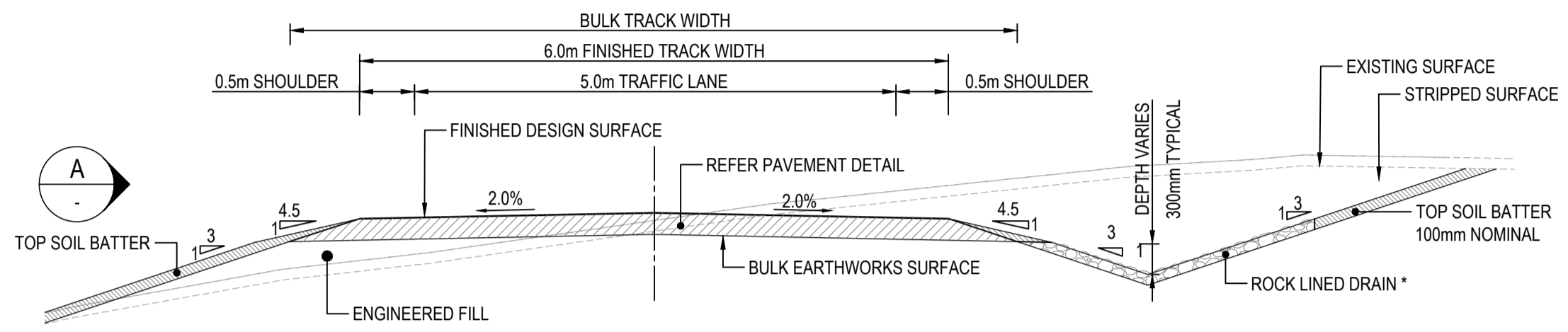


Appendix C – Typical Drawings



TYPICAL WIND FARM ACCESS TRACK CROSS SECTION - TOP SOIL DRAIN

NTS



TYPICAL WIND FARM ACCESS TRACK CROSS SECTION - ROCK LINED DRAIN

NTS

TOPSOILED DRAIN ORDER

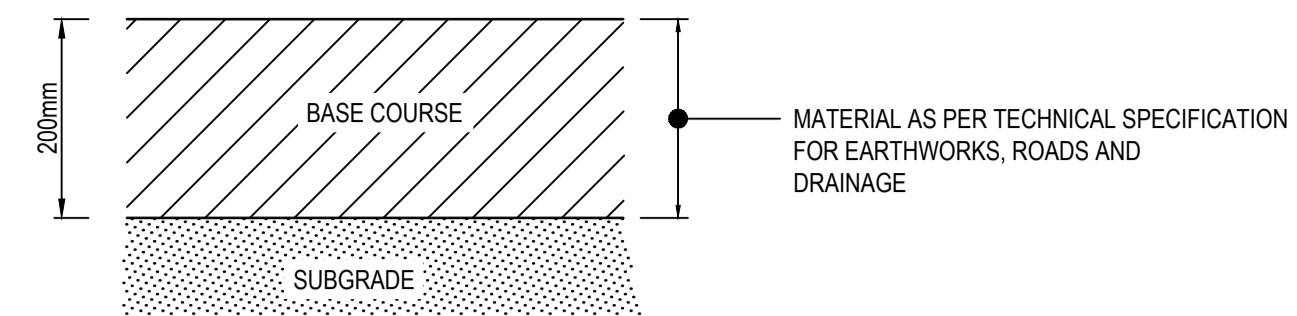
1. STRIP SURFACE
2. CUT BULK EARTHWORKS SURFACE
3. PLACE PAVEMENT
4. TOPSOIL BATTERS

ROCK LINED DRAIN ORDER

1. STRIP SURFACE
2. CUT BULK EARTHWORKS SURFACE
3. ROCK LINE DRAINS
4. PLACE PAVEMENT
5. TOPSOIL BATTERS

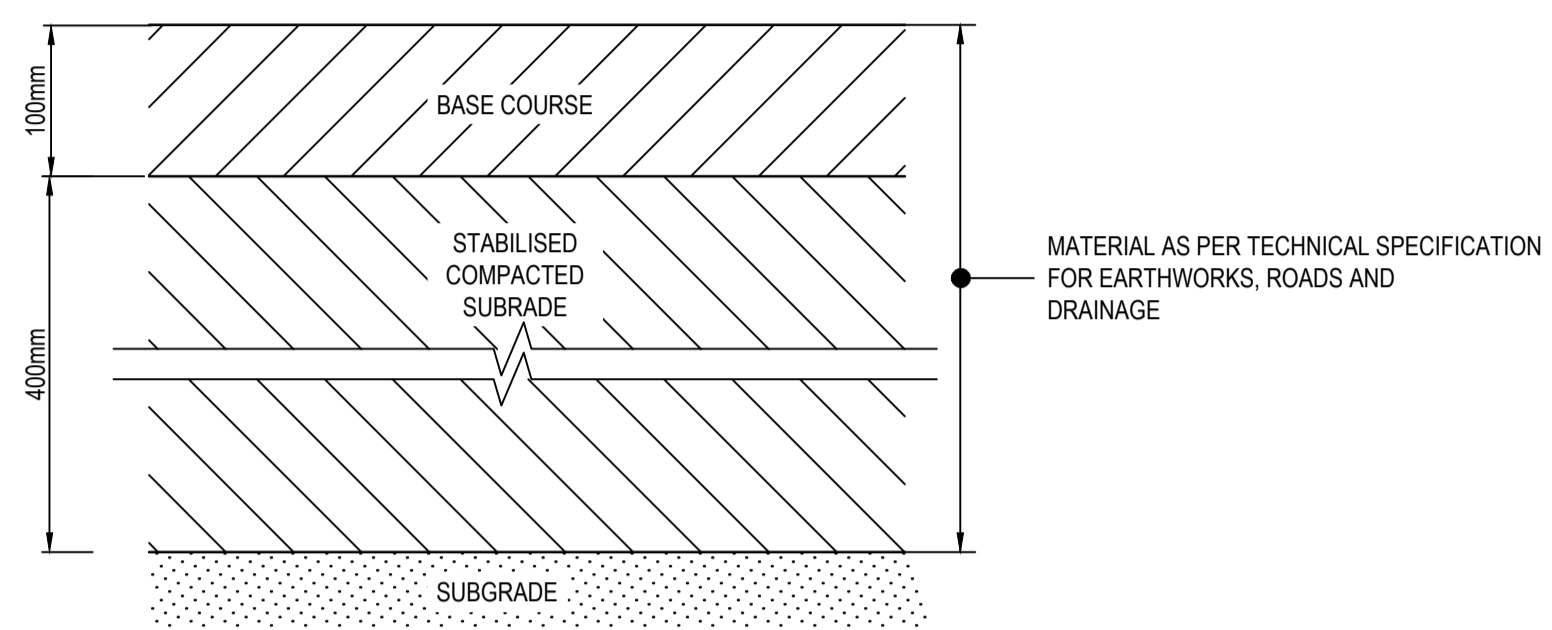
PAVEMENT NOTES

ALL PAVEMENTS ARE BASED ON A SOUND AND TRAFFICABLE SUBGRADE. WET AND/ OR SOFT AREAS FAILING THE SUBGRADE PROOF ROLL TEST MAY REQUIRE SOME FORM OF SUBGRADE IMPROVEMENT. THE DESIGN ENGINEER SHALL BE CONSULTED TO ASSESS OPTIONS SUCH AS:
 - STABILISATION
 - GEOTEXTILE STRENGTHENING
 - COARSE ROCKFILL STRENGTHENING
 - SUBGRADE REPLACEMENT
 OR A COMBINATION OF ALL THESE OPTIONS.
 SUBGRADE UNDRAINED SHEAR STRENGTH TO BE TBC OR BETTER.



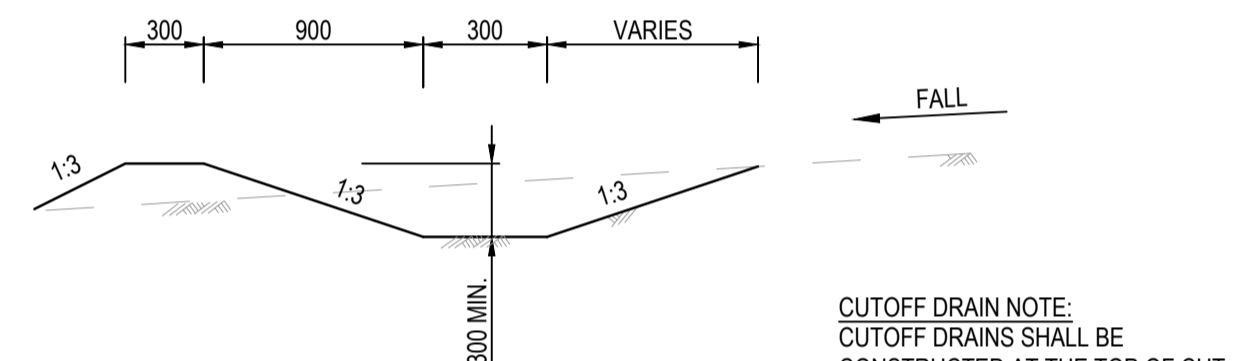
ACCESS TRACK PAVEMENT DETAILS

SUBJECT TO FINAL DESIGN BASED ON INSITU STRENGTH TESTING



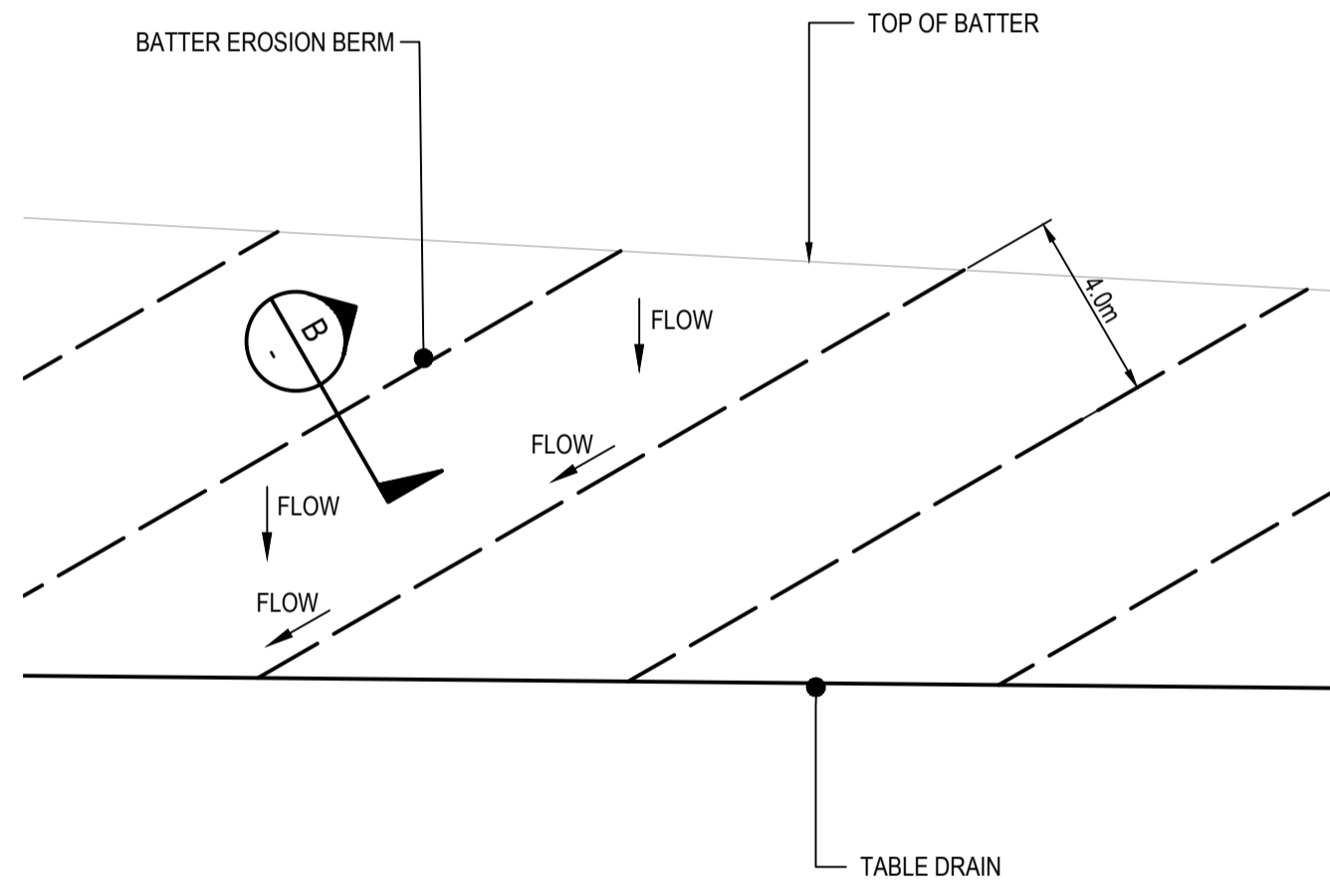
ALTERNATIVE PAVEMENTS - STABILISED SUBGRADE DETAILS

SUBJECT TO FINAL DESIGN BASED ON INSITU STRENGTH TESTING



TYPICAL CUTOFF DRAIN DETAIL

NTS

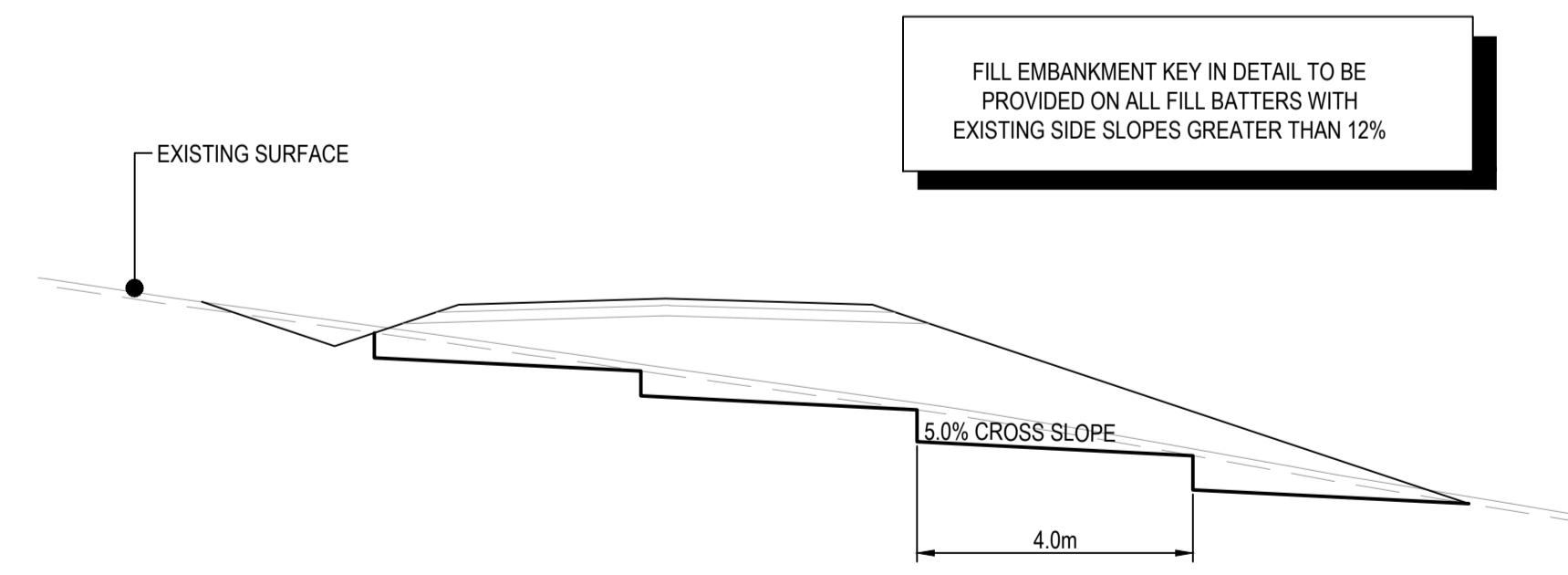


A BATTER EROSION BERM ELEVATION

NTS

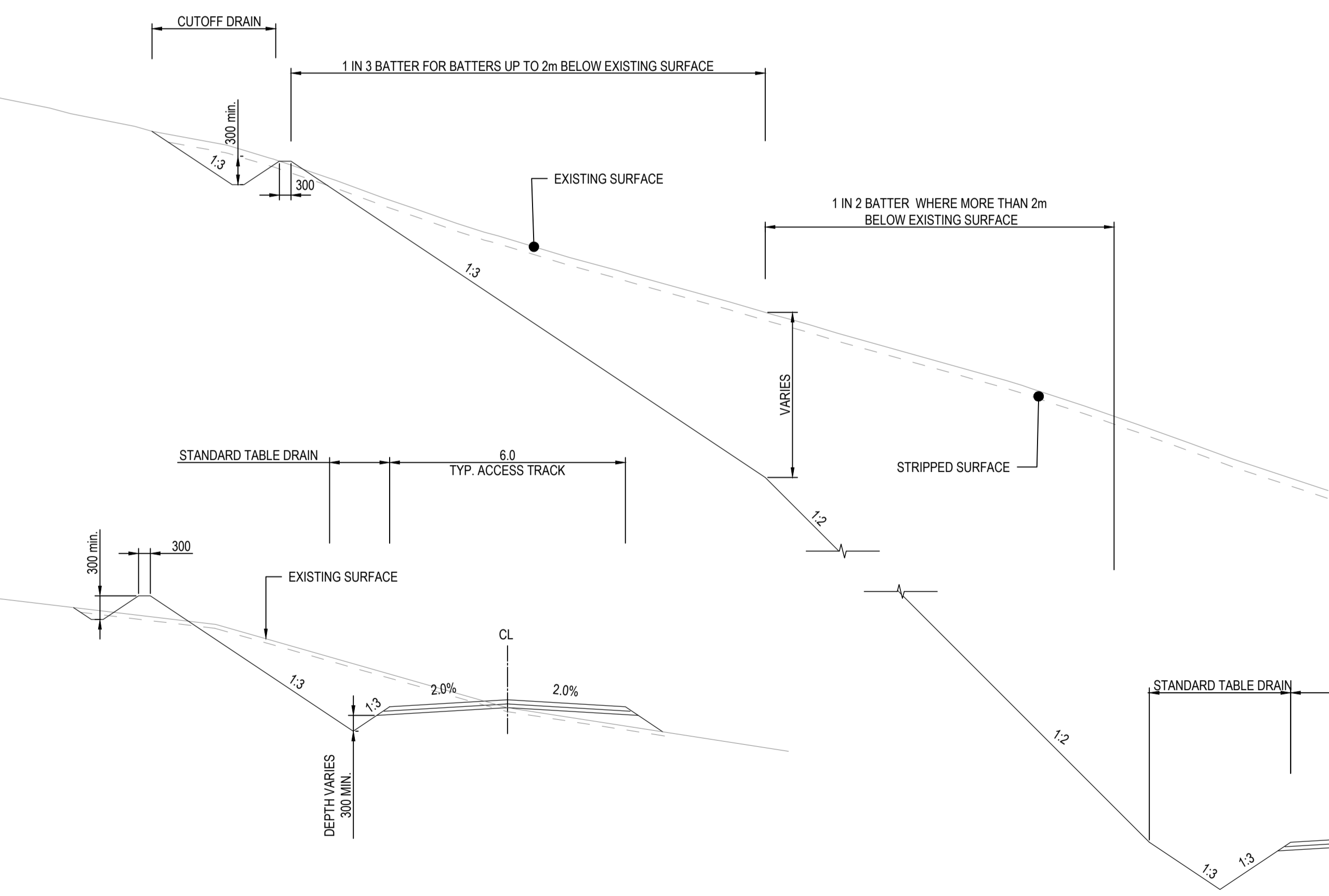
B BATTER EROSION BERM SECTION

NTS



TYPICAL EMBANKMENT FILL KEY DETAIL

NTS



TYPICAL WIND FARM CROSS SECTION

NTS

TYPICAL WIND FARM ACCESS TRACK CROSS SECTION - BATTERS IN CUT GREATER THAN 2m DEPTH

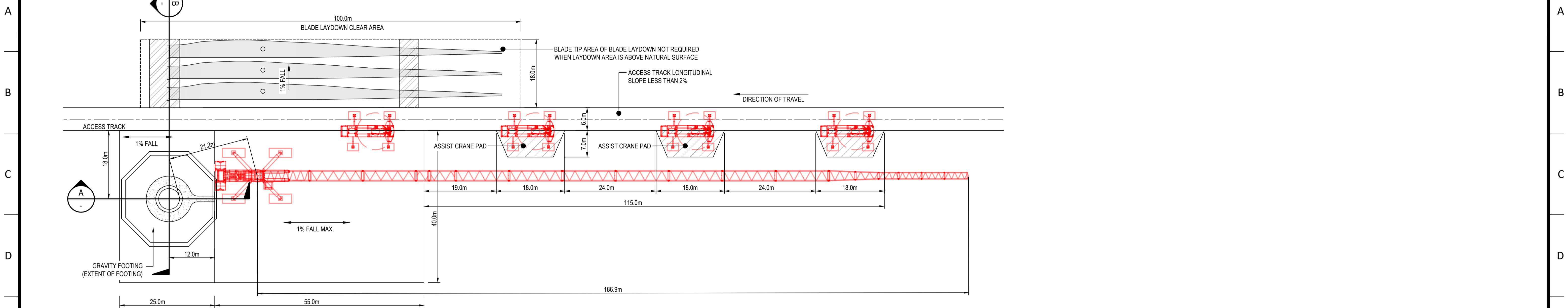
NTS

No	DESCRIPTION	DES	DRN	CHK	APP	DATE
A	PRELIMINARY					19.08.21
REVISION HISTORY						

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 engineering consultants
 innovation, ingenuity, inspiration
 L2 39 Sherwood Rd Toowoong, Qld 4066
 www.icubed.com.au
 PO Box 878 Toowoong, Qld 4066
 mail@icubed.com.au
 ABN 89 106 675 156
 ACN 106 675 156
 p. 07 3870 8888

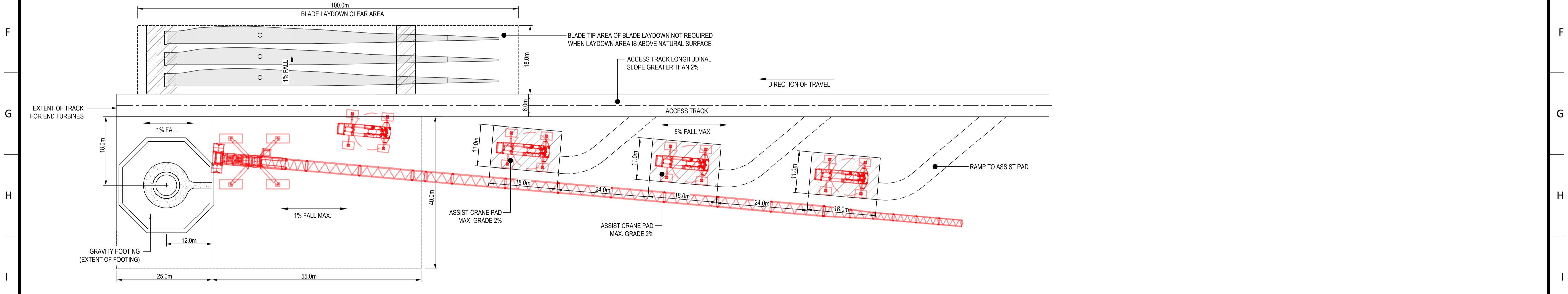


SIZE A1	SCALE AS SHOWN	PROJECT VALLEY OF THE WINDS WIND FARM
STATUS PRELIMINARY NOT FOR CONSTRUCTION	TITLE TYPICAL ACCESS TRACK CROSS SECTION DETAILS AND NOTES	
DRAWING No. VOWWF - TYP - 001		REV A



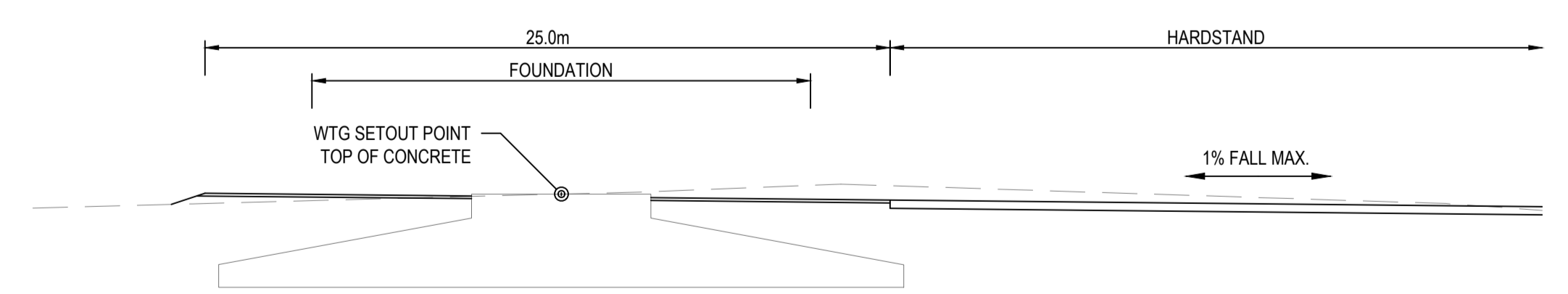
HARDSTAND GENERAL ARRANGEMENT TYPE 1

SCALE 1 : 500



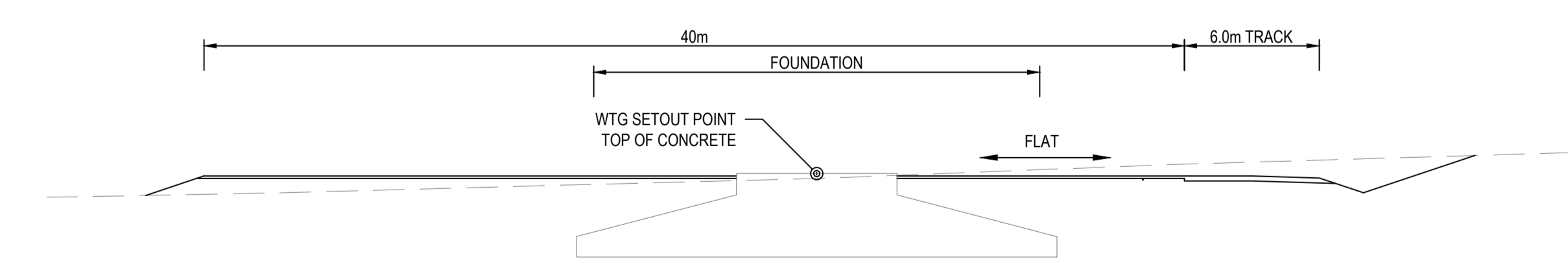
HARDSTAND GENERAL ARRANGEMENT TYPE 2

SCALE 1 : 500



A WTG - HARDSTAND TYPICAL SECTION

SCALE 1:200



B WTG - TRACK TYPICAL SECTION

SCALE 1:200

No	DESCRIPTION	DES	DRN	CHK	APP	DATE
A	PRELIMINARY					19.08.21

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UPC AC Renewables AUSTRALIA

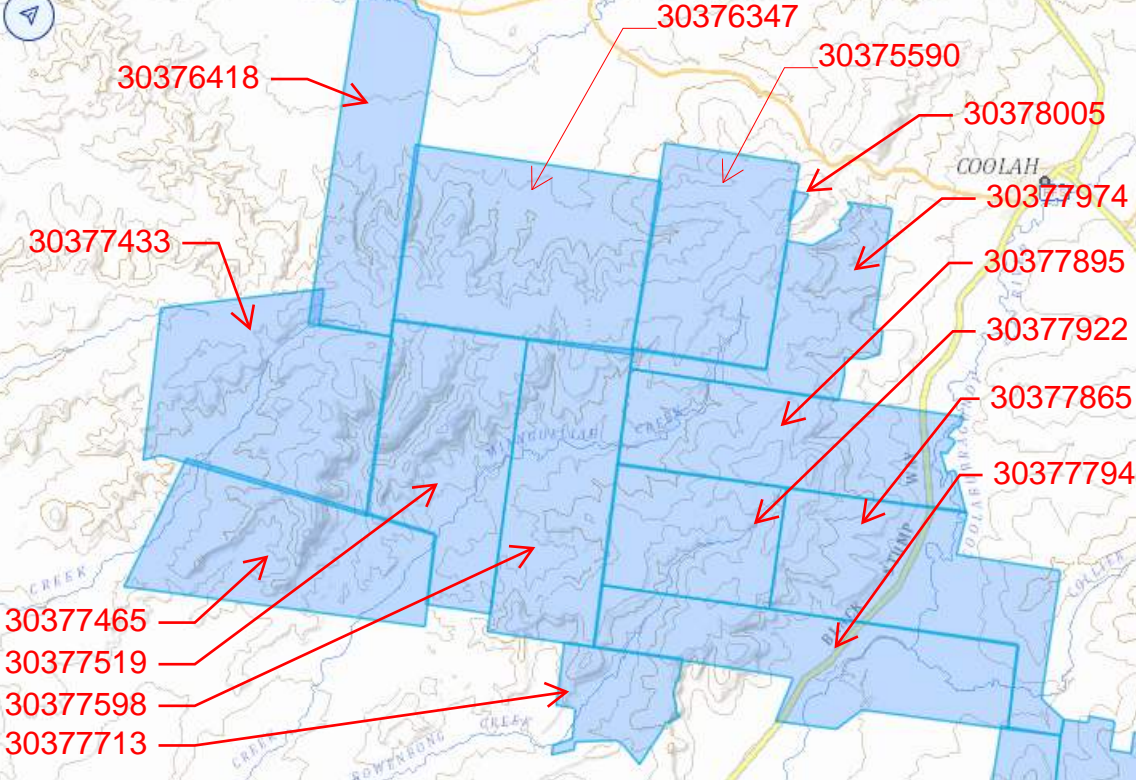
UPC AC Renewables AUSTRALIA

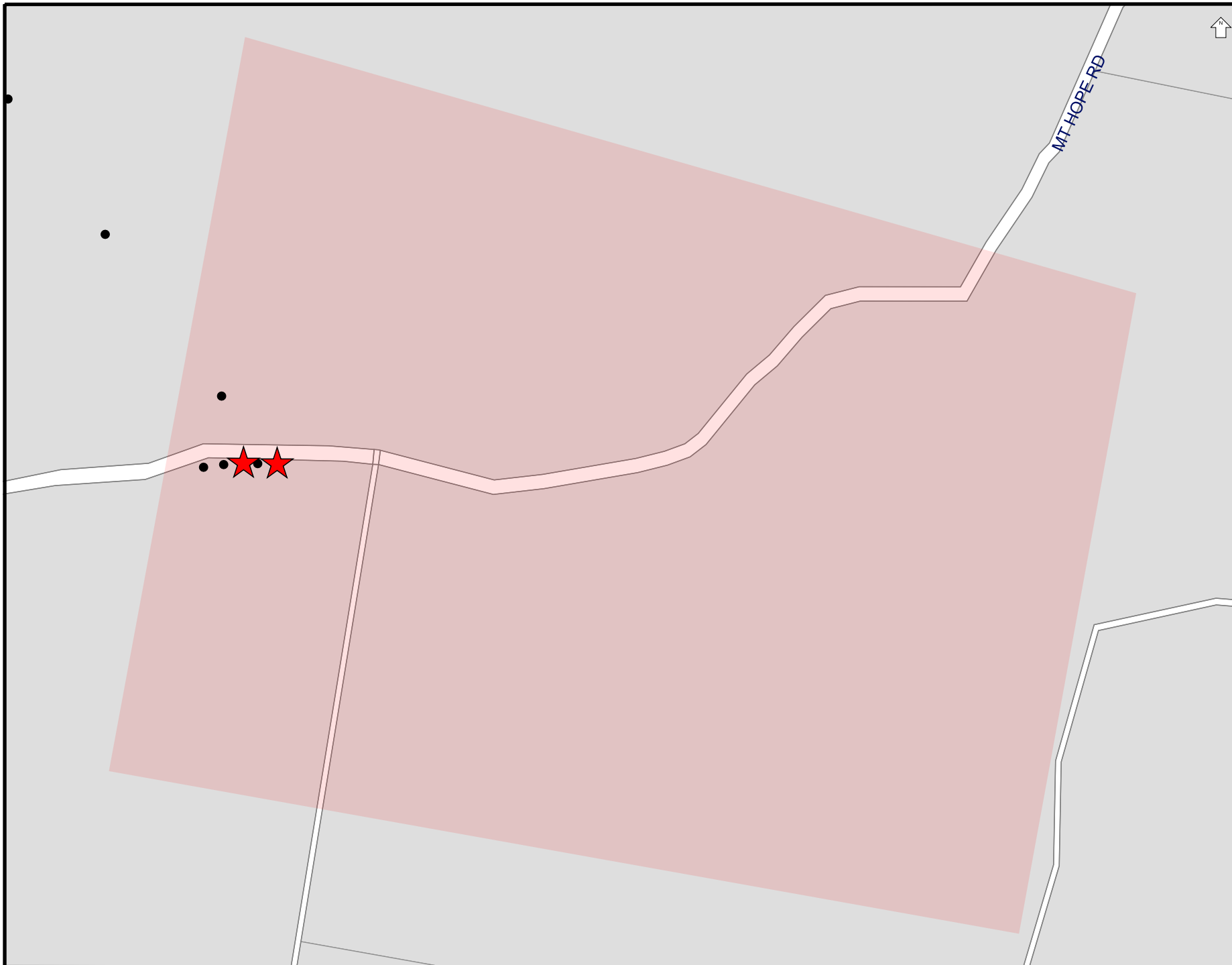
SIZE	A1
SCALE	AS SHOWN
STATUS	PRELIMINARY NOT FOR CONSTRUCTION
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PROJECT	VALLEY OF THE WINDS WIND FARM	
TITLE	TYPICAL HARDSTAND LAYOUT	
DRAWING No.	VOWWF - TYP - 003	REV A



Appendix D – Dial Before You Dig





Overhead wires not shown
LOOK UP & LIVE!

LEGEND

- - - LV Underground Cable
- - - HV Underground Cable
- - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊗ Cubicle
- Pit
- Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
- Zone Substation
 - . - . - Underground Cable
 - . - . - Underground Fibre

Proposed Works

- Area of proposed works
- Proposed assets are shown as orange symbols

THE INFORMATION ON THIS MAP MAY NOT BE ACCURATE.
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Essential Energy on 13 23 91
(or fax 1800 354 636)

ISSUE DATE: 25/08/2021

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A4 SCALE: 1:15208

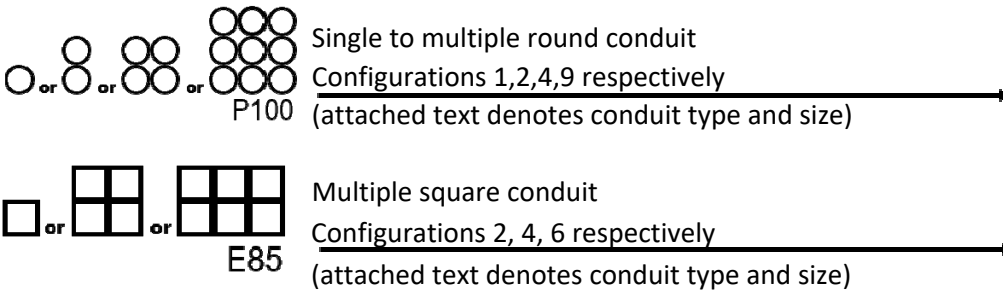
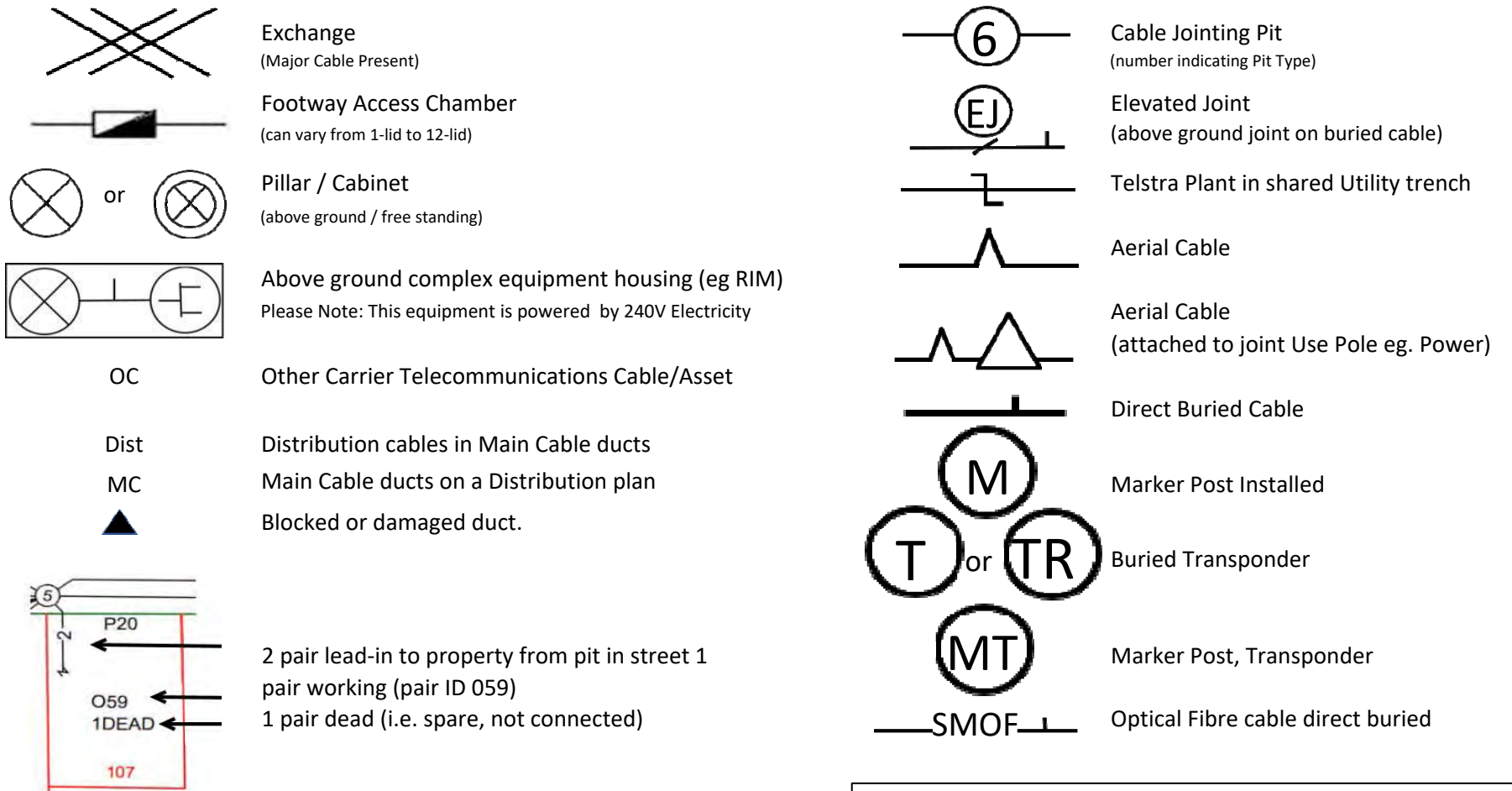


LEGEND

IT'S HOW WE CONNECT



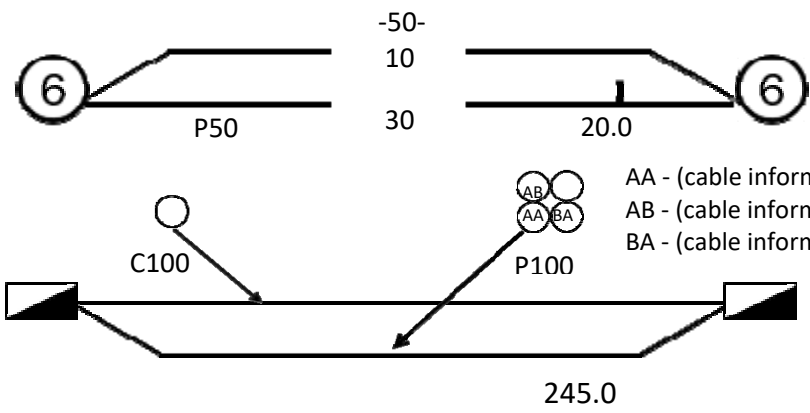
For more info contact a Certified Locating Organisation or Telstra Plan Services 1800 653 935



Some examples of conduit type and size:

A - Asbestos cement, P - PVC / Plastic, C - Concrete, GI - Galanised iron, E - Earthenware
Conduit sizes *nominally* range from 20mm to 100mm
P50 50mm PVC conduit
P100 100mm PVC conduit
A100 100mm asbestos cement conduit

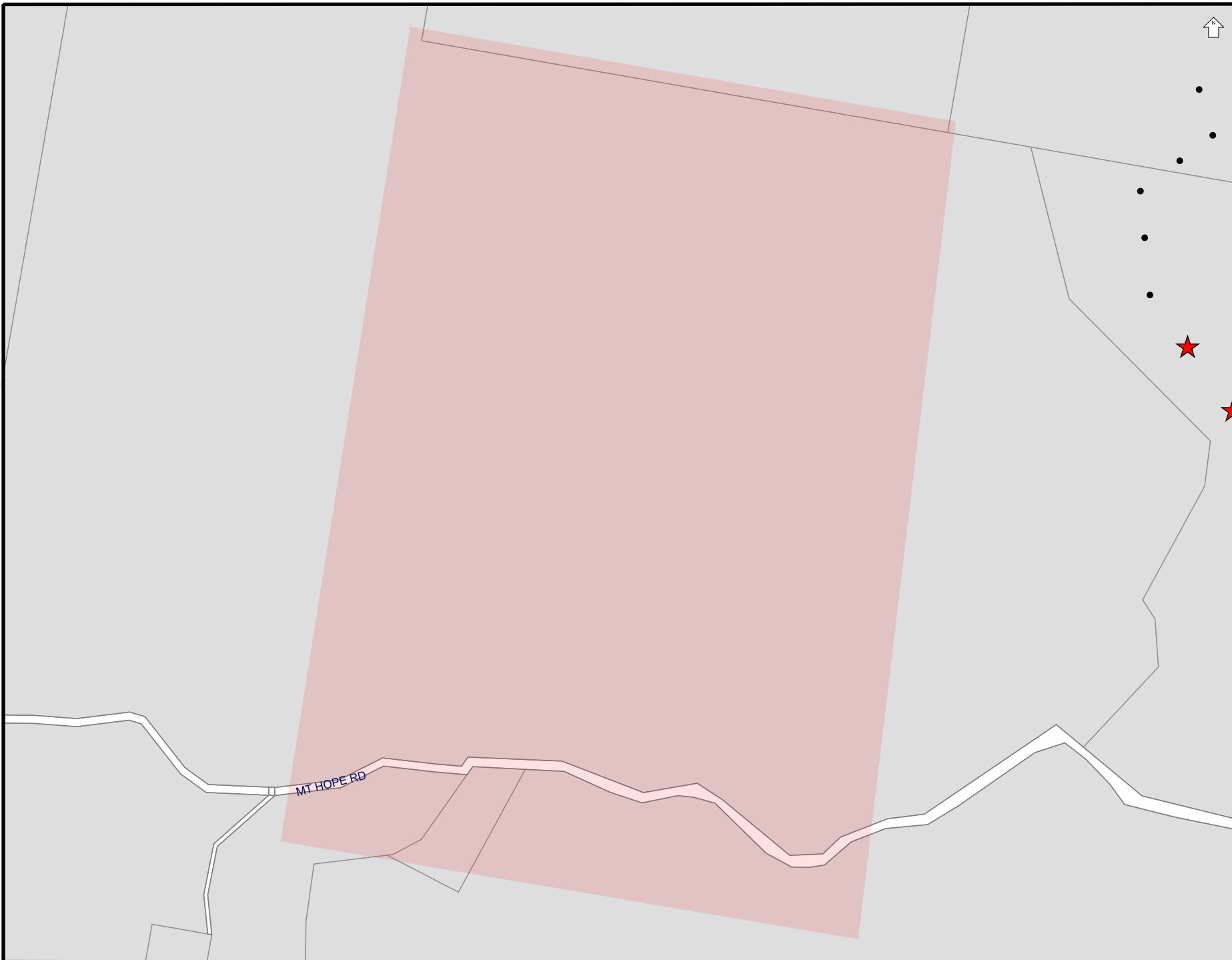
Some Examples of how to read Telstra Plans



One 50mm PVC conduit (P50) containing a 50-pair and a 10-pair cable between two 6-pits. approximately 20.0m apart, with a direct buried 30-pair cable along the same route










Two separate conduit runs between two footway access chambers (manholes) approximately 245m apart A nest of four 100mm PVC conduits (P100) containing assorted cables in three ducts (one being empty) and one empty 100mm concrete duct (C100) along

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Overhead wires not shown
LOOK UP & LIVE!


LEGEND

-  LV Underground Cable
-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
-  Zone Substation
 -  Underground Cable
 -  Underground Fibre

Proposed Works

-  Area of proposed works
- Proposed assets are shown as orange symbols

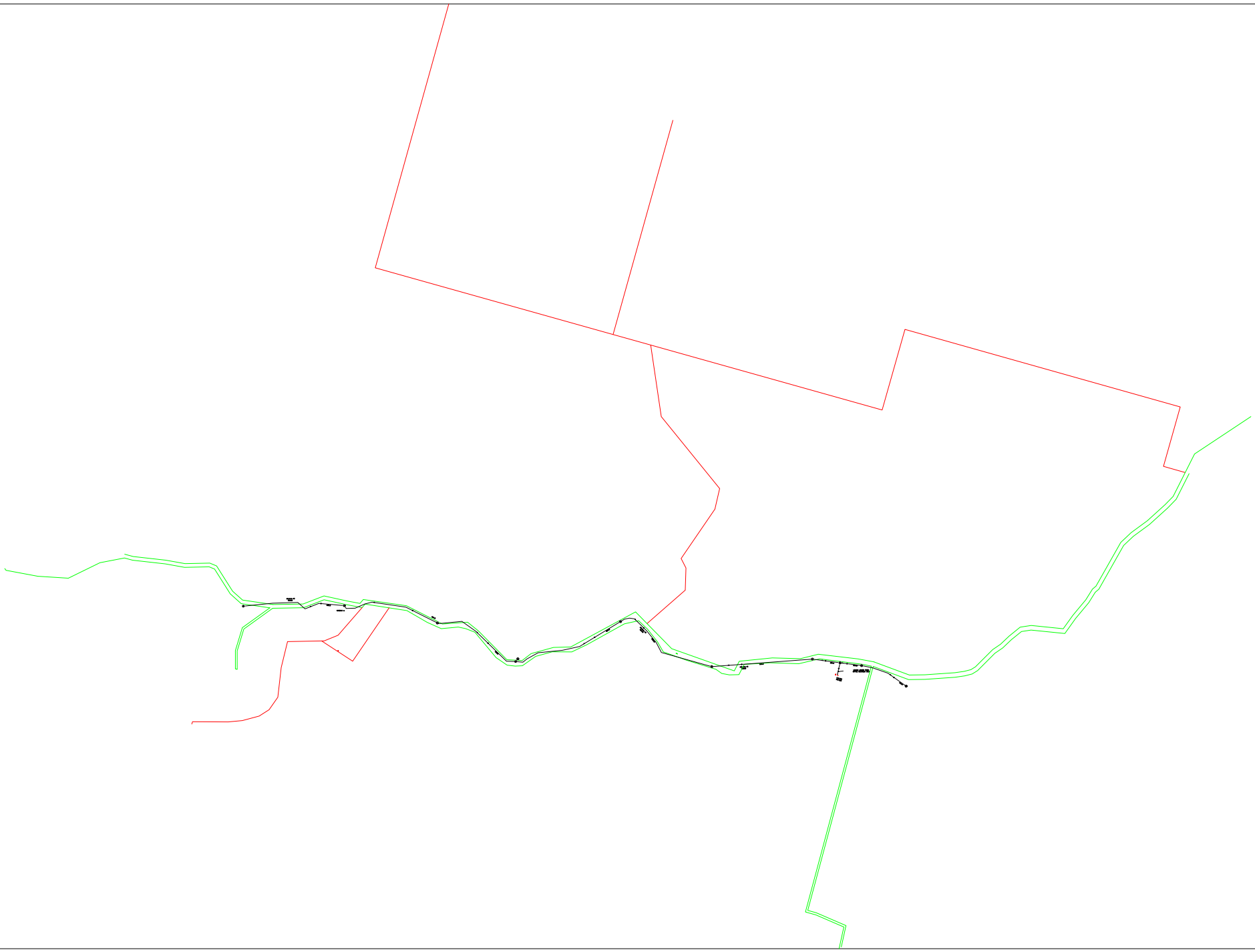
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A4 SCALE: 1:21978



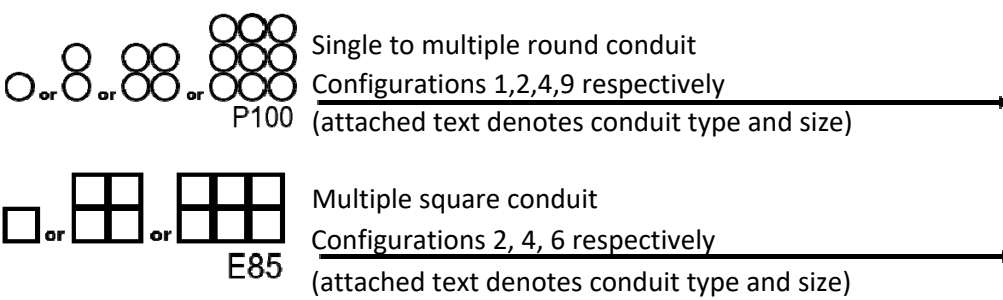
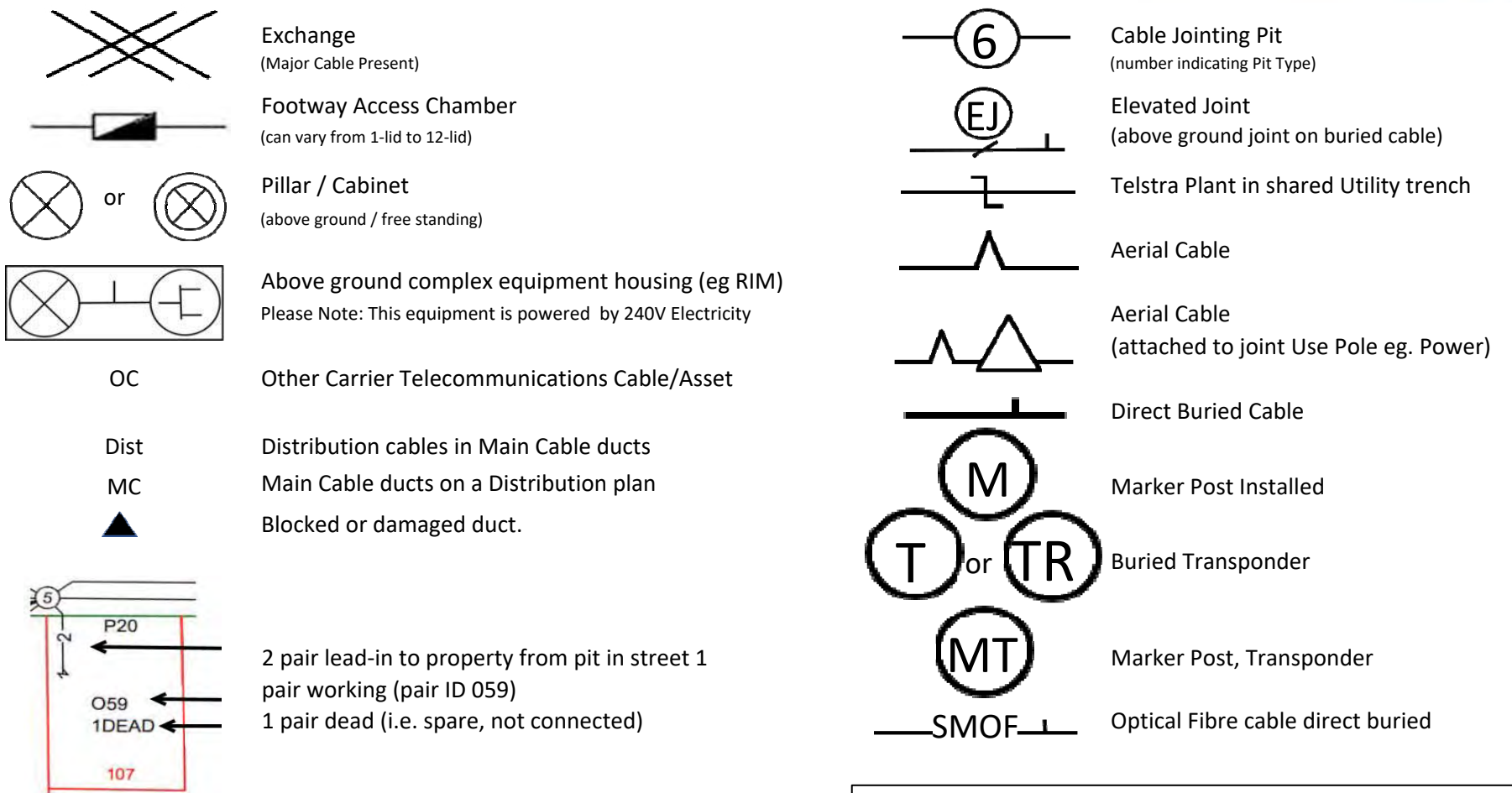


LEGEND

IT'S HOW WE CONNECT



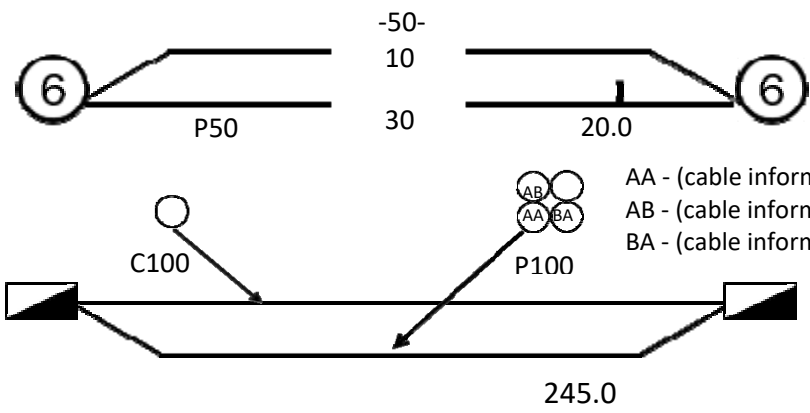
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Some Examples of how to read Telstra Plans



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


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


Overhead wires not shown
LOOK UP & LIVE!

LEGEND


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-  HV Underground Cable
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-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

Contact Essential Energy
on 13 23 91

-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works

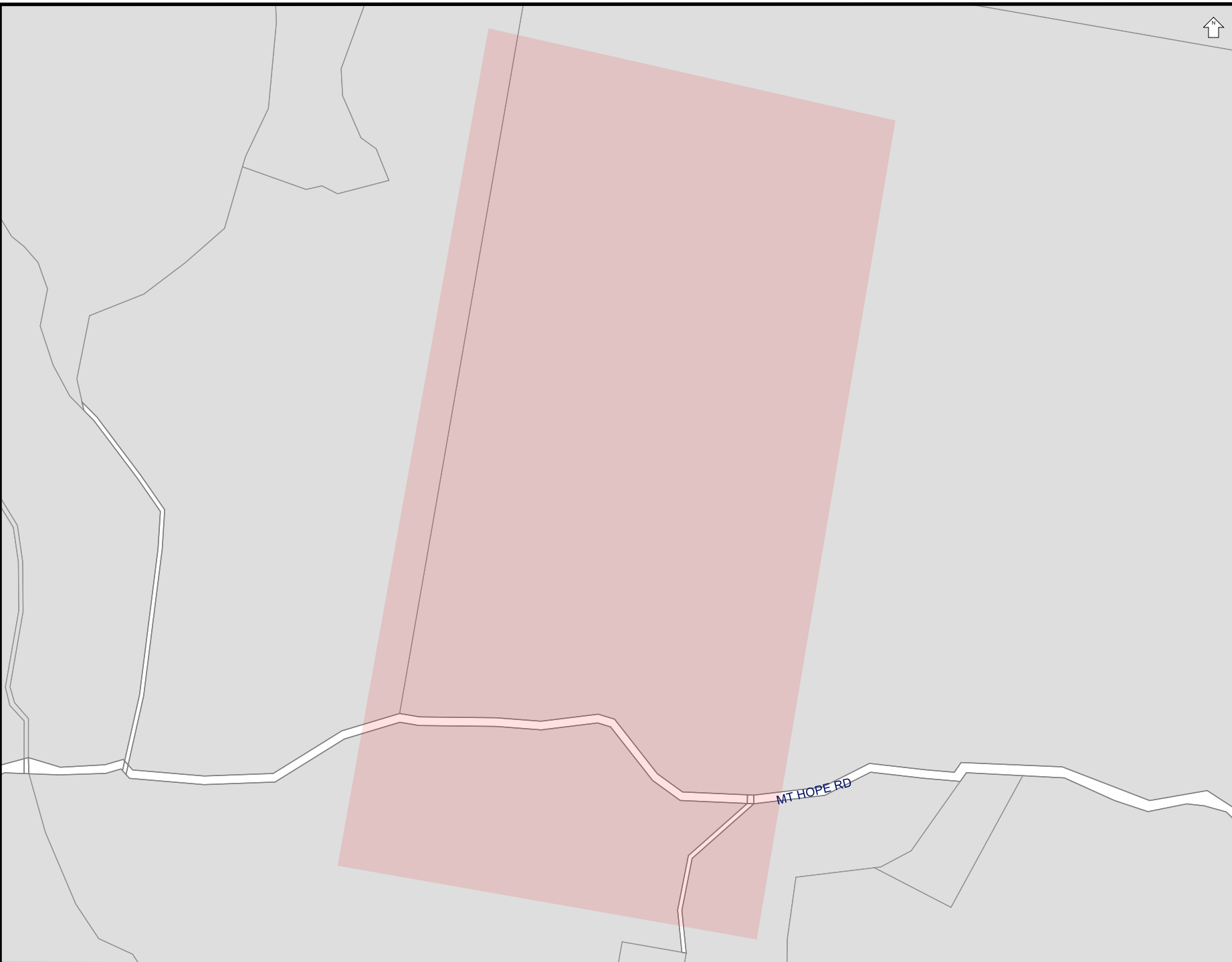
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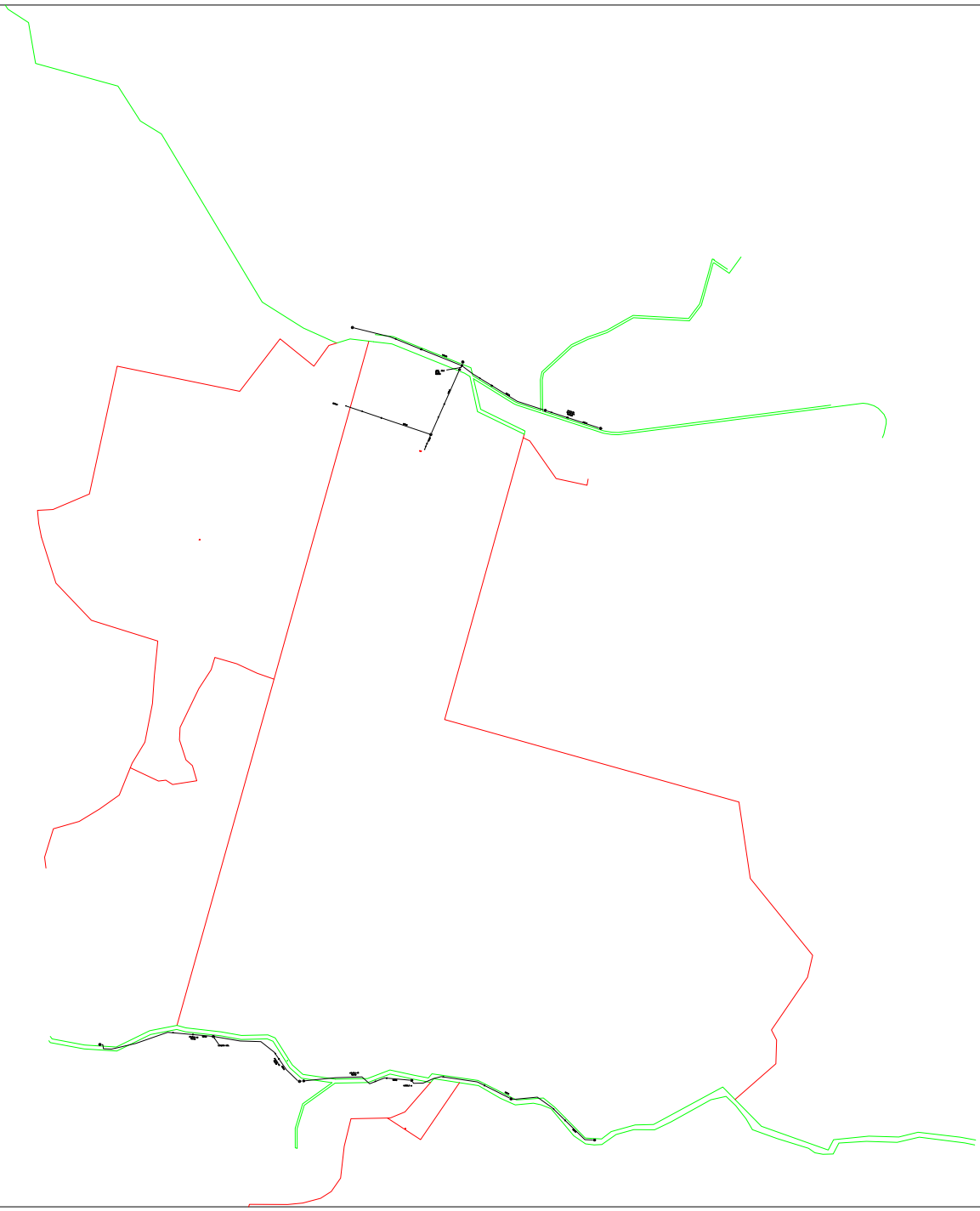
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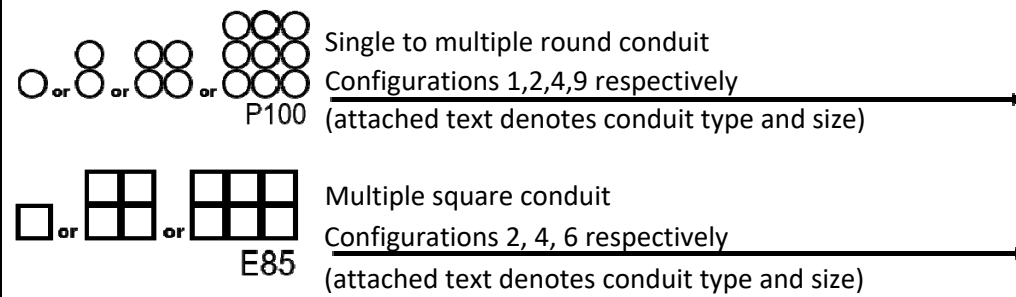
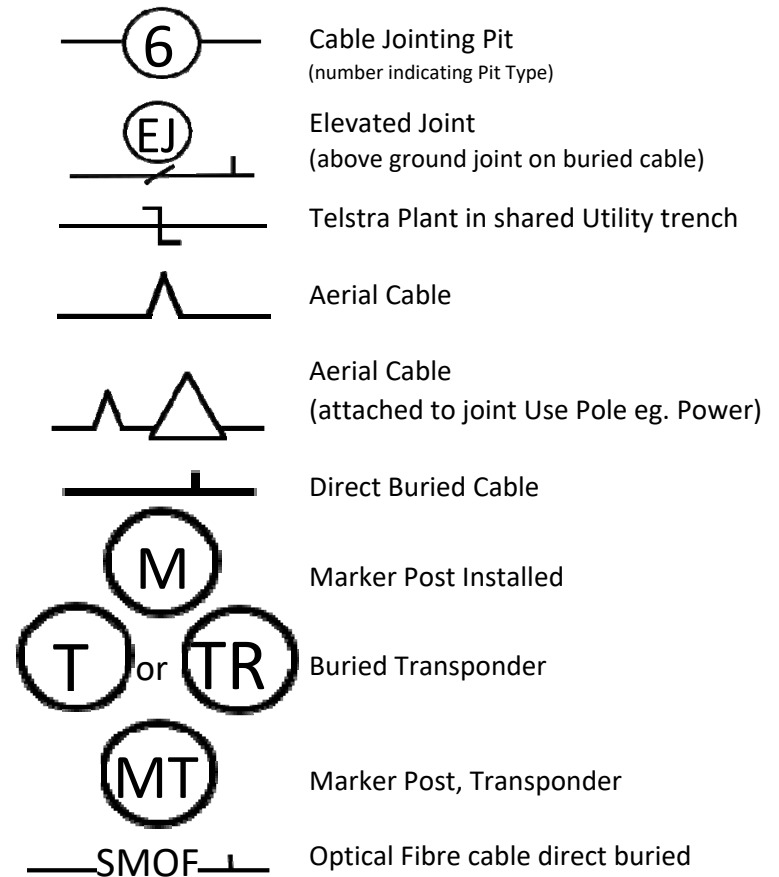
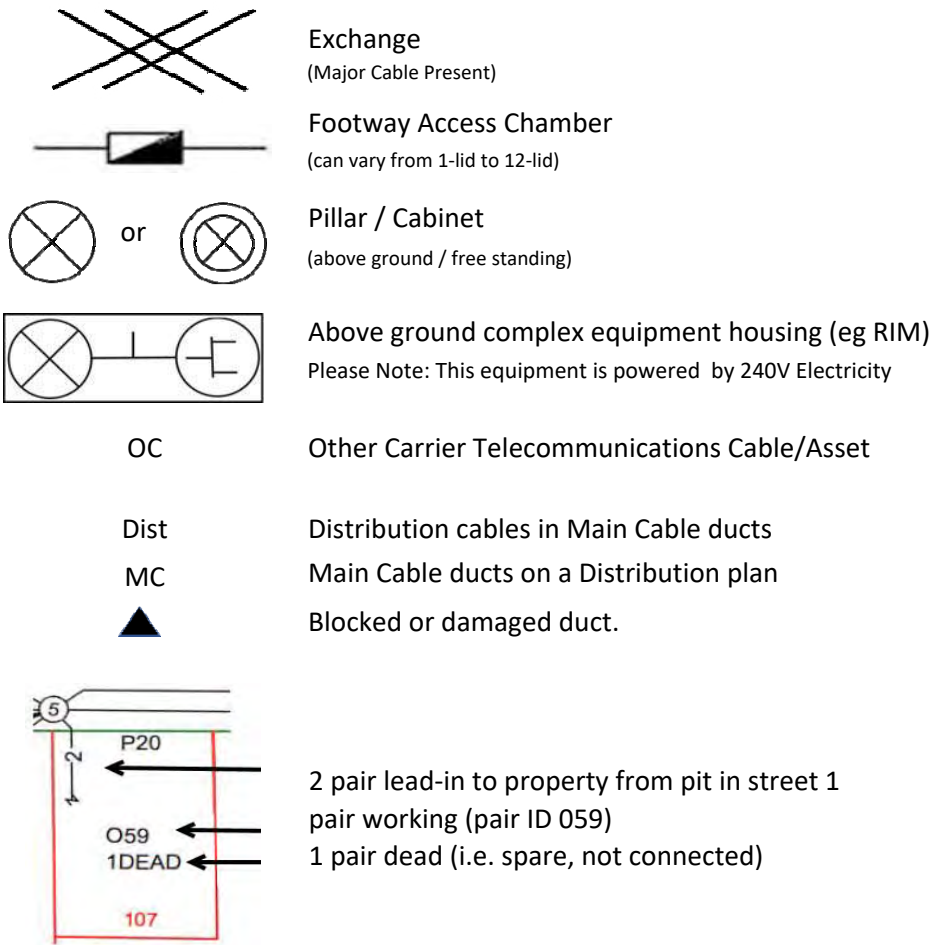
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LEGEND

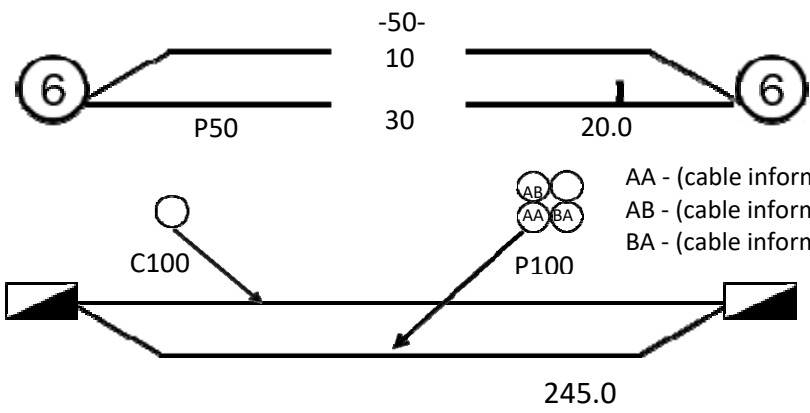
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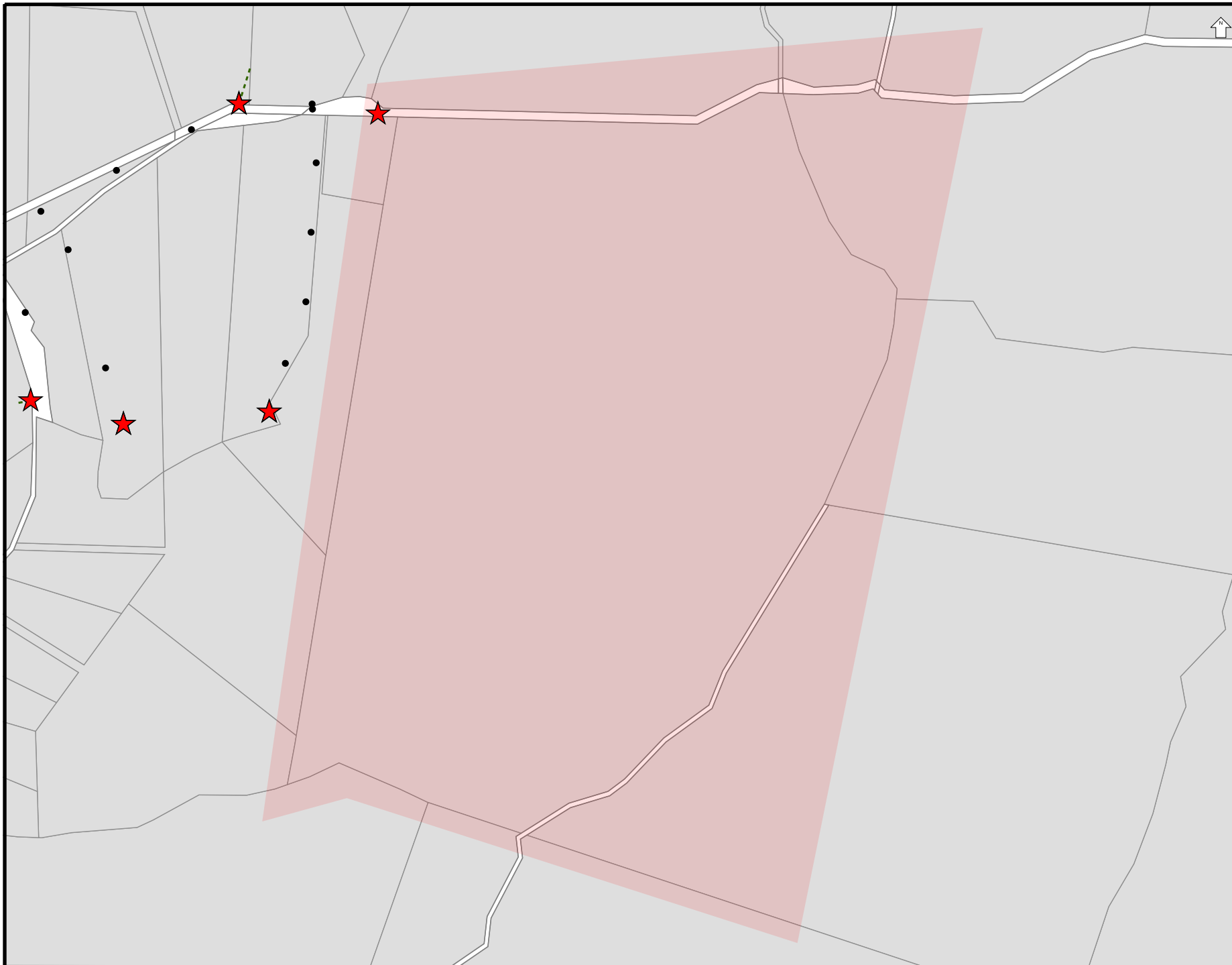
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- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊠ Cubicle
- Pit
- Area of Interest

Critical Assets

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- ▨ Zone Substation
- · - · - Underground Cable
- · - · - Underground Fibre

Proposed Works

- ▨ Area of proposed works
- Proposed assets are shown as orange symbols

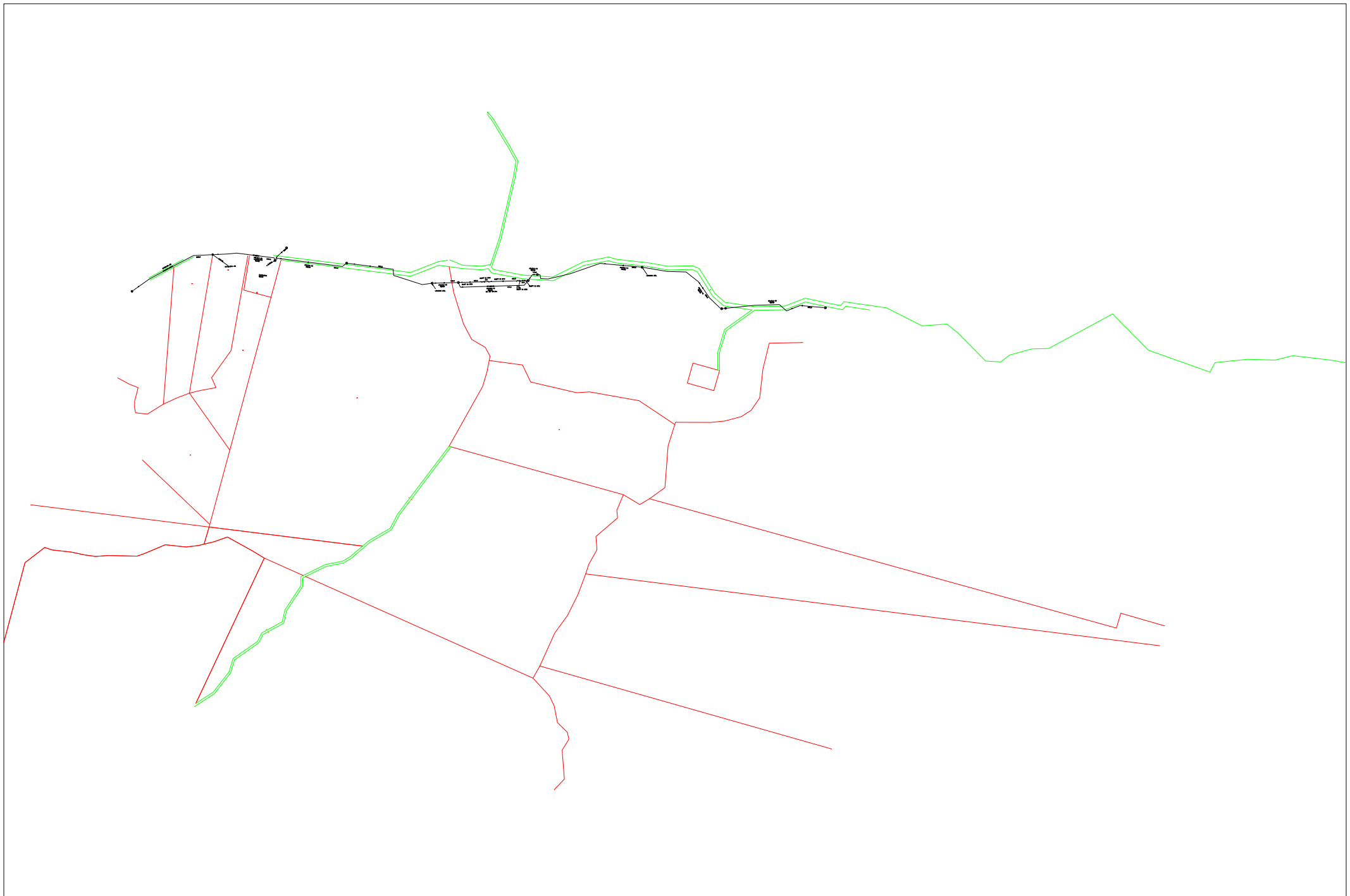
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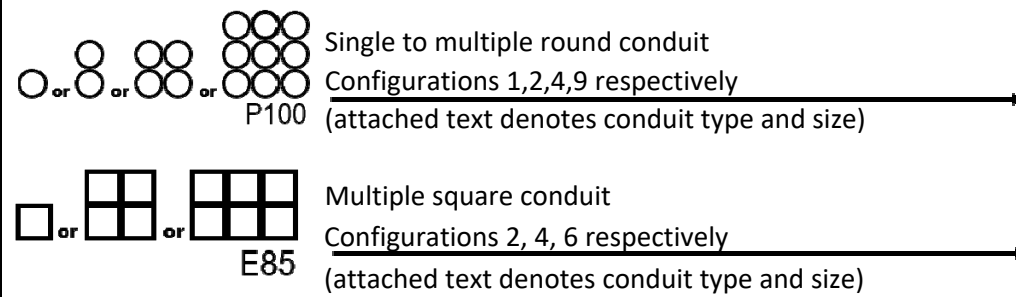
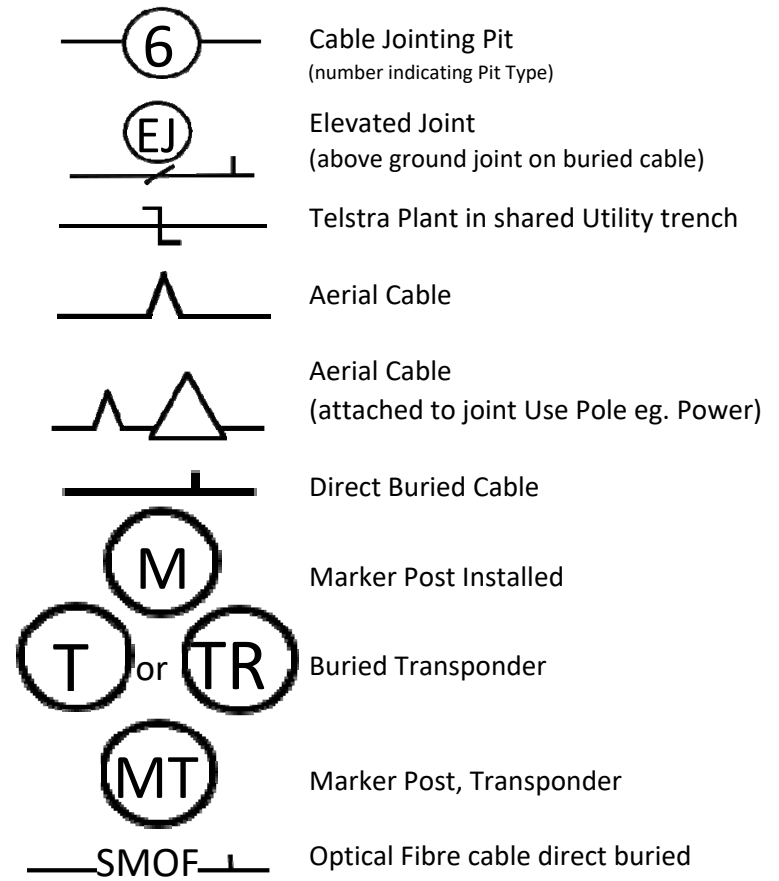
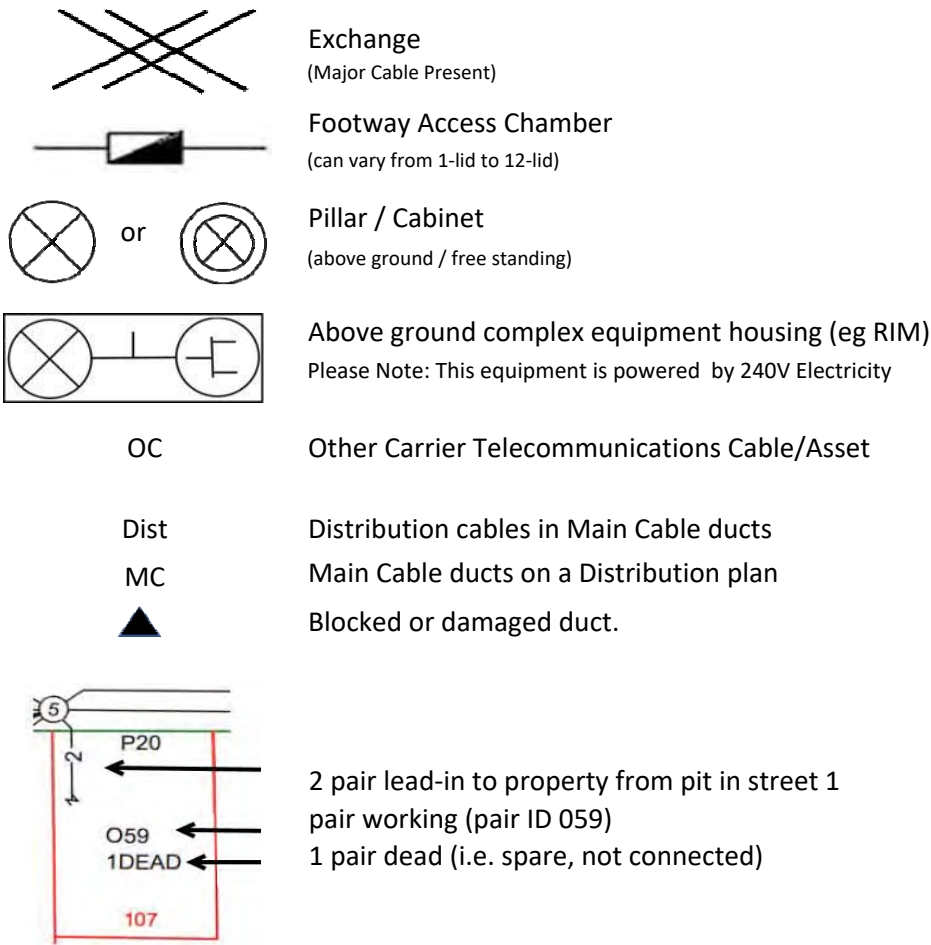
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LEGEND

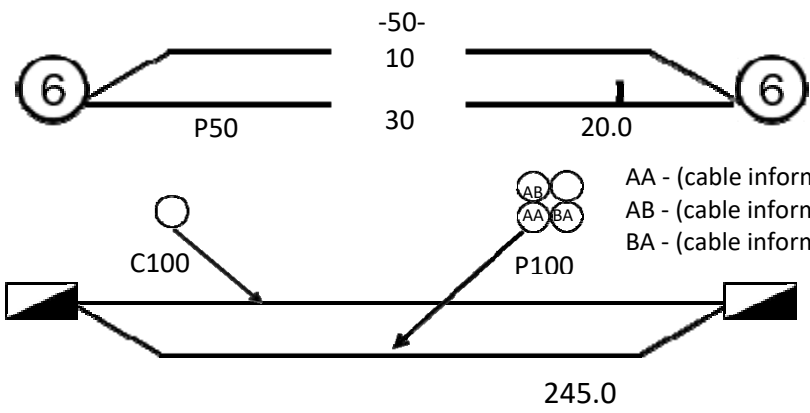
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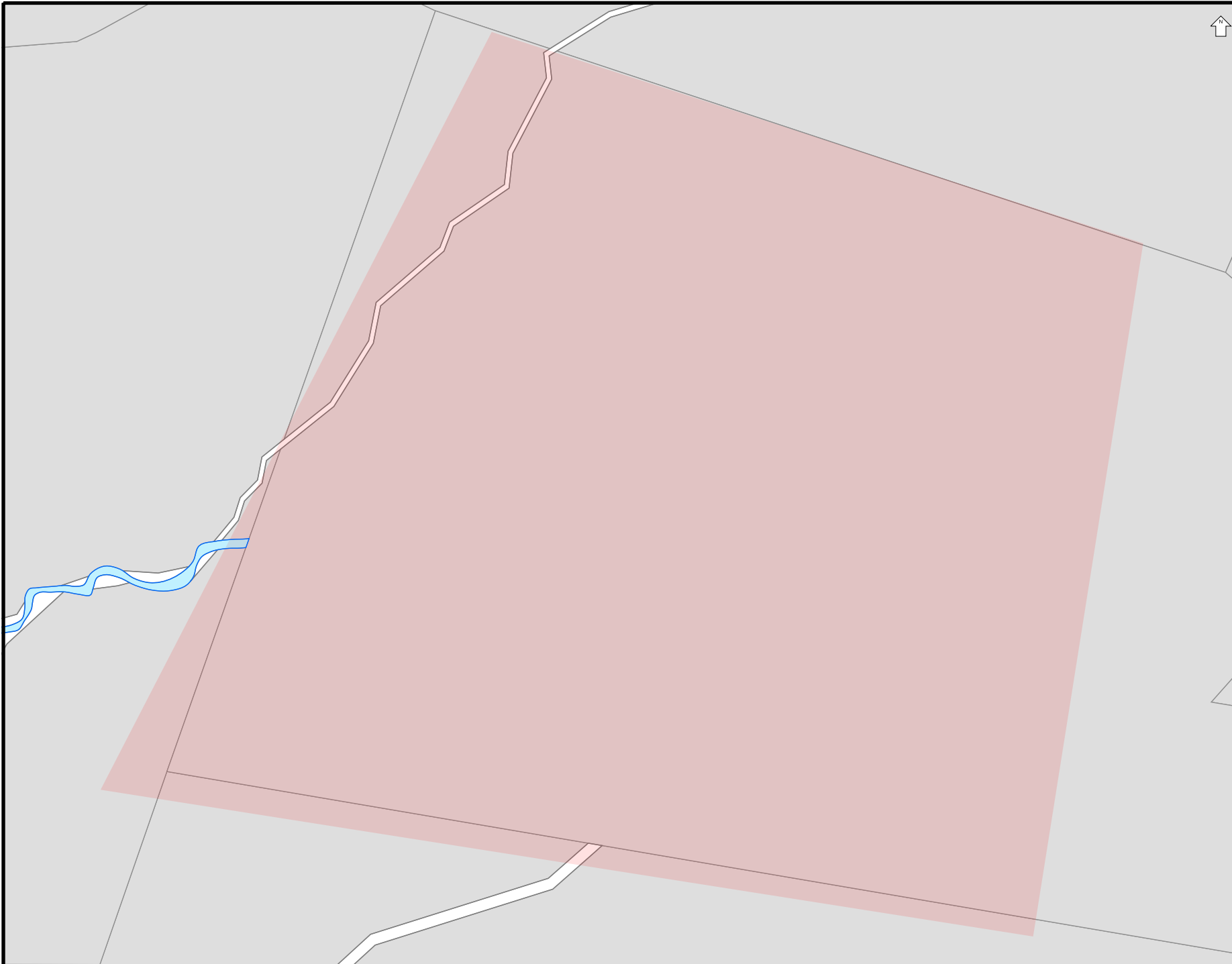
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-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

Contact Essential Energy
on 13 23 91

-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works

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

A4 SCALE: 1:17133








Overhead wires not shown
LOOK UP & LIVE!


LEGEND

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-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
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Critical Assets

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-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works

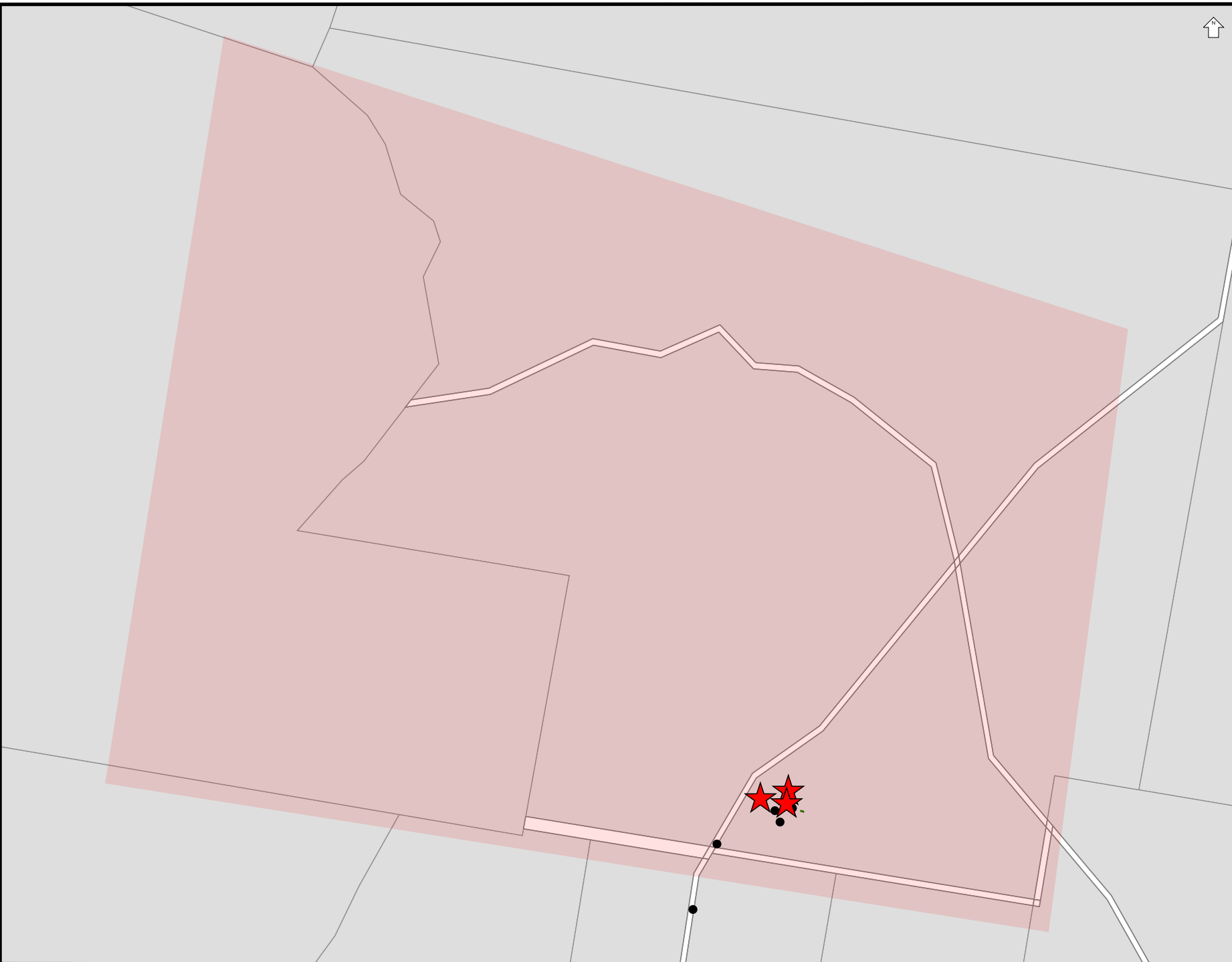
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A4 SCALE: 1:15827



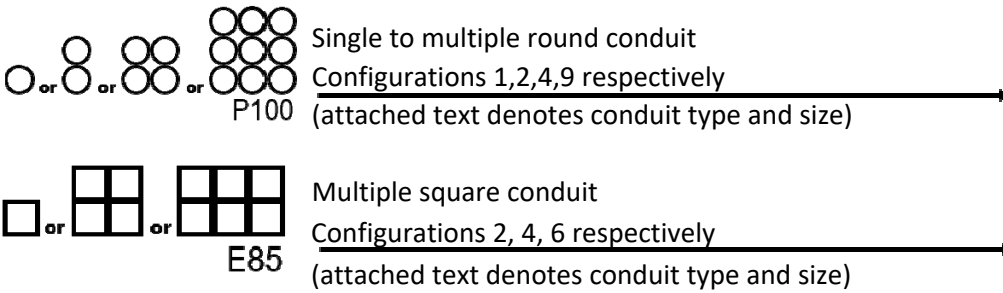
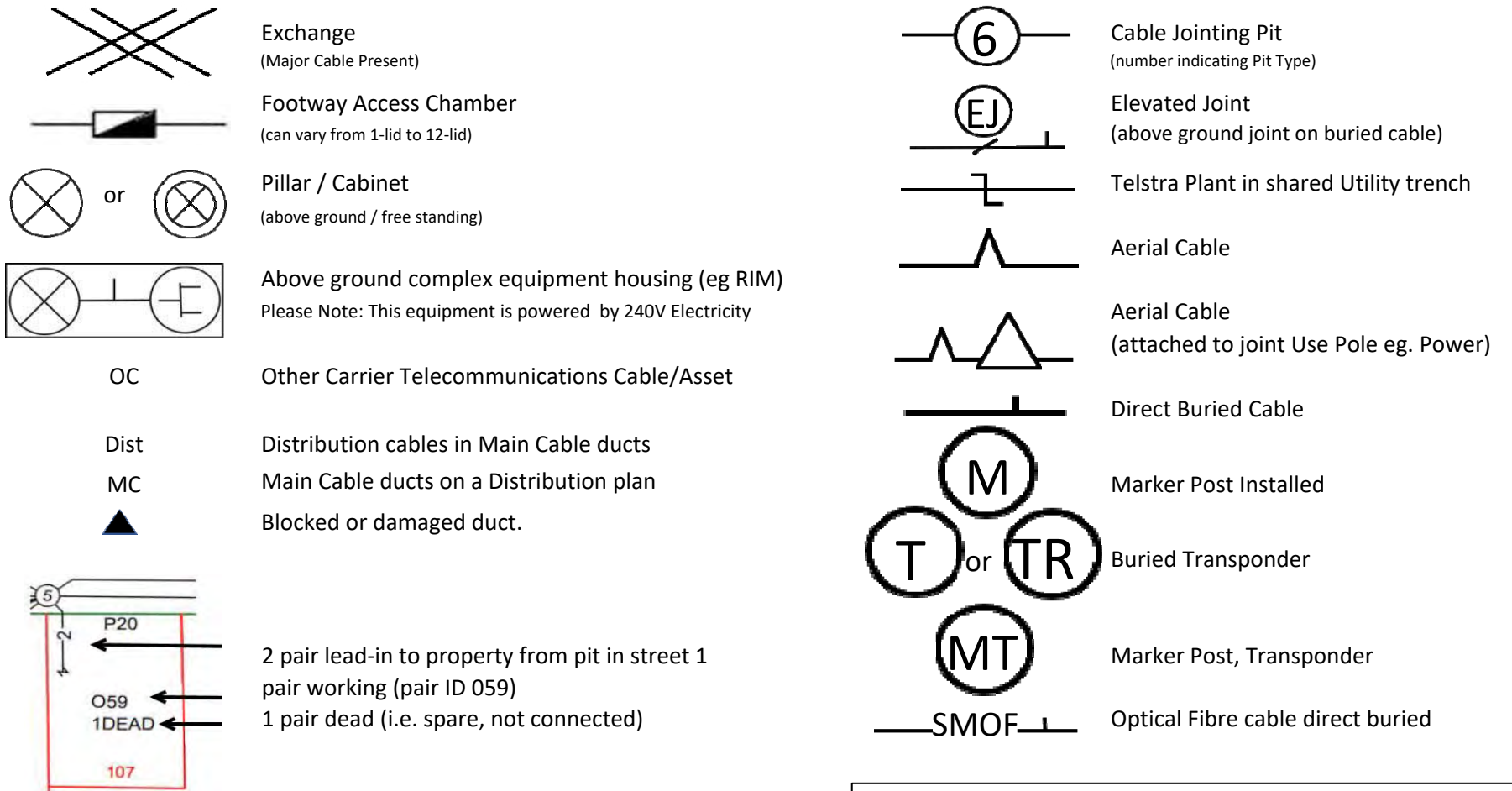


LEGEND

IT'S HOW WE CONNECT



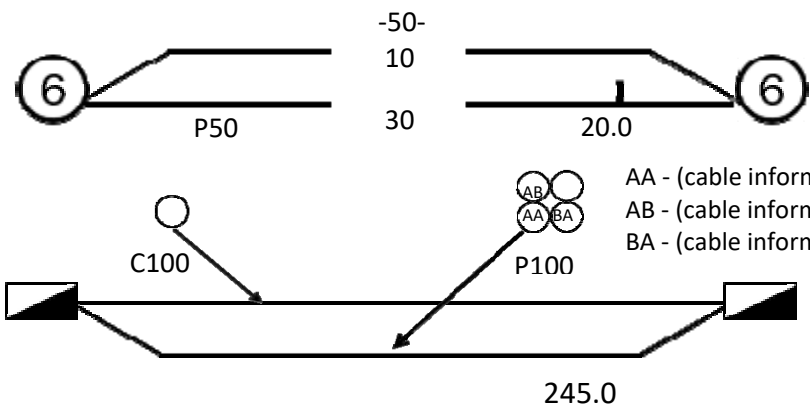
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Some examples of conduit type and size:

A - Asbestos cement, P - PVC / Plastic, C - Concrete, GI - Galanised iron, E - Earthenware
Conduit sizes *nominally* range from 20mm to 100mm
P50 50mm PVC conduit
P100 100mm PVC conduit
A100 100mm asbestos cement conduit

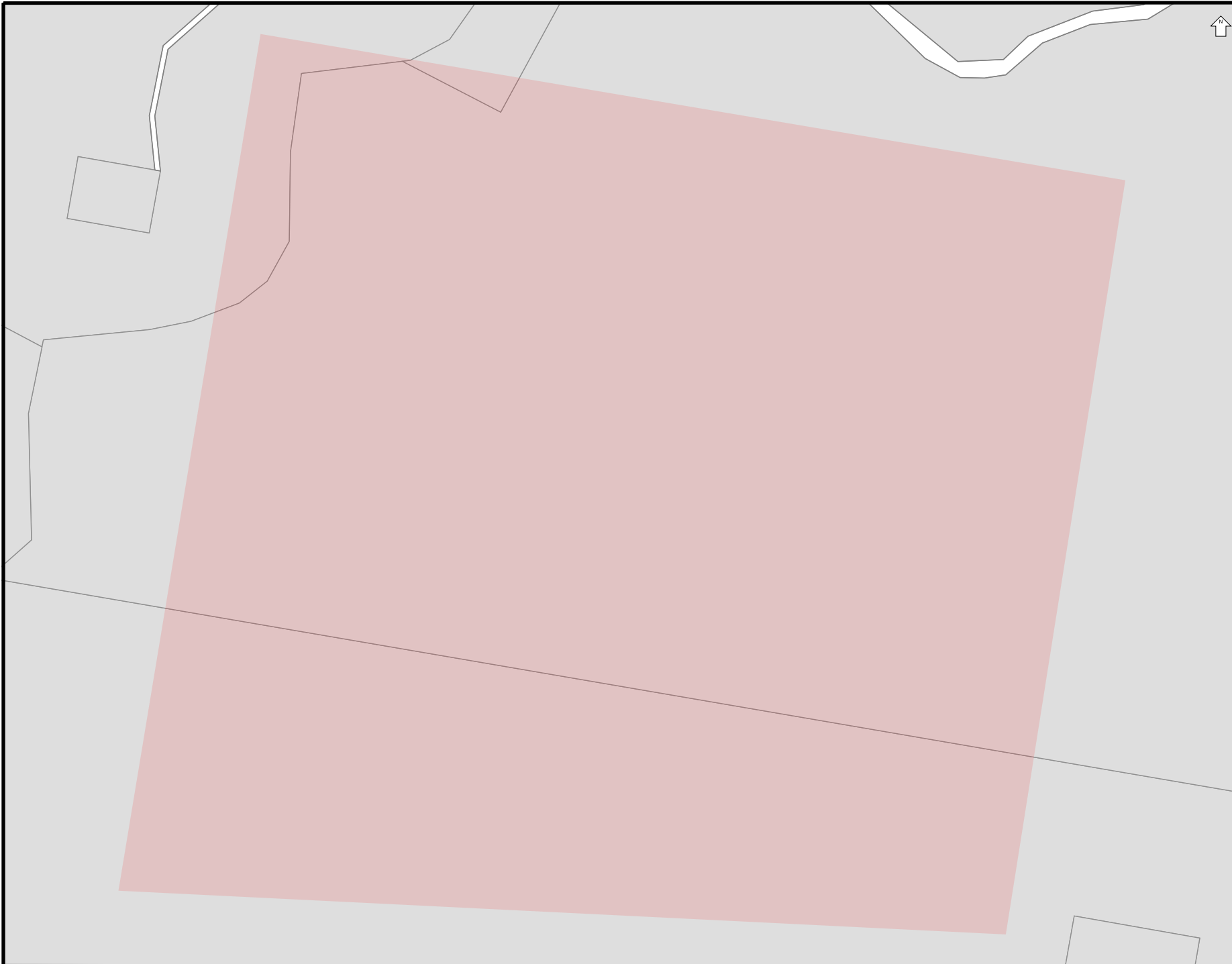
Some Examples of how to read Telstra Plans



One 50mm PVC conduit (P50) containing a 50-pair and a 10-pair cable between two 6-pits. approximately 20.0m apart, with a direct buried 30-pair cable along the same route










Two separate conduit runs between two footway access chambers (manholes) approximately 245m apart A nest of four 100mm PVC conduits (P100) containing assorted cables in three ducts (one being empty) and one empty 100mm concrete duct (C100) along

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Overhead wires not shown
LOOK UP & LIVE!

LEGEND


-  LV Underground Cable
-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

Contact Essential Energy
on 13 23 91

-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works

Proposed assets are shown as
orange symbols

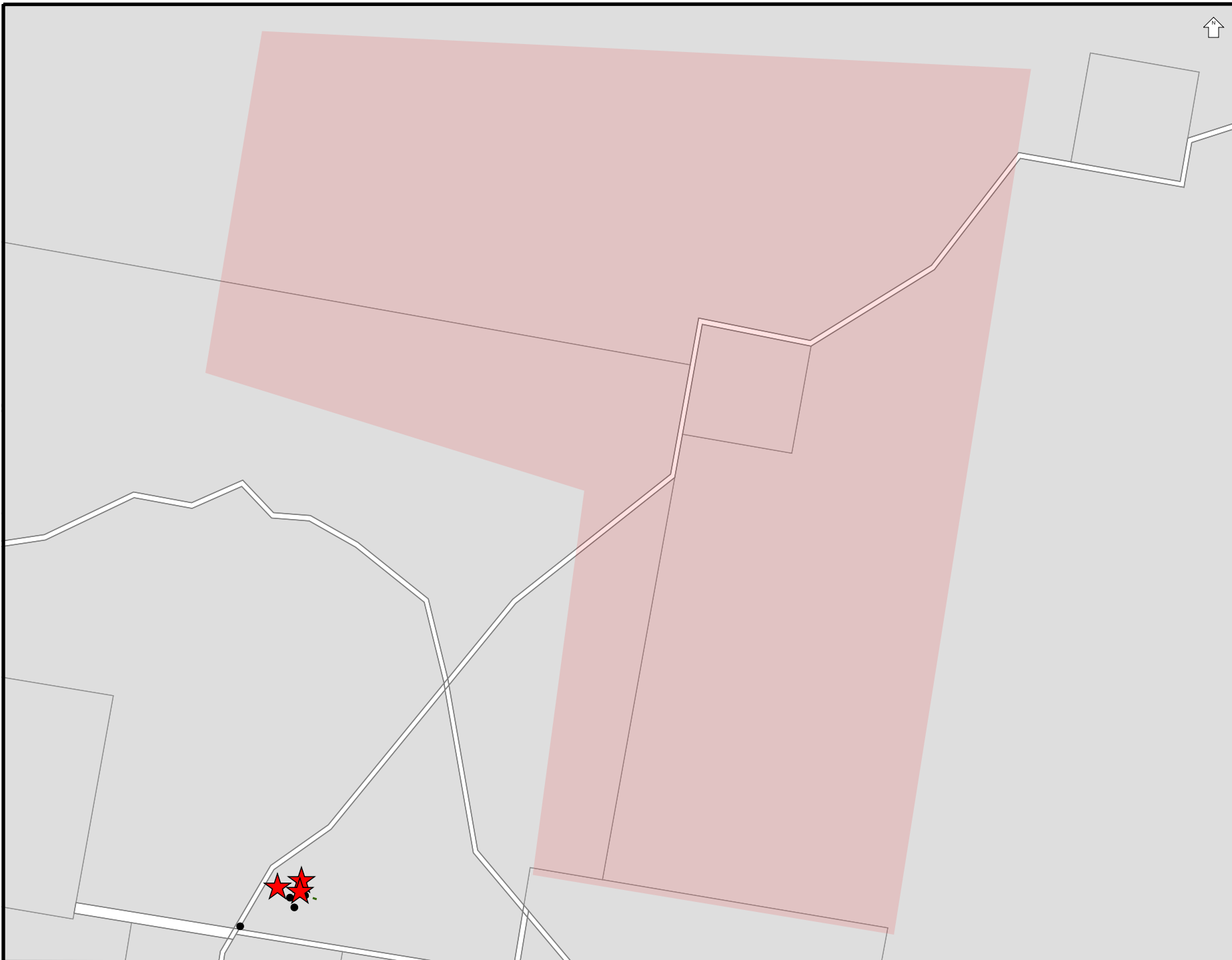
**THE INFORMATION ON THIS
MAP MAY NOT BE
ACCURATE.
If details are
incorrect, please
notify
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13 23 91
(or fax 1800 354 636)**

ISSUE DATE: 25/08/2021

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A4 SCALE: 1:16026





Overhead wires not shown
LOOK UP & LIVE!

LEGEND

- - - - LV Underground Cable
- - - - HV Underground Cable
- - - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊗ Cubicle
- Pit
- Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
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- . - . - . Underground Cable
- . - . - . Underground Fibre

Proposed Works

- ▨ Area of proposed works
- Proposed assets are shown as orange symbols

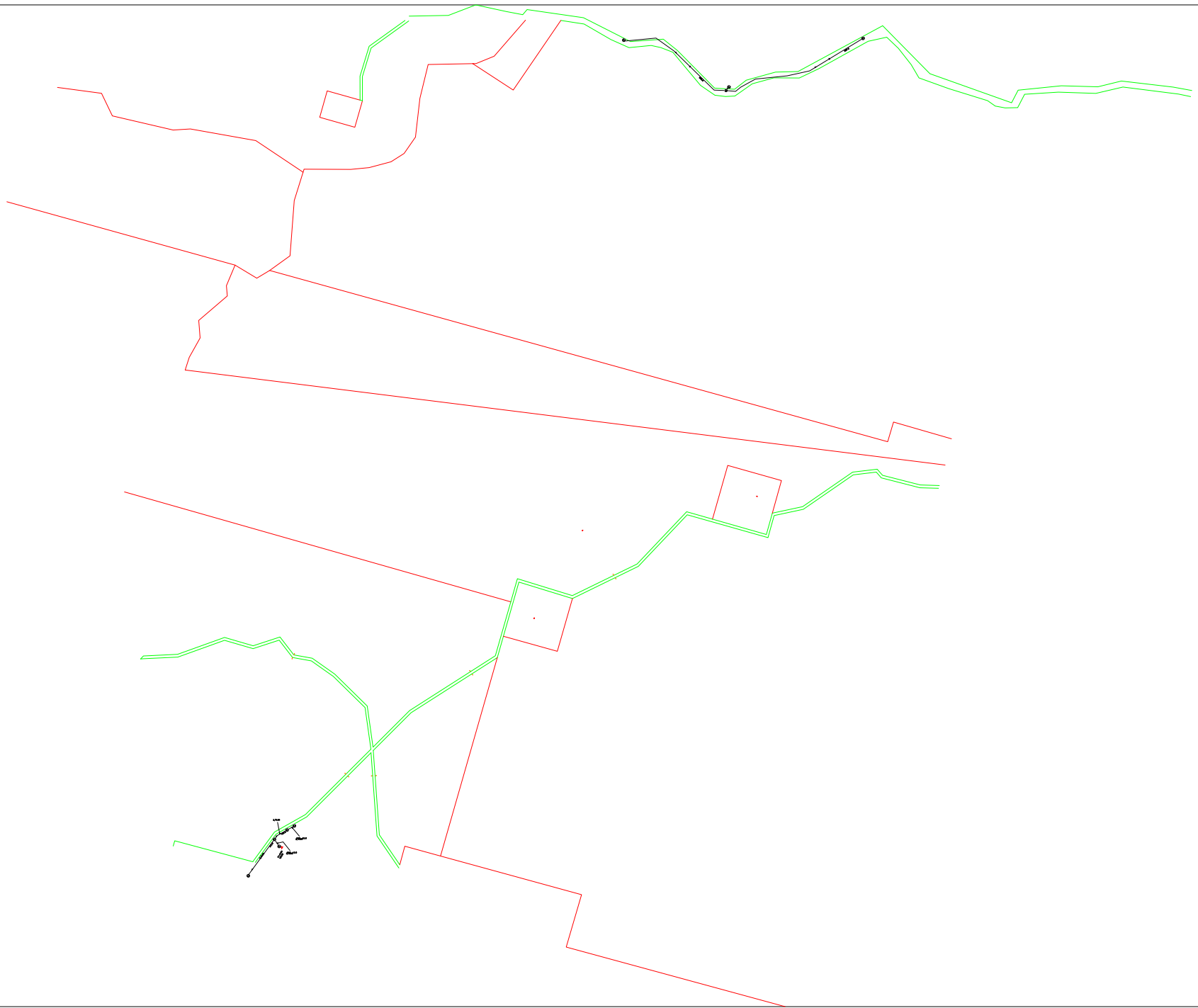
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ISSUE DATE: 25/08/2021

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A4 SCALE: 1:18381



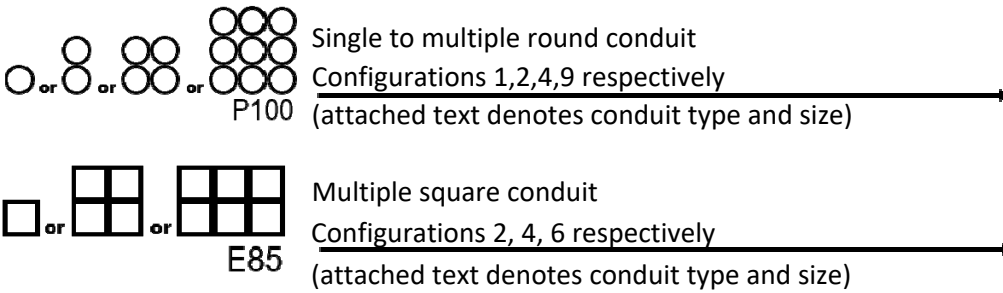
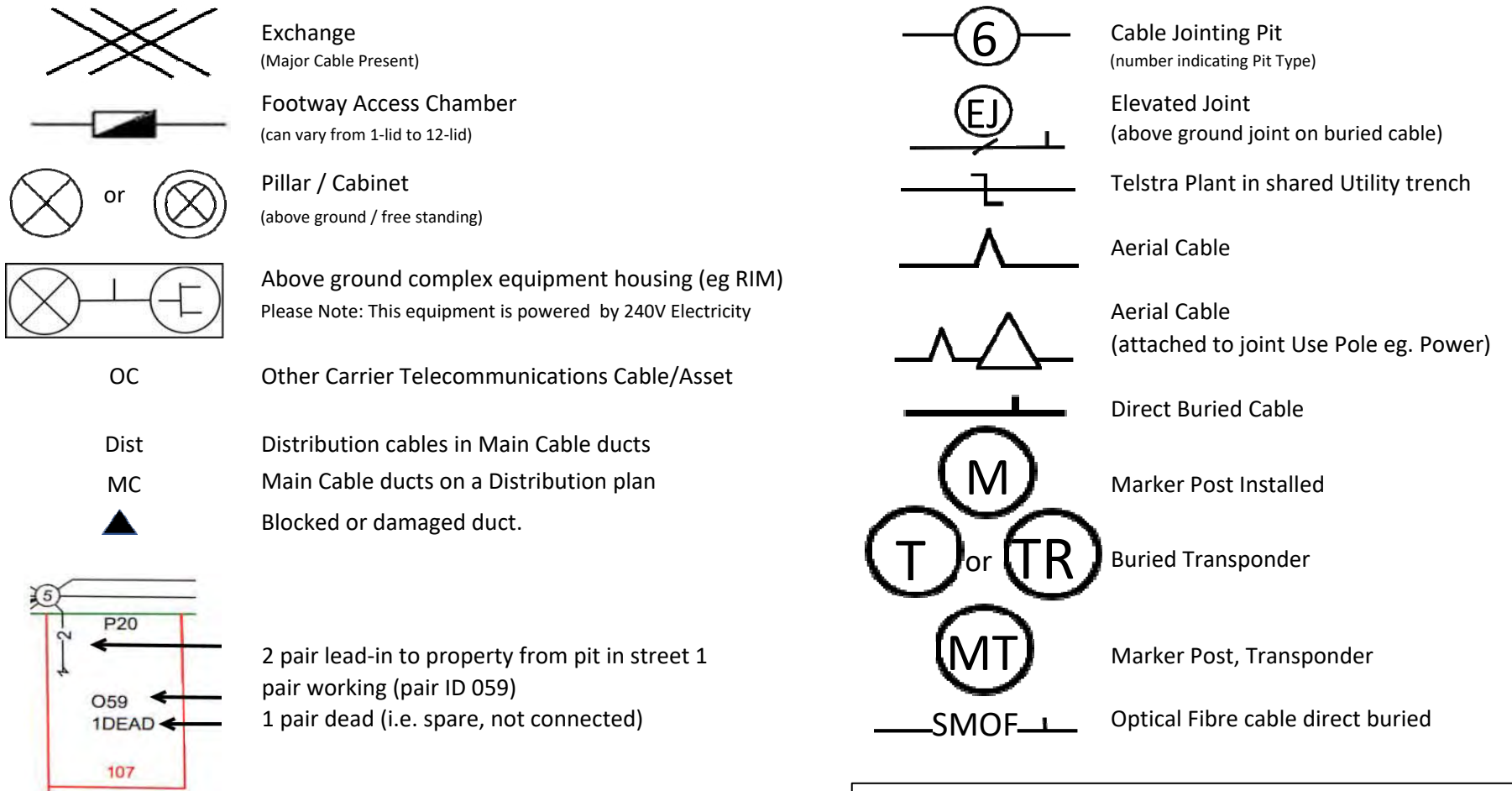


LEGEND

IT'S HOW WE CONNECT



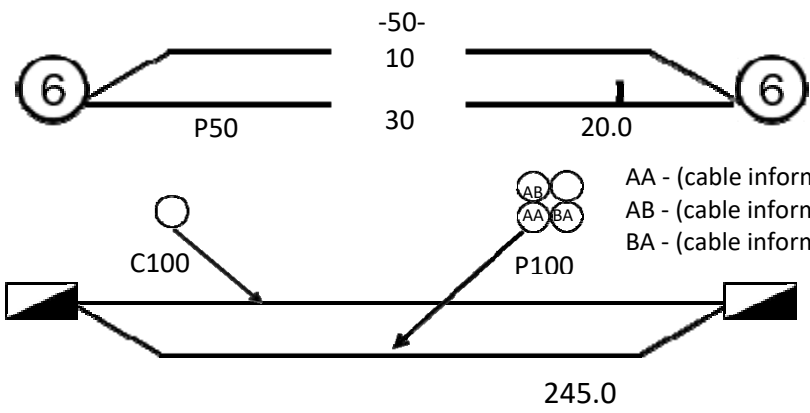
For more info contact a Certified Locating Organisation or Telstra Plan Services 1800 653 935



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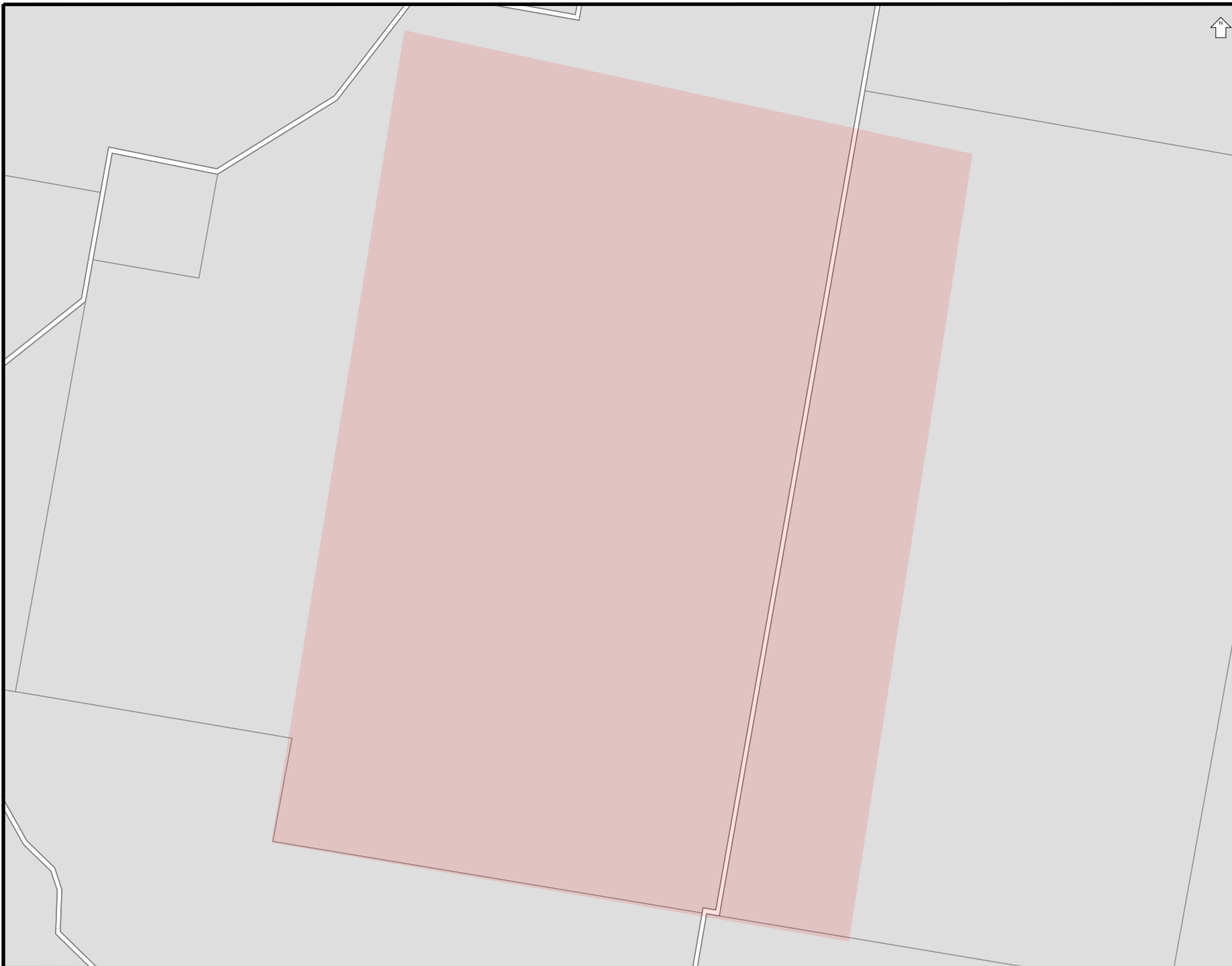
Some Examples of how to read Telstra Plans



One 50mm PVC conduit (P50) containing a 50-pair and a 10-pair cable between two 6-pits. approximately 20.0m apart, with a direct buried 30-pair cable along the same route










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Overhead wires not shown
LOOK UP & LIVE!

LEGEND


-  LV Underground Cable
-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

Contact Essential Energy
on 13 23 91

-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works

Proposed assets are shown as orange symbols

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ISSUE DATE: 25/08/2021

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A4 SCALE: 1:19076

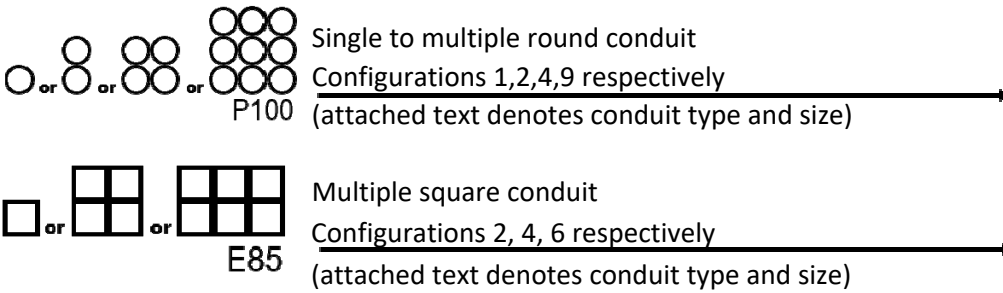
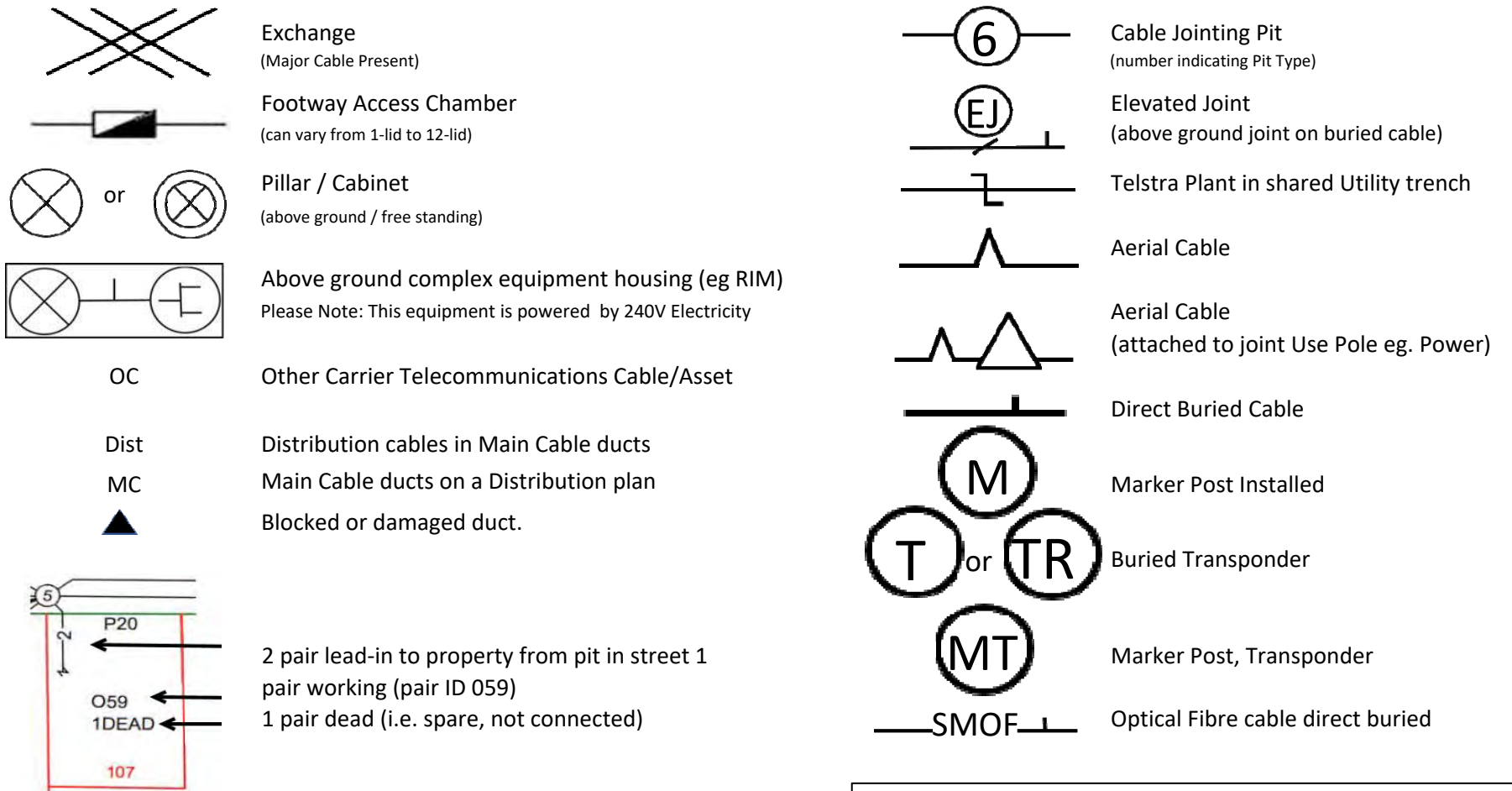


LEGEND

IT'S HOW WE CONNECT



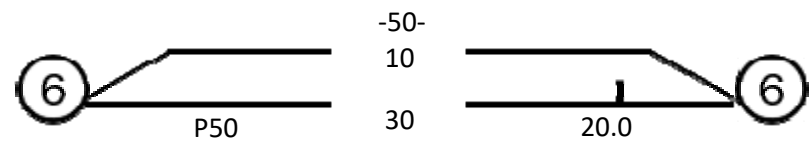
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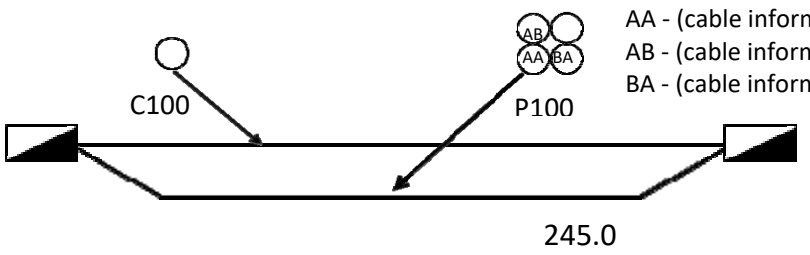
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Some Examples of how to read Telstra Plans

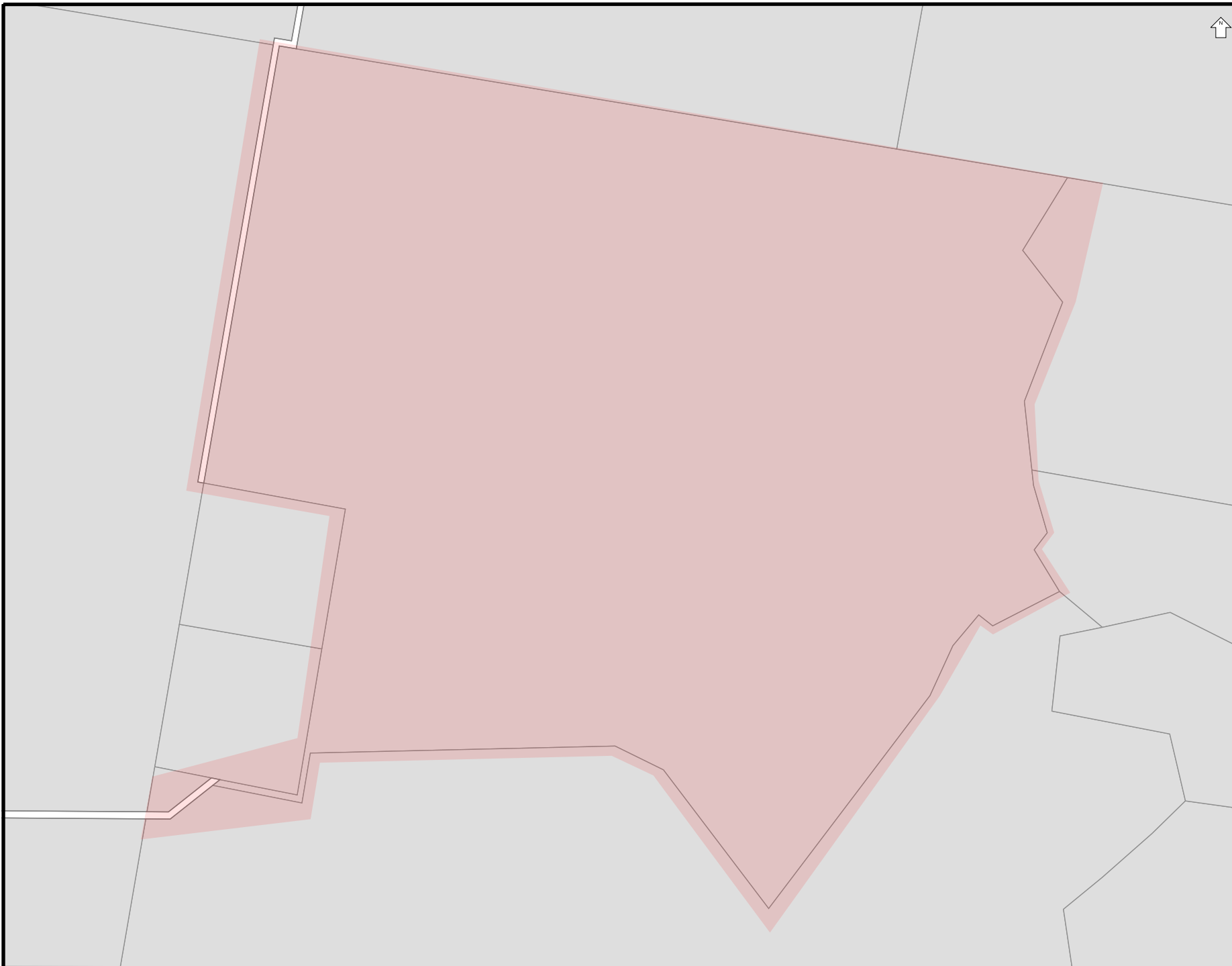


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
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Overhead wires not shown
LOOK UP & LIVE!

LEGEND


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-  HV Underground Cable
-  Underground Pipe
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Critical Assets

Contact Essential Energy
on 13 23 91

-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works

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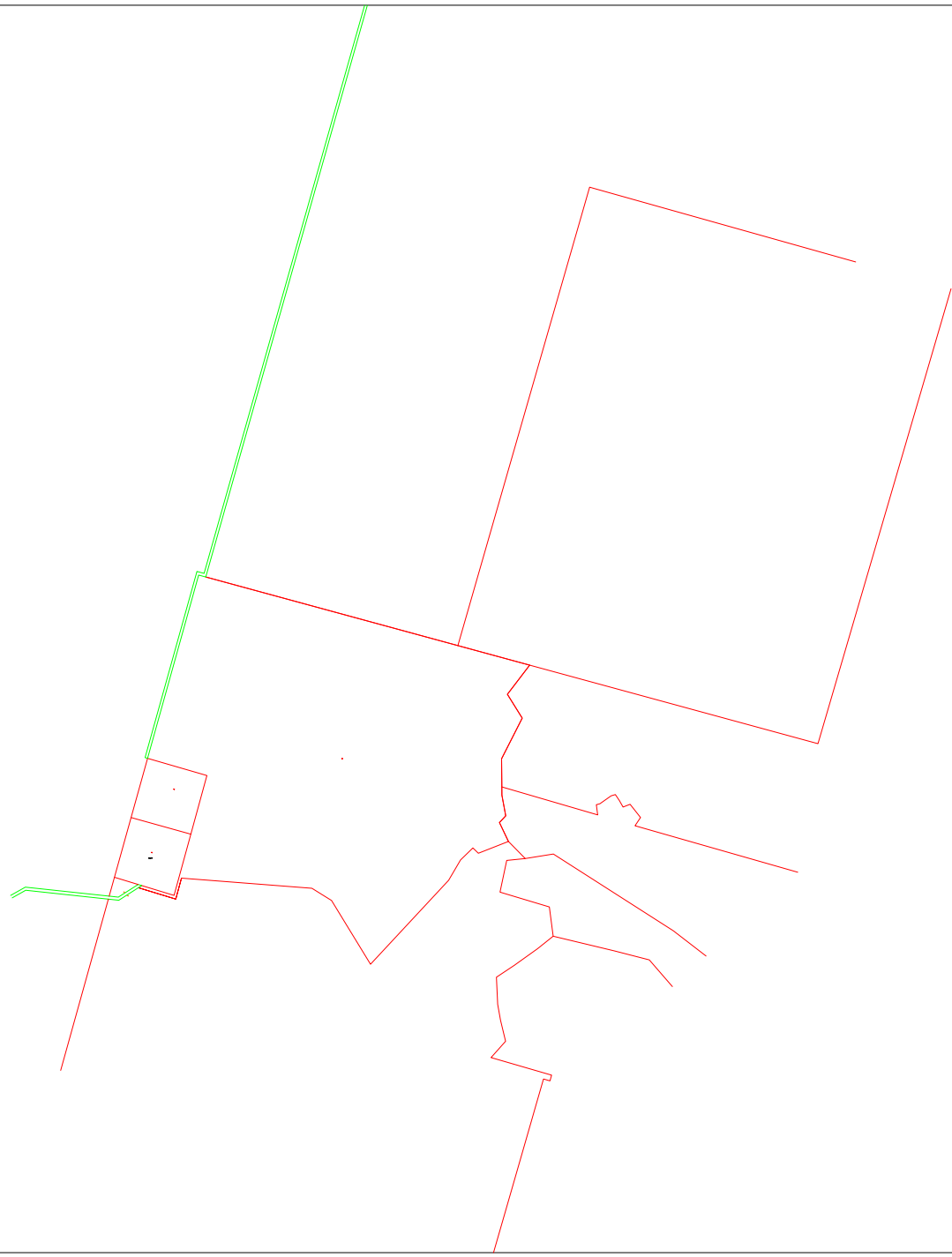
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A4 SCALE: 1:14307



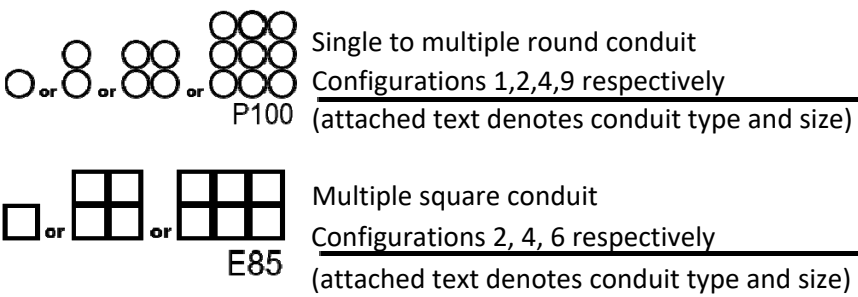
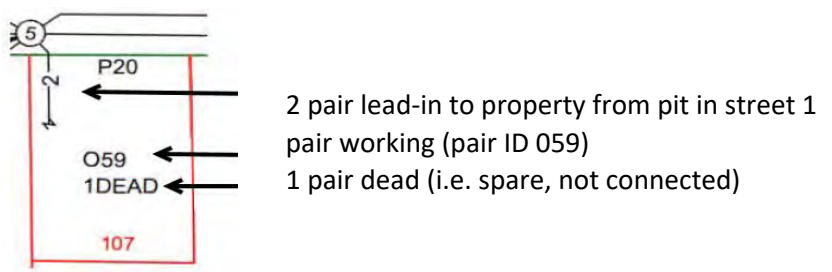
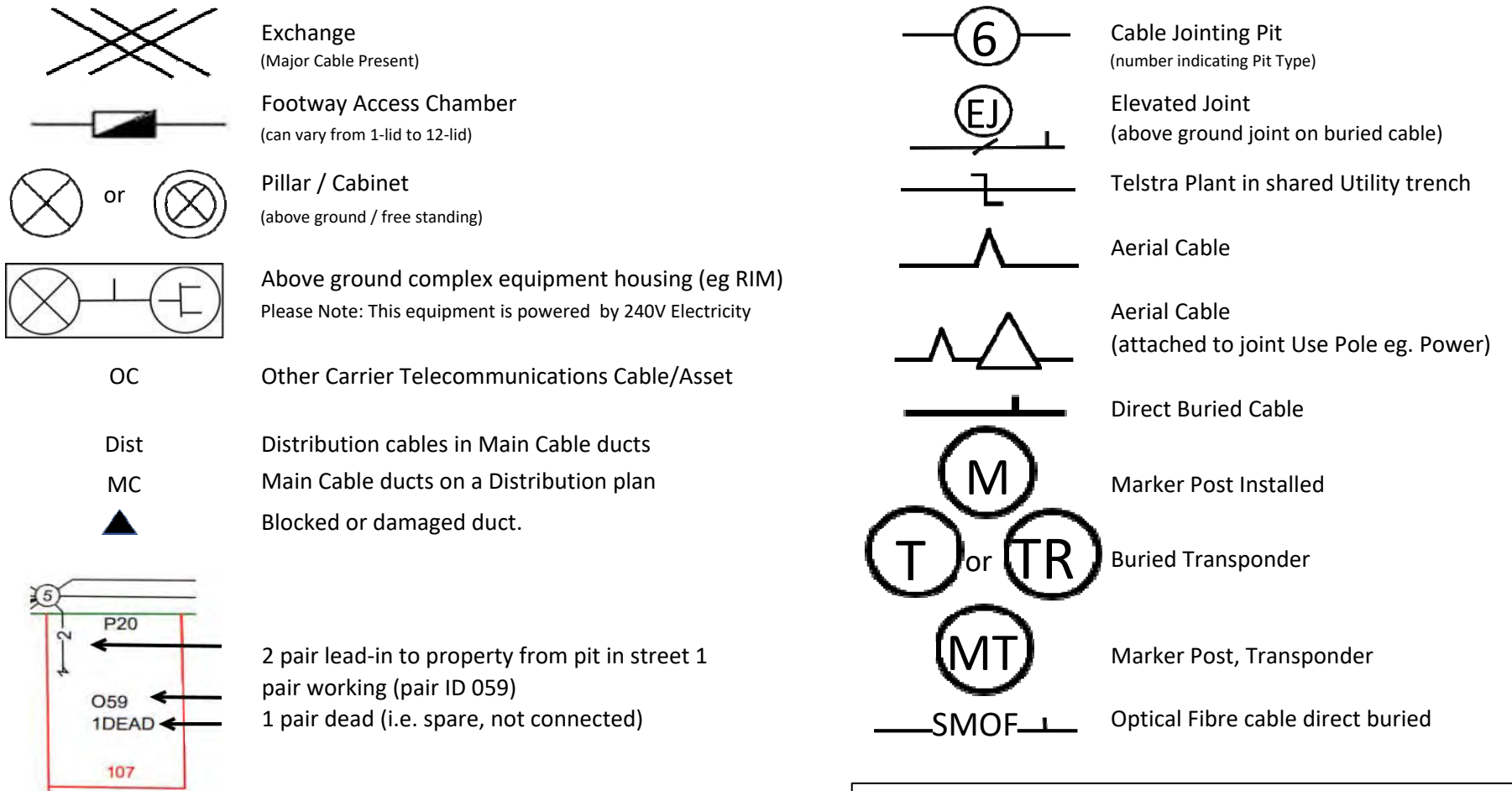


LEGEND

IT'S HOW WE CONNECT



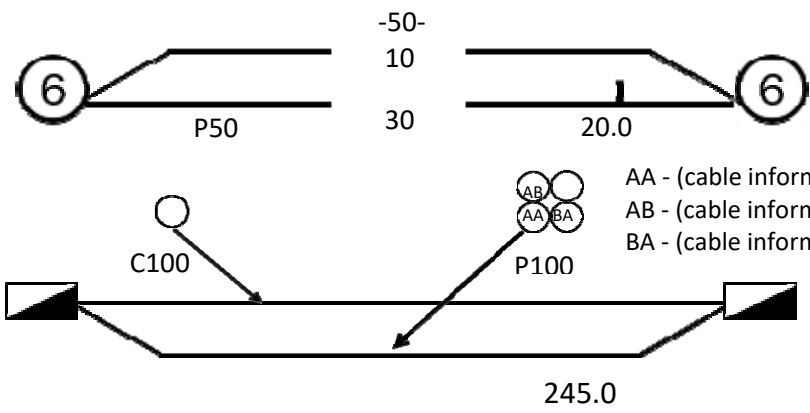
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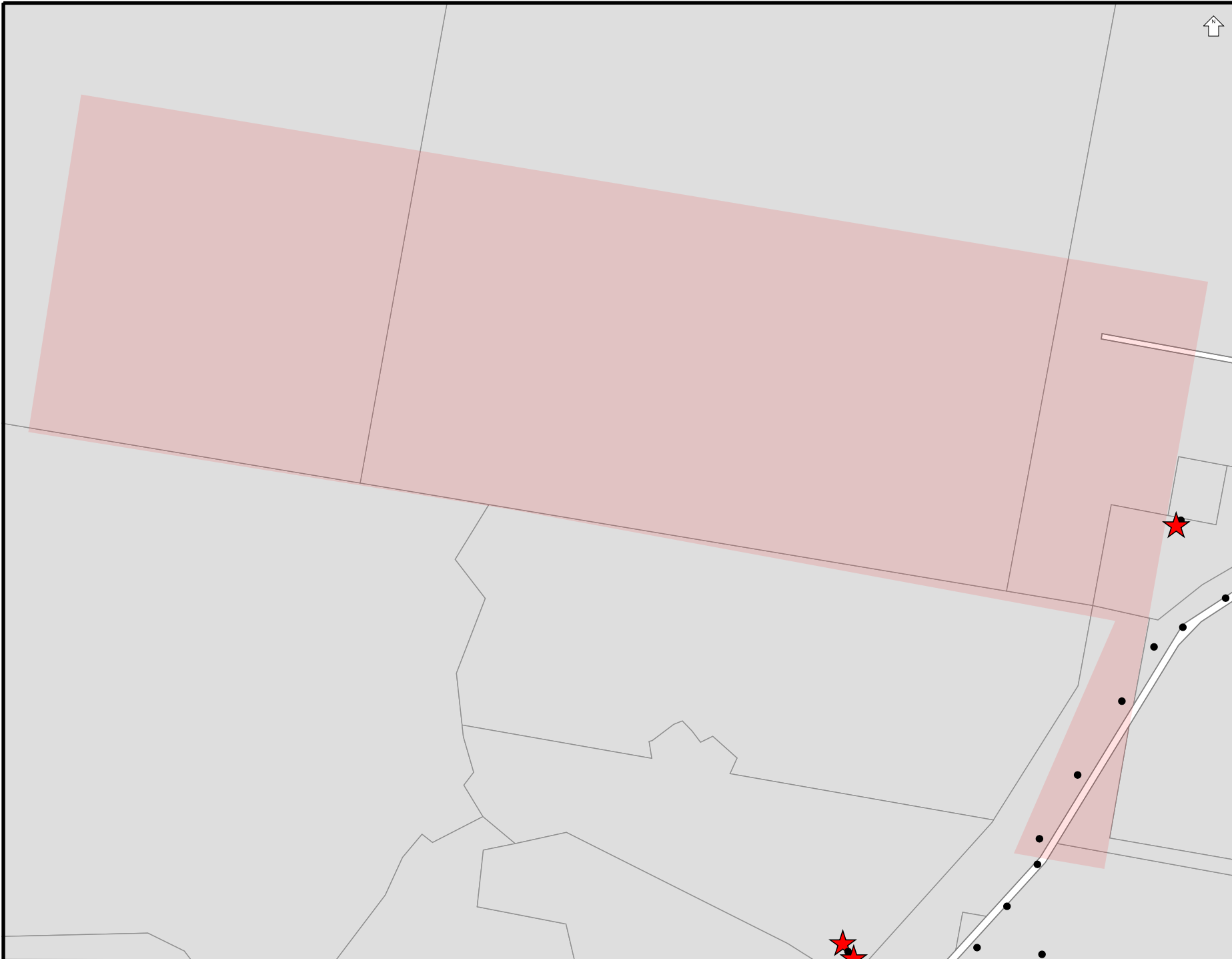
Some Examples of how to read Telstra Plans



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Overhead wires not shown
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LEGEND

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- - - - - HV Underground Cable
- - - - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊠ Cubicle
- Pit
- Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
- Zone Substation
- . - . - Underground Cable
- . - . - Underground Fibre

Proposed Works

- Area of proposed works
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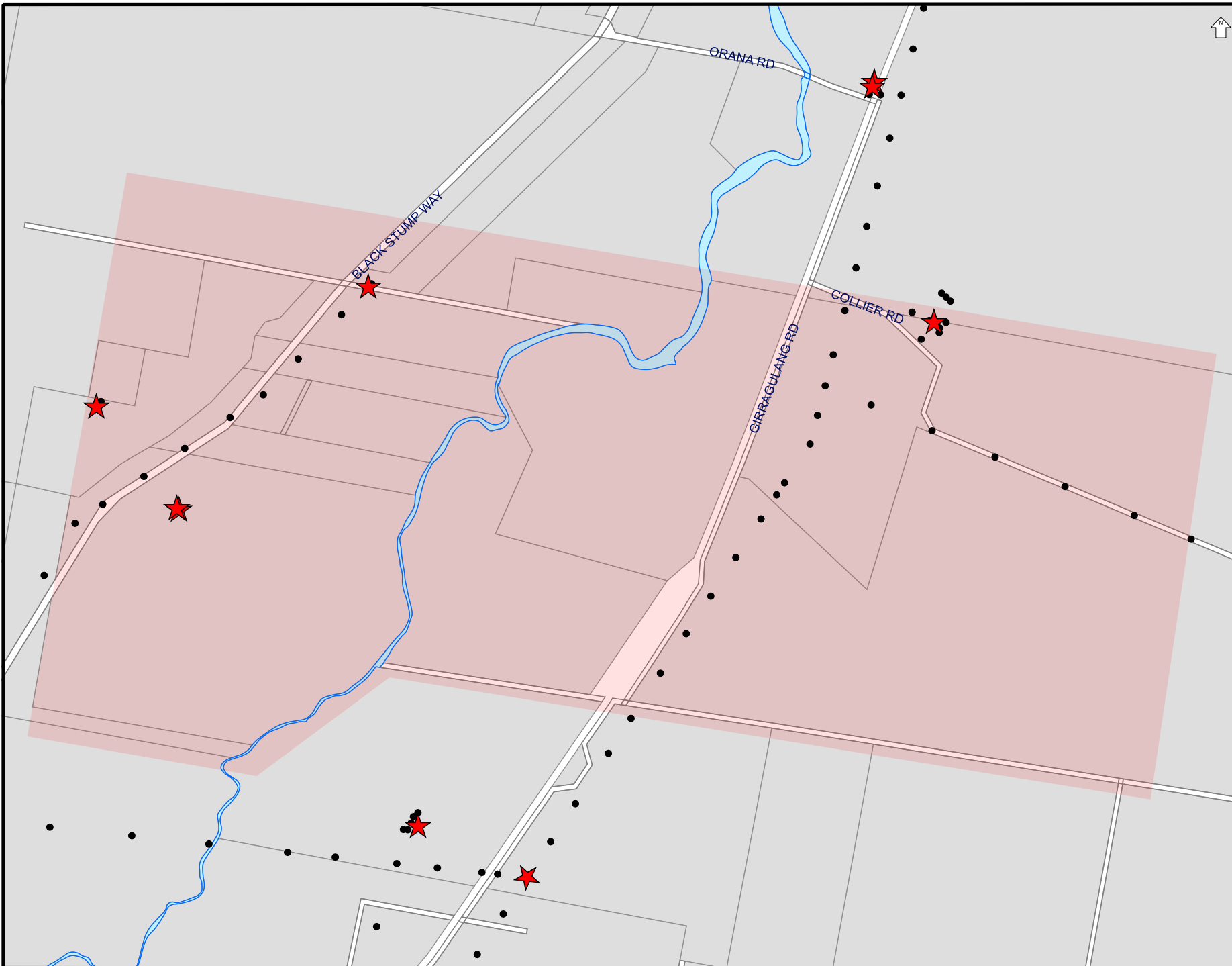
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A4 SCALE: 1:18866





Overhead wires not shown
LOOK UP & LIVE!

LEGEND

- - - LV Underground Cable
- - - HV Underground Cable
- - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- X Cubicle
- Pit
- Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
- Zone Substation
- - - Underground Cable
- - - Underground Fibre

Proposed Works

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A4 SCALE: 1:19754



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Issued Date: 25/08/2021

From: Infrastructure Protection Officer
APA Group

Phone: 1800 103 452

Email: APAProtection@apa.com.au

Company: icubed Consulting

Phone: +61427383307

Email: carterlawsonkelleway@gmail.com

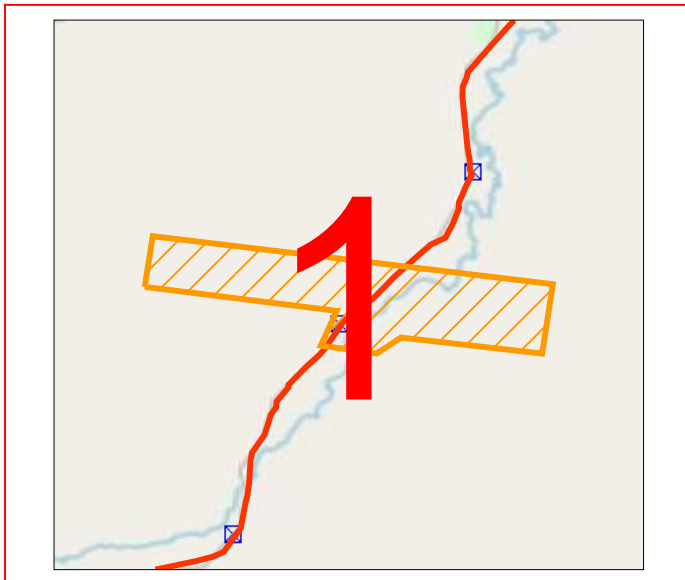
RE: DBYD Seq No: **202206246**

Validity: This response is valid for **30 days** from the **Issued Date**

Utility ID: 70509

Worksite Address: 2463 Black Stump Way
Coolah

Please Check: Have you received **multiple responses** from APA? Refer to statement at top of page.



Scale: 1 : 138000 0 1km

Next Step:



Please contact an APA Infrastructure Protection Officer immediately on **1800 103 452** (business days – 8:00am to 5:00pm AEST) to discuss the exact nature and extent of your works.

DO NOT ATTEMPT TO PHYSICALLY LOCATE THE PIPELINE. Although the route of the pipeline is marked out by warning signs it shall not be inferred that the pipe is buried under and in a straight line between signs. No depths on the pipeline should be assumed. Only an **APA representative** can locate the pipeline and is required to be scheduled for locations. APA also operates natural gas transmission pipelines on behalf of Australian Gas Networks.

Damage to a high-pressure gas transmission pipeline could result in:-

- ❖ possible explosion and fire;
- ❖ possible injury or loss of life;
- ❖ substantial repair and gas restoration liability damage costs;
- ❖ gas escaping at pressures of up to 15,000 kPa; and
- ❖ loss of gas to thousands of customers.

Thank you for your interest in maintaining a safe and secure gas pipeline network.

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Legend

- DBYD Requests
- APA Pipelines
- APA Associated Infrastructure

Scale: 1: 70000

0 0.9km



This response is valid for **30 days** only from the **Issued Date**.

APA DBYD Transmissions Dial Before You Dig Enquiry

ISSUED DATE: 25/08/2021

SEQUENCE NO: 202206246

DATA SOURCE:

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Mapping data is **Quality Level D** as defined by AS5488. This means the information is indicative only, and the actual location may vary significantly from that shown on plans.



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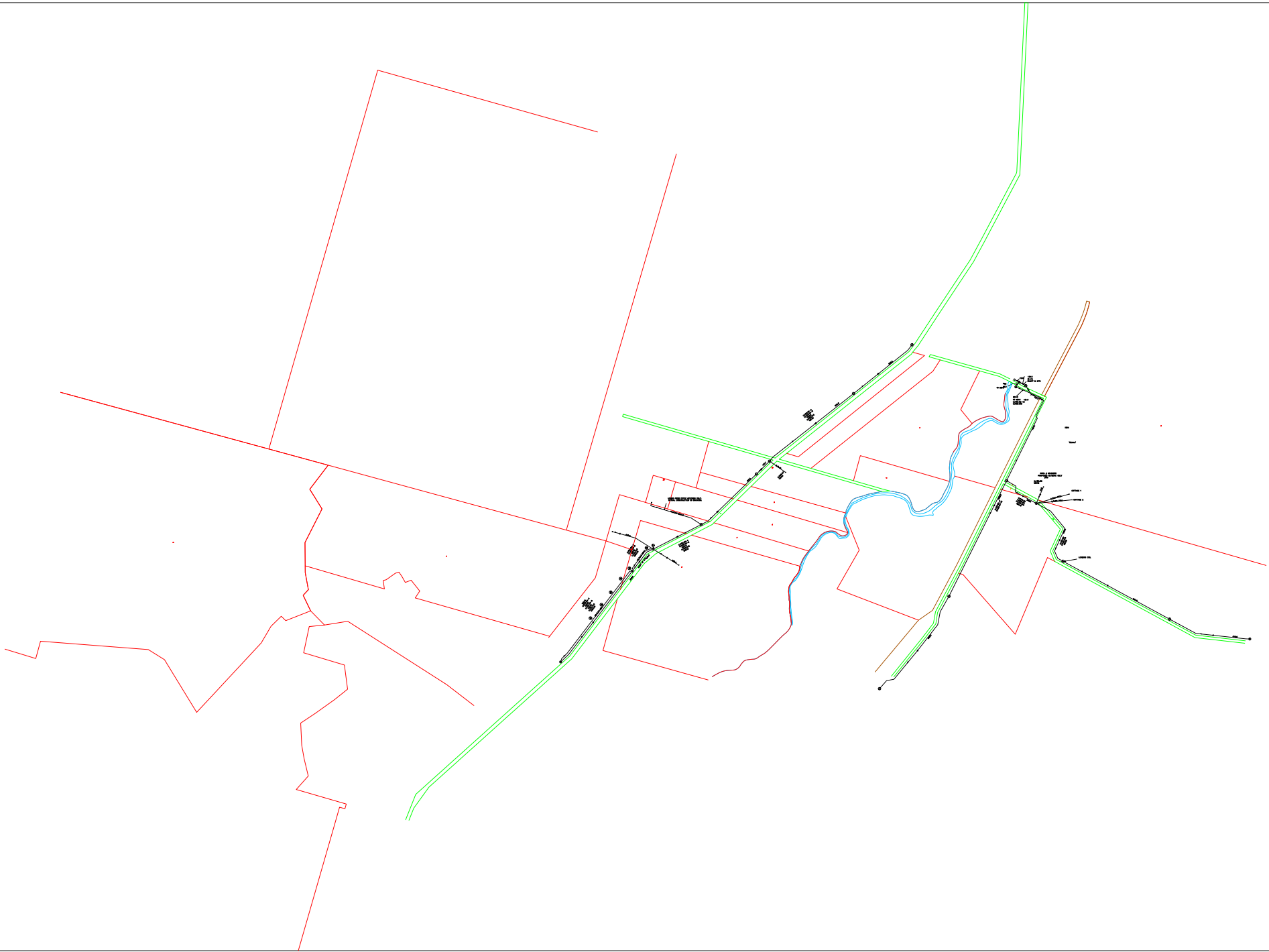
Damage to APA assets could have serious consequences. Do NOT attempt to physically locate the pipeline. If you receive multiple DBYD responses from APA, they will relate to different assets. Read all responses carefully and action all requirements.

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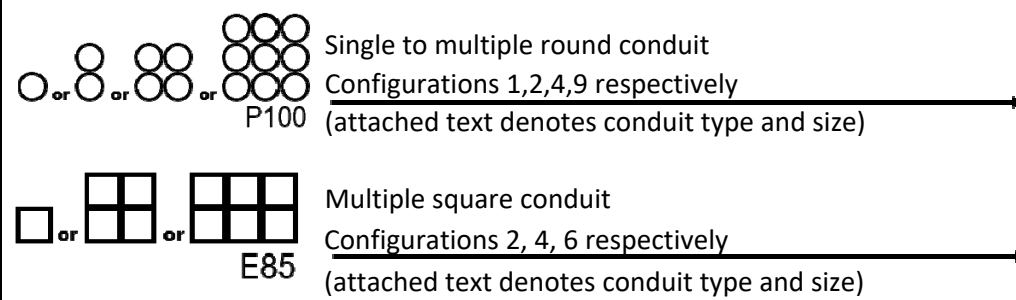
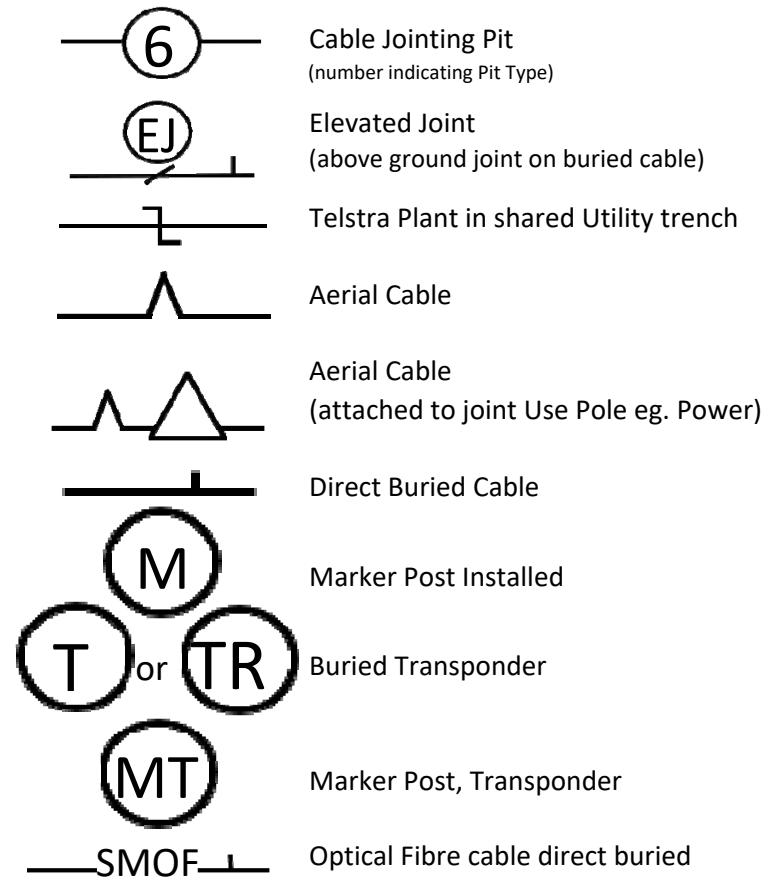
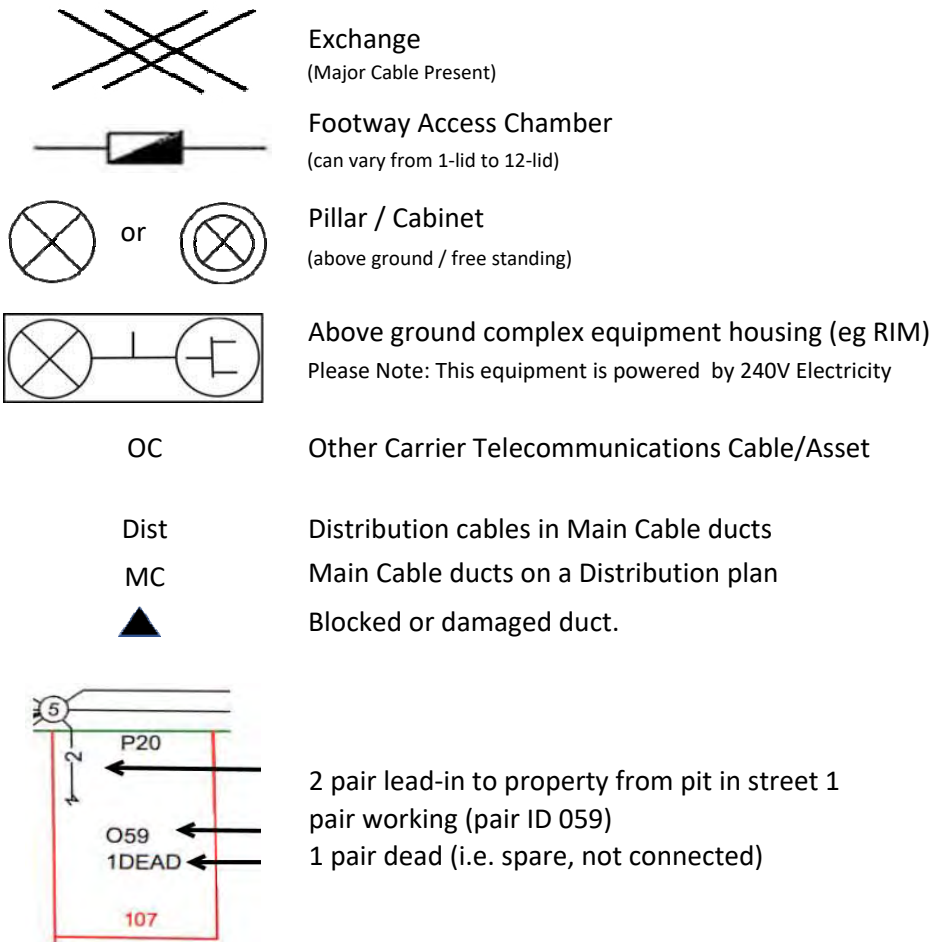
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LEGEND

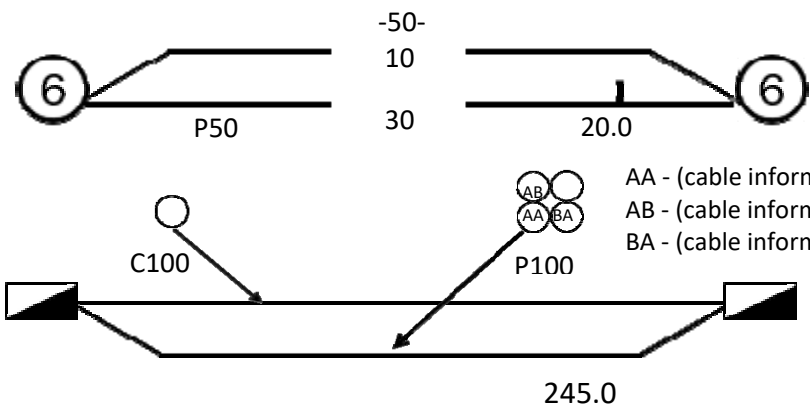
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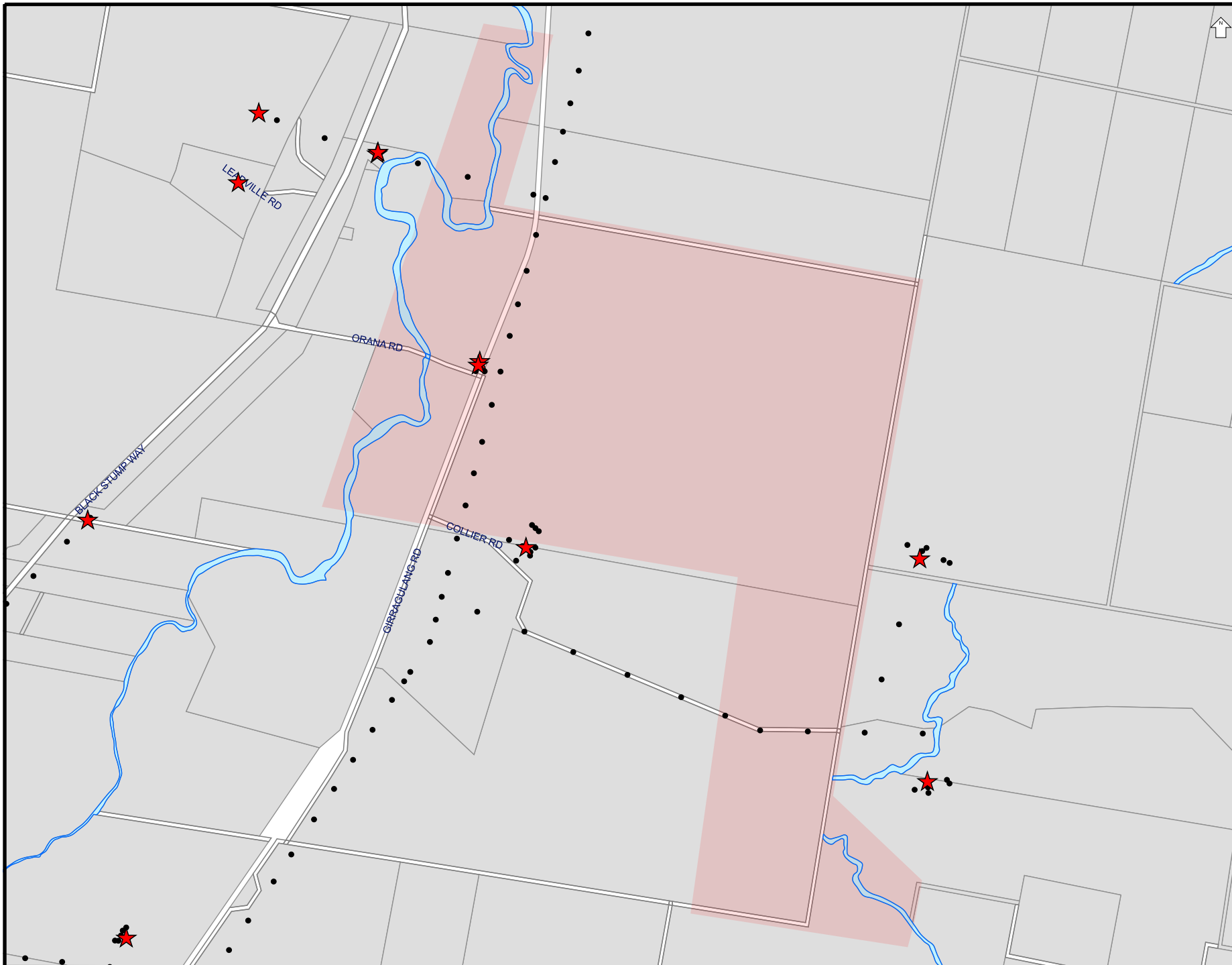
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Overhead wires not shown
LOOK UP & LIVE!

LEGEND

- - - LV Underground Cable
- - - HV Underground Cable
- - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊠ Cubicle
- Pit
- Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
- Zone Substation
- - - Underground Cable
- - - Underground Fibre

Proposed Works

- Area of proposed works
- Proposed assets are shown as orange symbols

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ISSUE DATE: 25/08/2021

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A4 SCALE: 1:25471



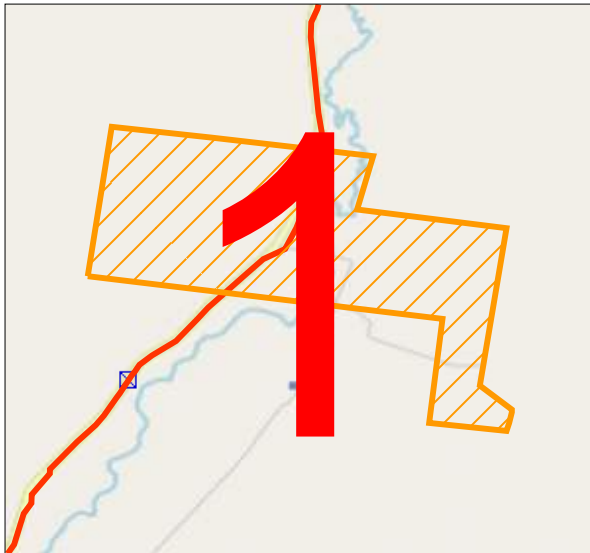
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Issued Date: 25/08/2021

From: Infrastructure Protection Officer
APA Group



Scale: 1 : 92000 0 1km

Phone: 1800 103 452

Email: APAProtection@apa.com.au

Company: icubed Consulting

Phone: +61427383307

Email: carterlawsonkelleway@gmail.com

RE: DBYD Seq No: **202206651**

Validity: This response is valid for **30 days** from the **Issued Date**

Utility ID: 70509

Worksite Address: 2788 Black Stump Way
Coolah

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Next Step:



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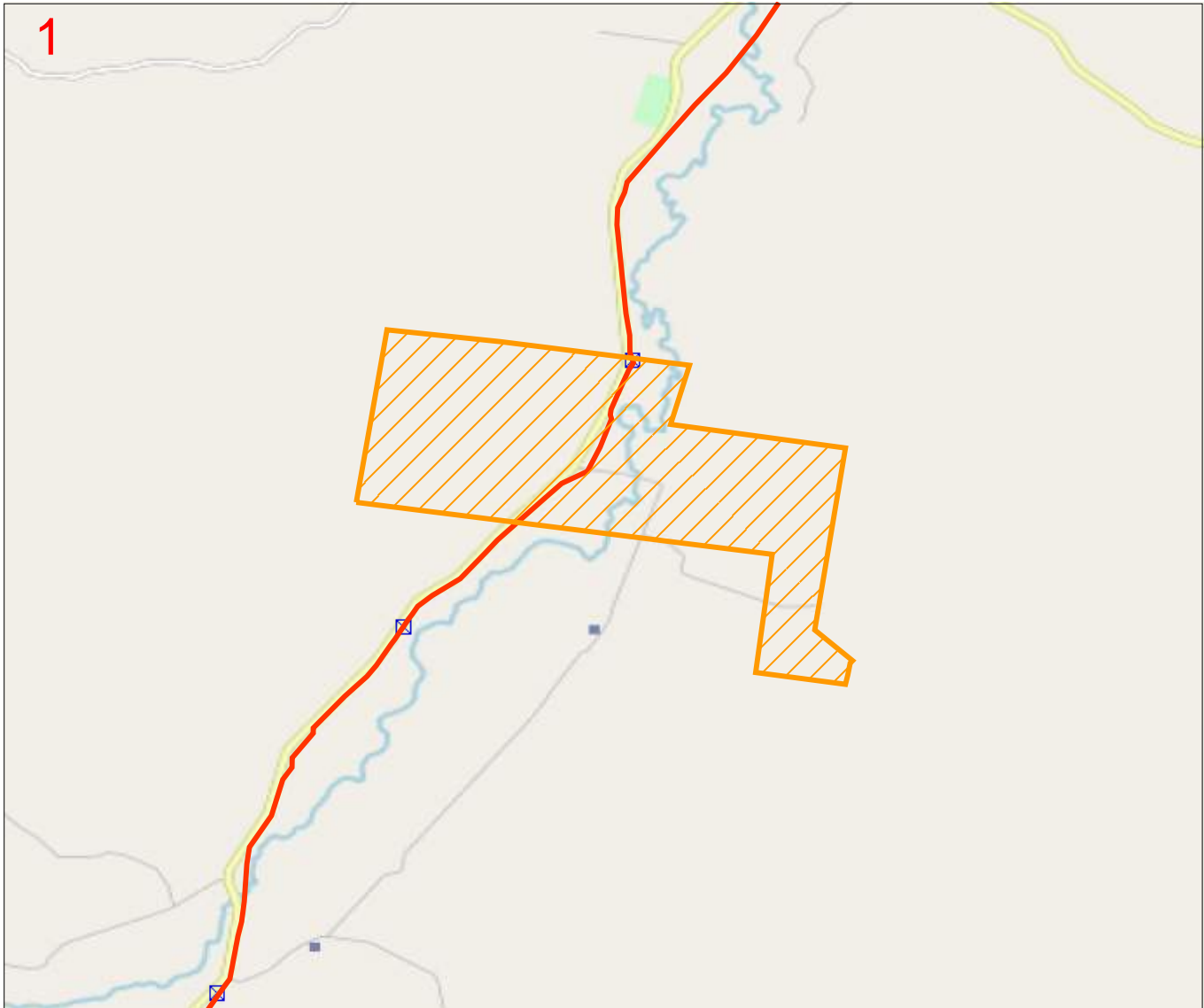
Damage to a high-pressure gas transmission pipeline could result in:-

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- ❖ possible injury or loss of life;
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- ❖ gas escaping at pressures of up to 15,000 kPa; and
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Legend

- DBYD Requests
- APA Pipelines
- APA Associated Infrastructure

Scale: 1: 70000

0 0.9km



This response is valid for **30 days** only from the **Issued Date**.

APA DBYD Transmissions Dial Before You Dig Enquiry

ISSUED DATE: 25/08/2021

SEQUENCE NO: 202206651

DATA SOURCE:

Pipeline Data Copyright APA Group, Property Parcels Copyright respective State Governments, mapping data Copyright [OpenStreetMap](#) contributors, DBYD Dig Location provided by DBYD.

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DO NOT PROCEED until you have contacted APA on **1800 103 452** (business days – 8:00am to 5:00pm AEST) to discuss the exact nature and extent of your works.

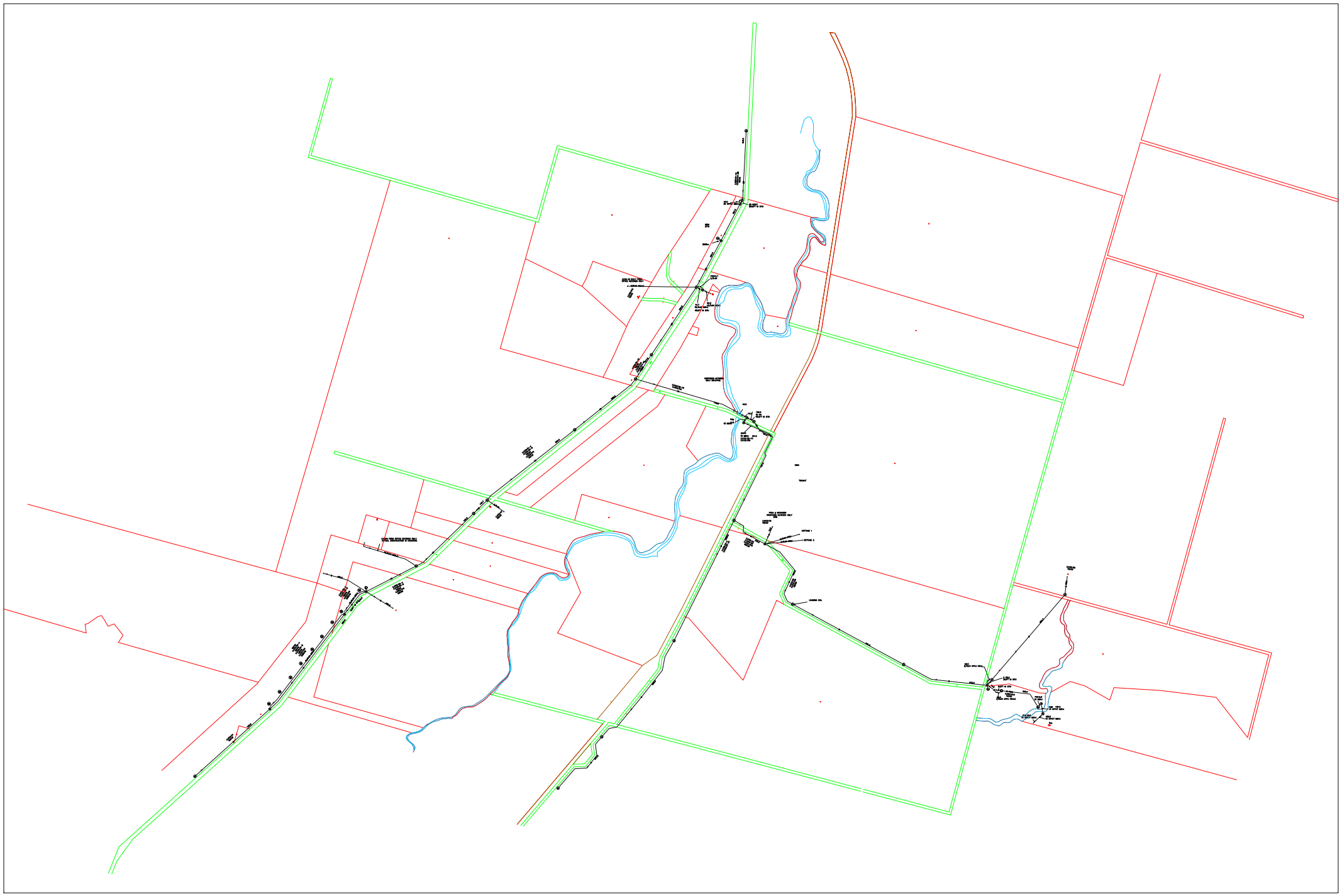
Damage to APA assets could have serious consequences. Do NOT attempt to physically locate the pipeline. If you receive multiple DBYD responses from APA, they will relate to different assets. Read all responses carefully and action all requirements.

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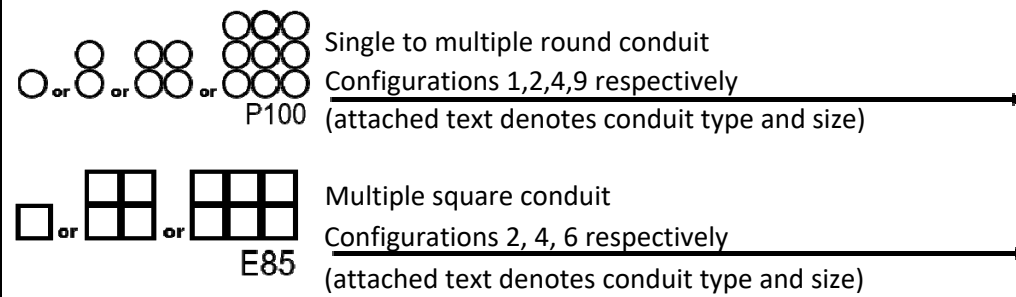
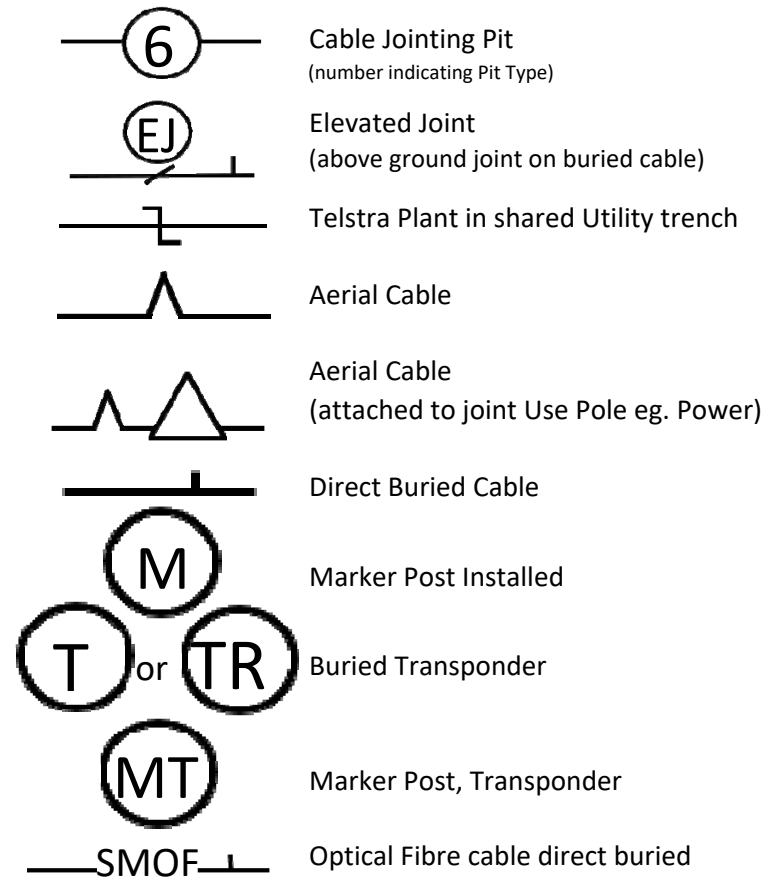
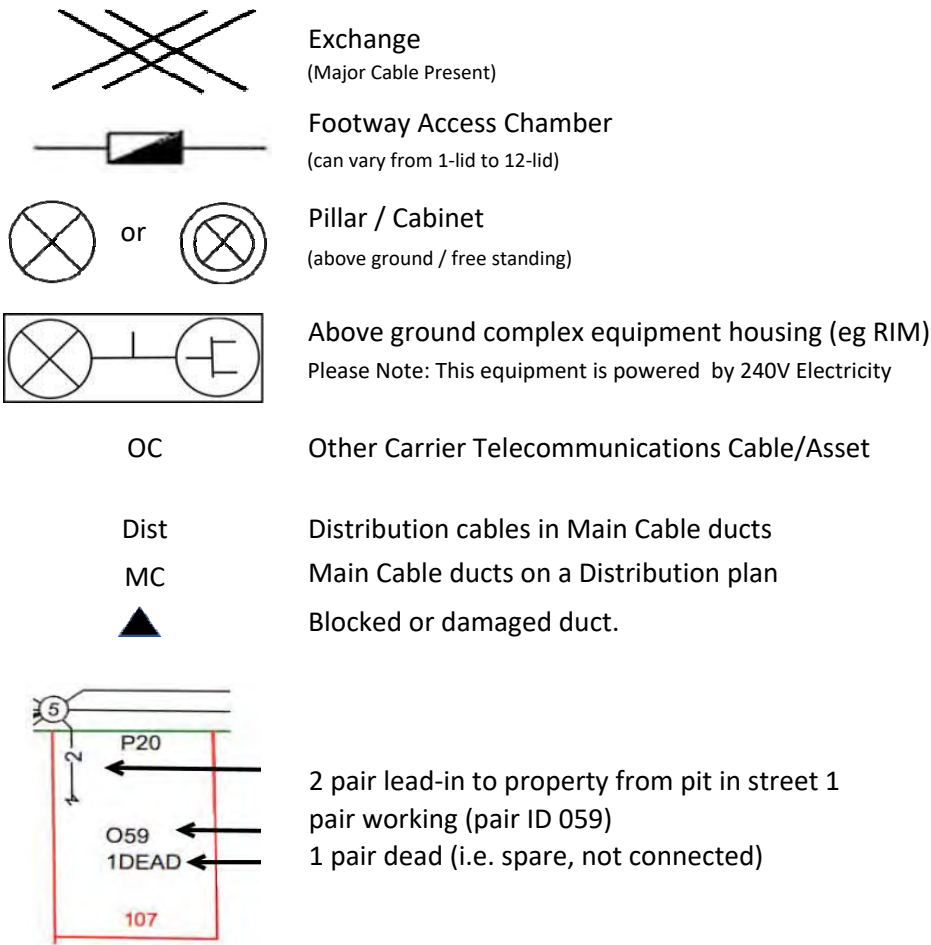
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LEGEND

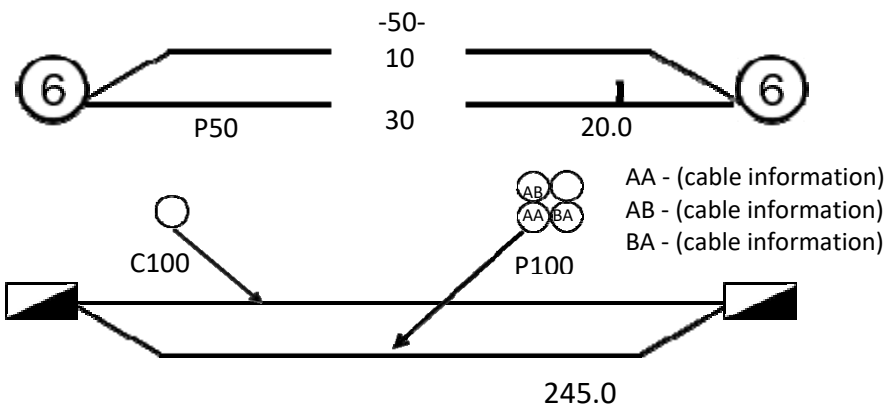
For more info contact a Certified Locating Organisation or Telstra Plan Services 1800 653 935



Some examples of conduit type and size:

A - Asbestos cement, P - PVC / Plastic, C - Concrete, GI - Galanised iron, E - Earthenware
Conduit sizes *nominally* range from 20mm to 100mm
P50 50mm PVC conduit
P100 100mm PVC conduit
A100 100mm asbestos cement conduit

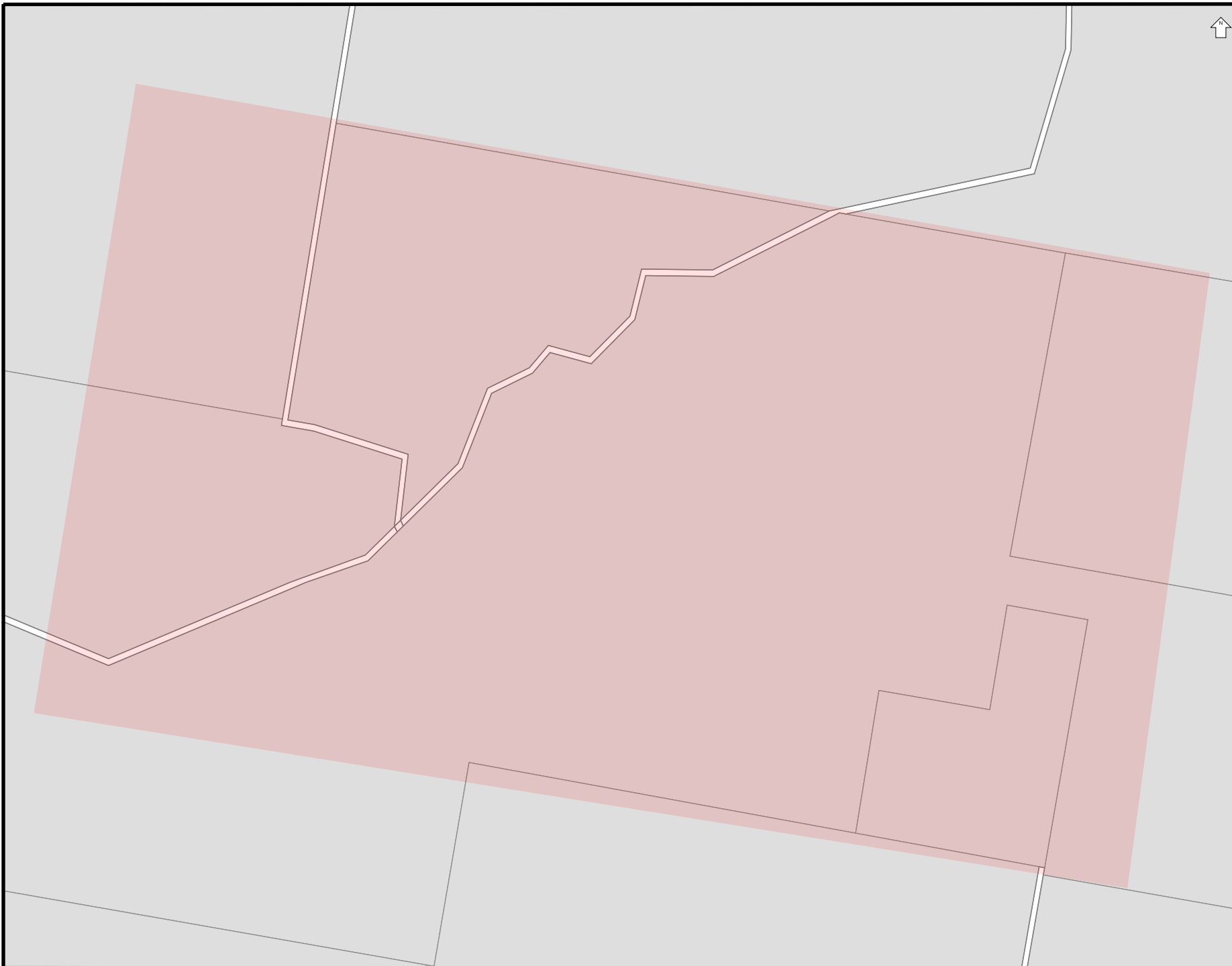
Some Examples of how to read Telstra Plans



One 50mm PVC conduit (P50) containing a 50-pair and a 10-pair cable between two 6-pits. approximately 20.0m apart, with a direct buried 30-pair cable along the same route










Two separate conduit runs between two footway access chambers (manholes) approximately 245m apart A nest of four 100mm PVC conduits (P100) containing assorted cables in three ducts (one being empty) and one empty 100mm concrete duct (C100) along

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Overhead wires not shown
LOOK UP & LIVE!


LEGEND

-  LV Underground Cable
-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works

Proposed assets are shown as orange symbols

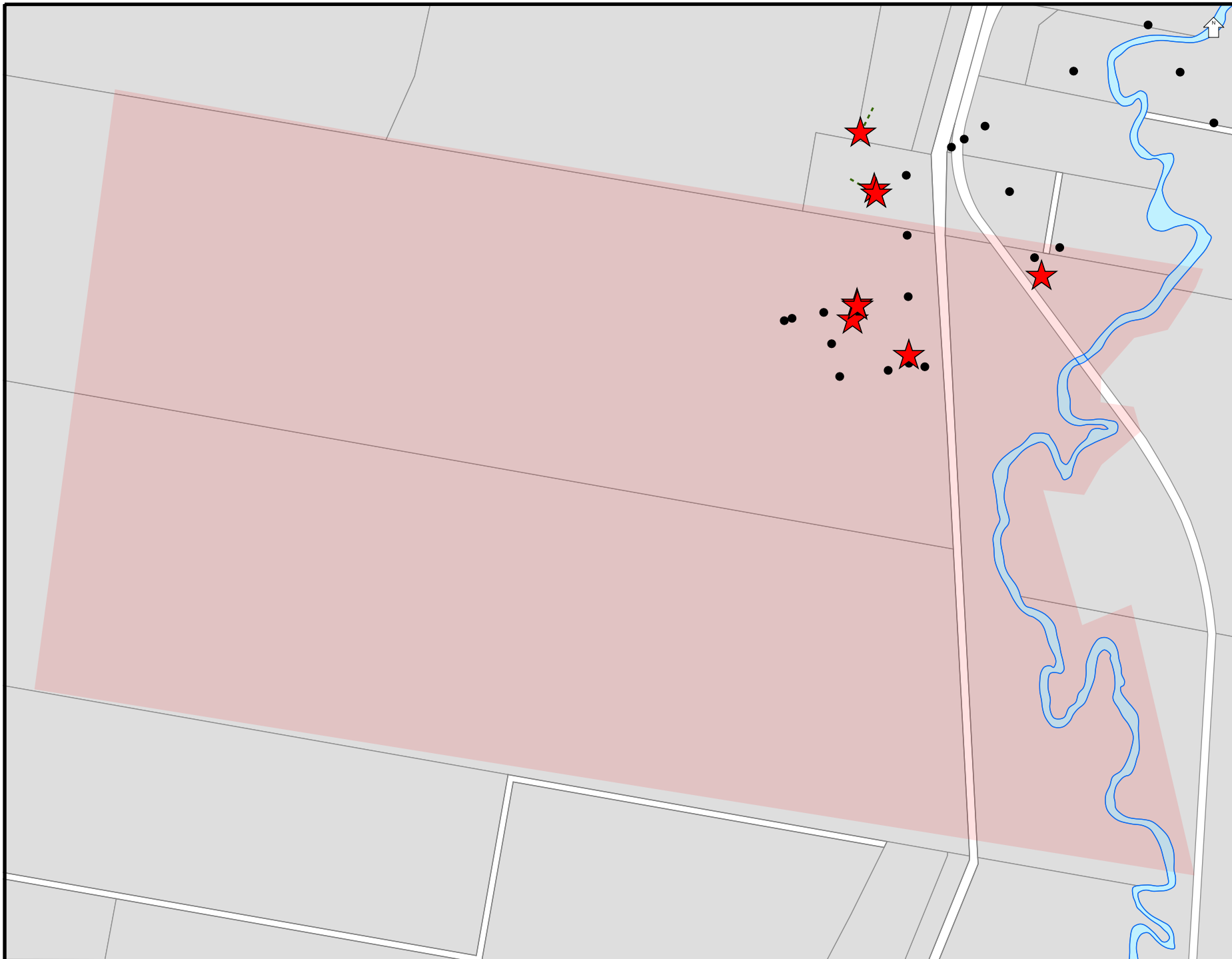
THE INFORMATION ON THIS MAP MAY NOT BE ACCURATE.
If details are incorrect, please notify
Essential Energy on 13 23 91
(or fax 1800 354 636)

ISSUE DATE: 25/08/2021

You must resubmit your request if you have not started work within 4 weeks of the 'Issue Date' above

A4 SCALE: 1:15711





Overhead wires not shown
LOOK UP & LIVE!

LEGEND

- - - - LV Underground Cable
- - - - HV Underground Cable
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- ★ Underground Earth or Wires
- ▲ Ground Substation
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A4 SCALE: 1:15986



Please Note: For some DBYD enquiries, you **might** receive **multiple responses** from APA Group (APA). Please read all responses carefully as they will relate to different assets. It is your responsibility to action all requirements set out in APA's DBYD responses.



For your immediate information **THERE IS AN APA HIGH-PRESSURE GAS TRANSMISSION PIPELINE AND/OR ASSOCIATED INFRASTRUCTURE** in the area of your proposed works. This is **NOT an approval** to carry out work within the **APA pipeline easement**. Please **DO NOT** proceed until the next steps below are completed.

Issued Date: 25/08/2021

From: Infrastructure Protection Officer
APA Group

Phone: 1800 103 452

Email: APAProtection@apa.com.au

Company: icubed Consulting

Phone: +61427383307

Email: carterlawsonkelleway@gmail.com

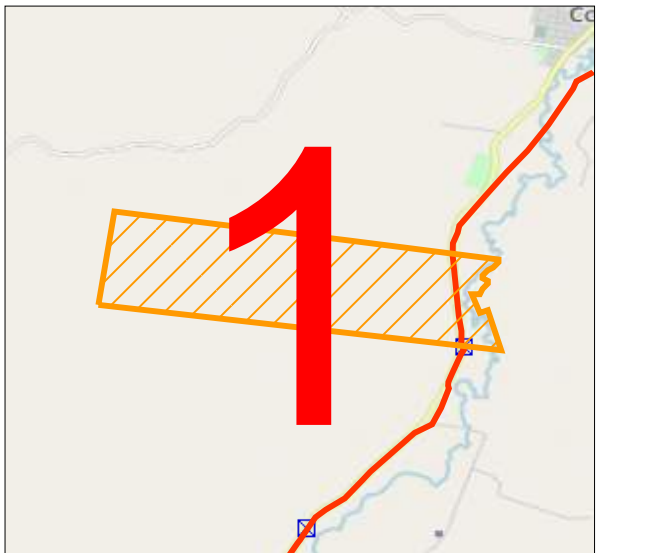
RE: DBYD Seq No: **202206810**

Validity: This response is valid for **30 days** from the **Issued Date**

Utility ID: 70509

Worksite Address: 3045 Black Stump Way
Coolah

Please Check: Have you received **multiple responses** from APA? Refer to statement at top of page.



Scale: 1 : 115000 0 1km

Next Step:



Please contact an APA Infrastructure Protection Officer immediately on **1800 103 452** (business days – 8:00am to 5:00pm AEST) to discuss the exact nature and extent of your works.

DO NOT ATTEMPT TO PHYSICALLY LOCATE THE PIPELINE. Although the route of the pipeline is marked out by warning signs it shall not be inferred that the pipe is buried under and in a straight line between signs. No depths on the pipeline should be assumed. Only an **APA representative** can locate the pipeline and is required to be scheduled for locations. APA also operates natural gas transmission pipelines on behalf of Australian Gas Networks.

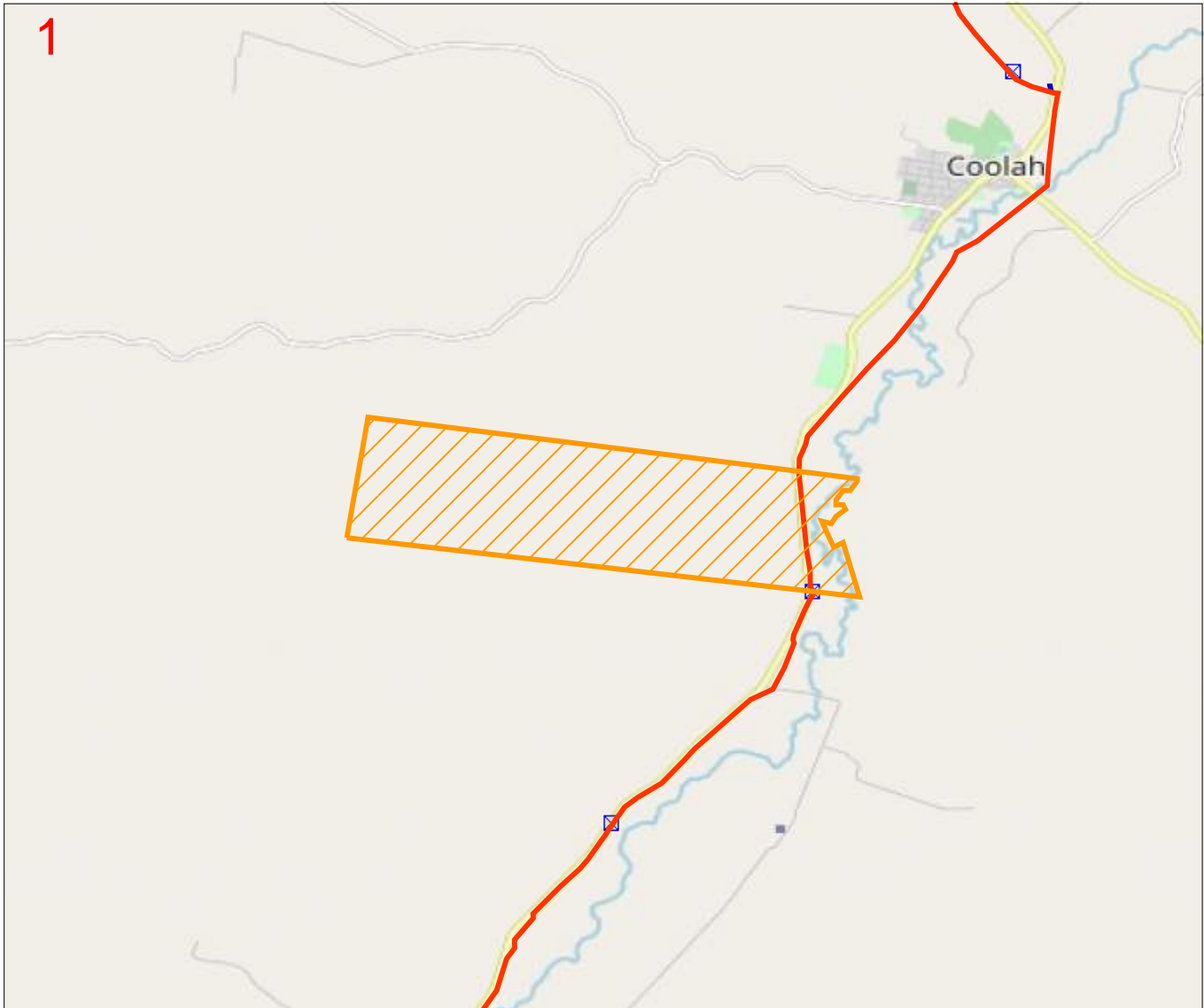
Damage to a high-pressure gas transmission pipeline could result in:-

- ❖ possible explosion and fire;
- ❖ possible injury or loss of life;
- ❖ substantial repair and gas restoration liability damage costs;
- ❖ gas escaping at pressures of up to 15,000 kPa; and
- ❖ loss of gas to thousands of customers.




Thank you for your interest in maintaining a safe and secure gas pipeline network.

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Legend

-  DBYD Requests
-  APA Pipelines
-  APA Associated Infrastructure

Scale: 1: 80000

0 1km



This response is valid for **30 days** only from the **Issued Date**.

**APA DBYD Transmissions
Dial Before You Dig Enquiry**

ISSUED DATE: 25/08/2021

SEQUENCE NO: 202206810

DATA SOURCE:

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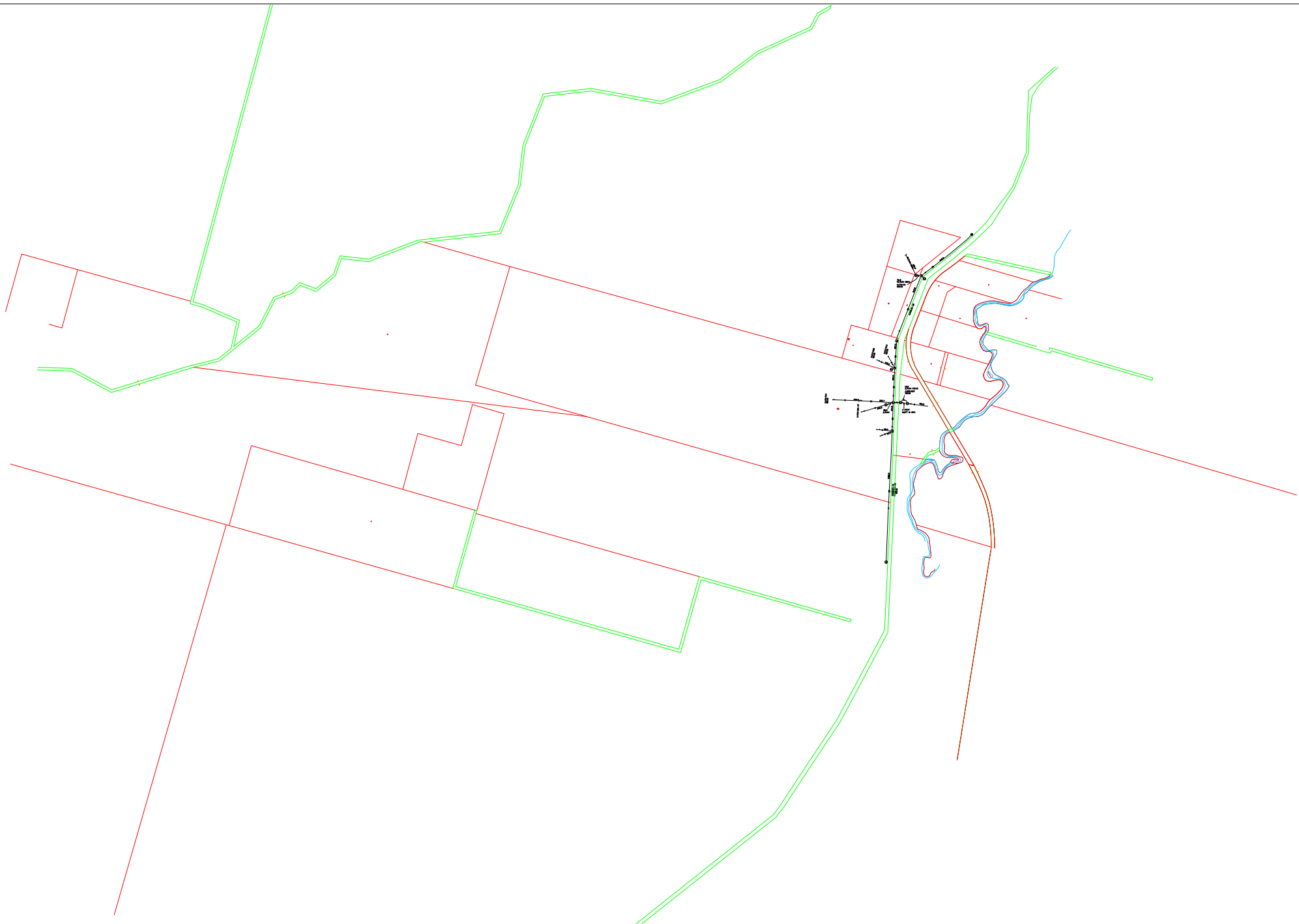
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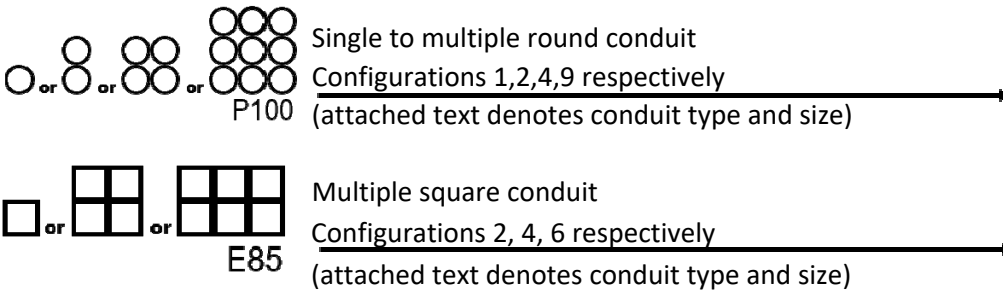
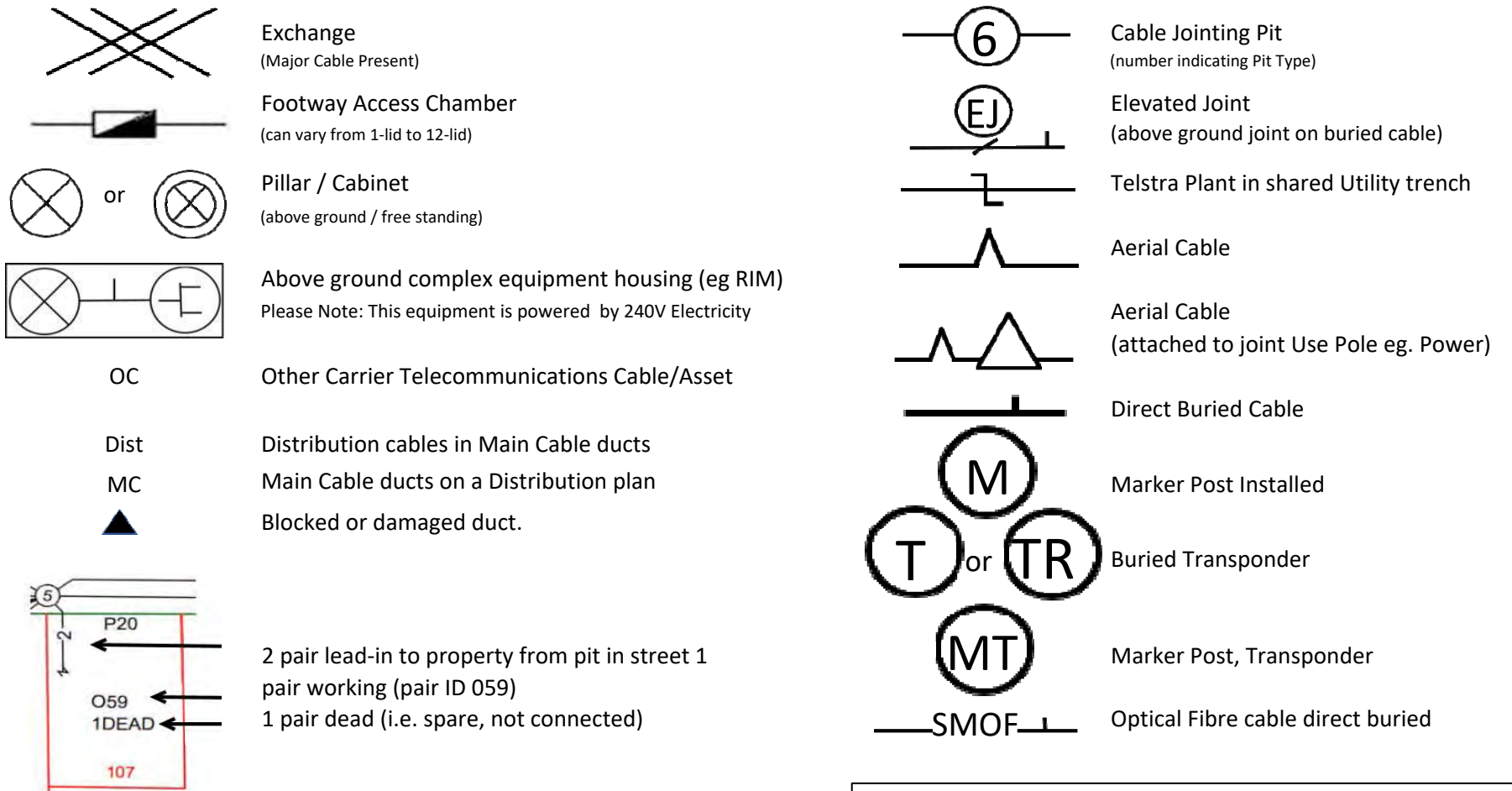


LEGEND

IT'S HOW WE CONNECT



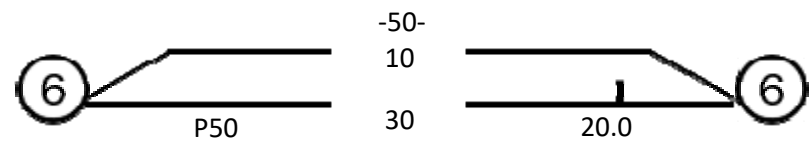
For more info contact a Certified Locating Organisation or Telstra Plan Services 1800 653 935



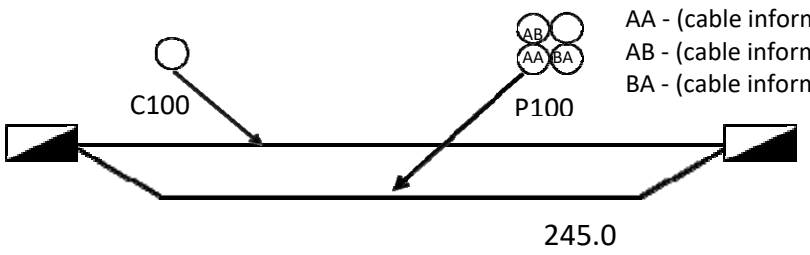
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Some Examples of how to read Telstra Plans

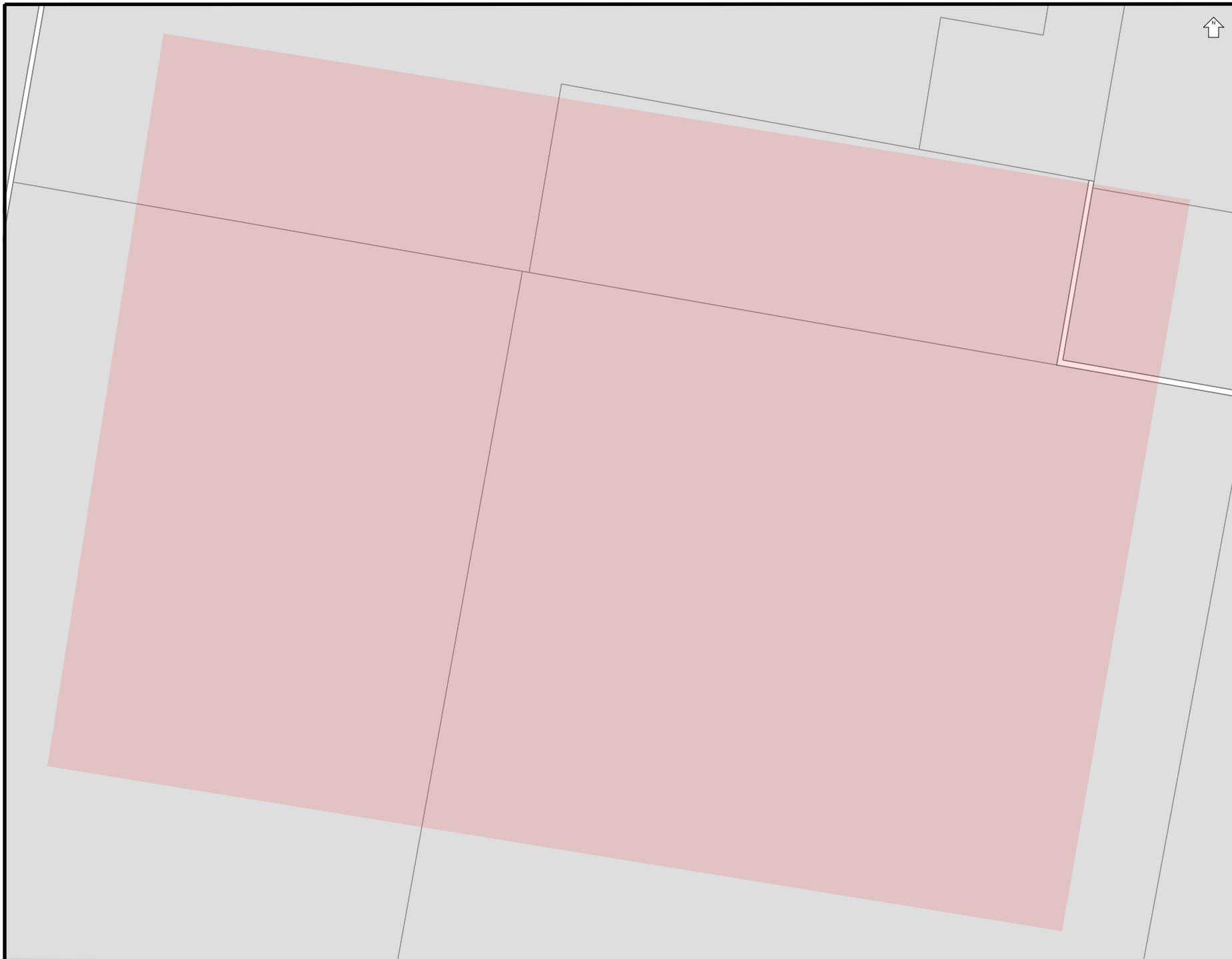


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Overhead wires not shown
LOOK UP & LIVE!

LEGEND


-  LV Underground Cable
-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

Contact Essential Energy
on 13 23 91

-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works

Proposed assets are shown as orange symbols

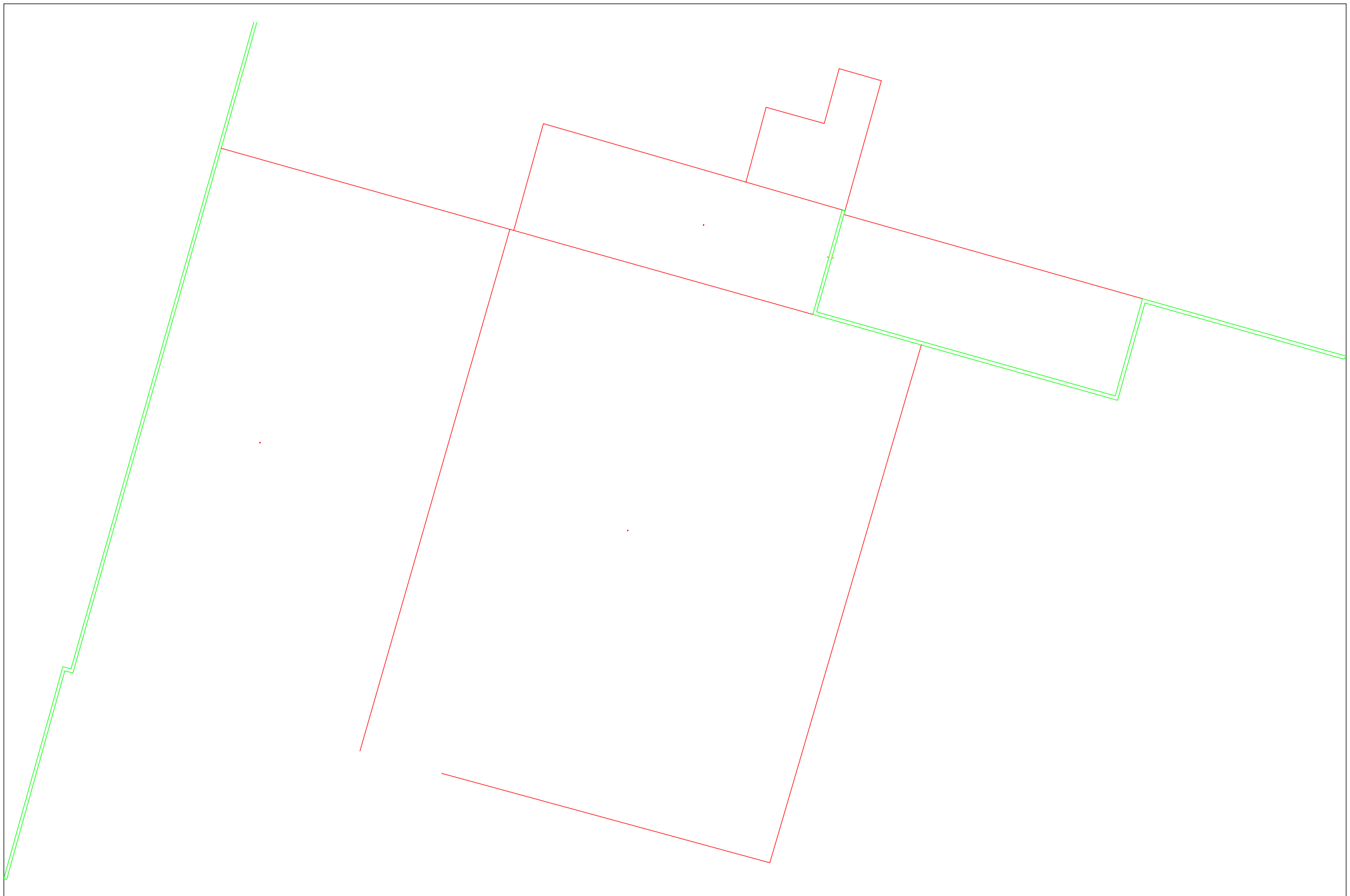
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ISSUE DATE: 25/08/2021

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A4 SCALE: 1:16863



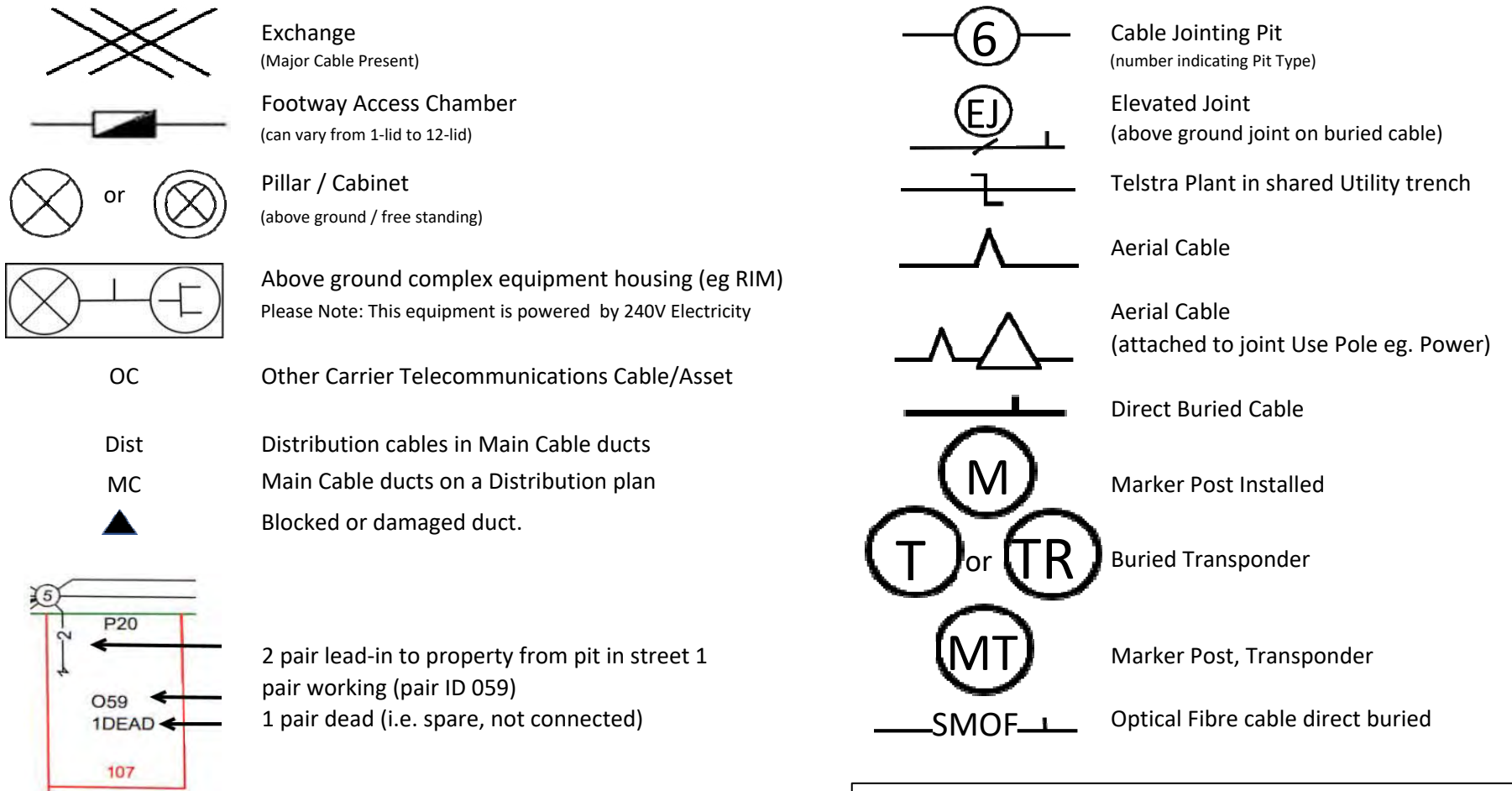


LEGEND

IT'S HOW WE CONNECT



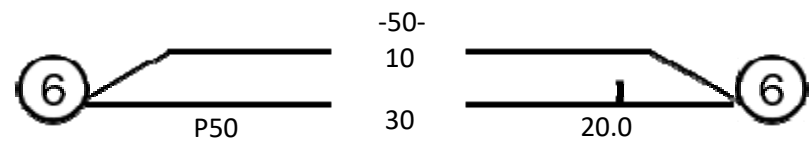
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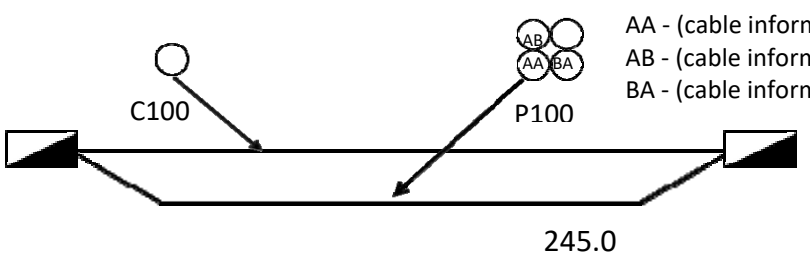
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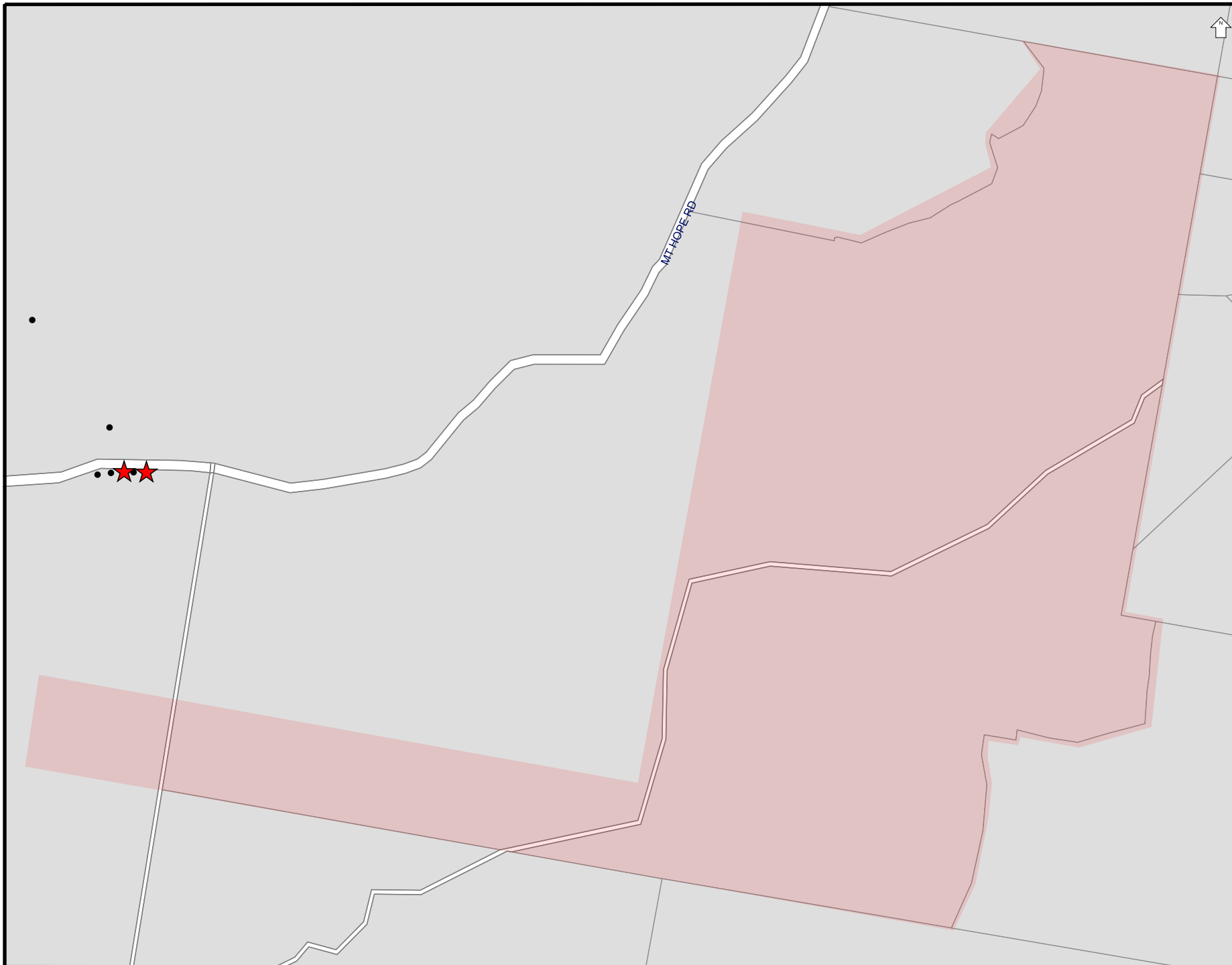


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Overhead wires not shown
LOOK UP & LIVE!

LEGEND

- - - LV Underground Cable
- - - HV Underground Cable
- - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊗ Cubicle
- Pit
- Area of Interest

Critical Assets

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on 13 23 91

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- . - . - Underground Cable
- . . - . Underground Fibre

Proposed Works

- Area of proposed works

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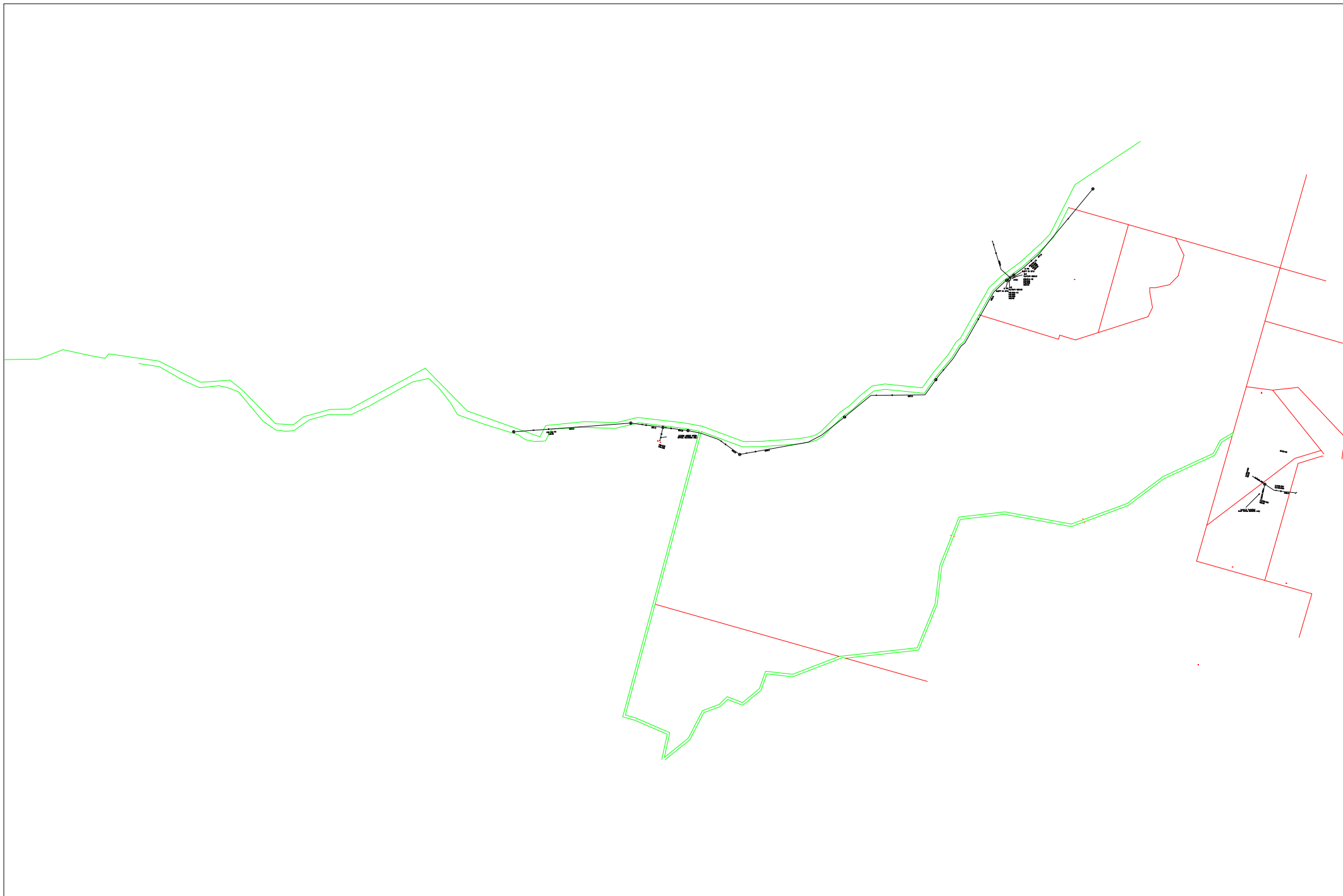
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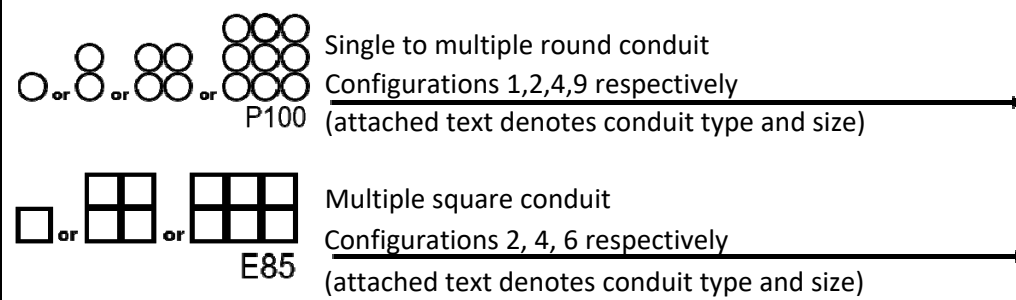
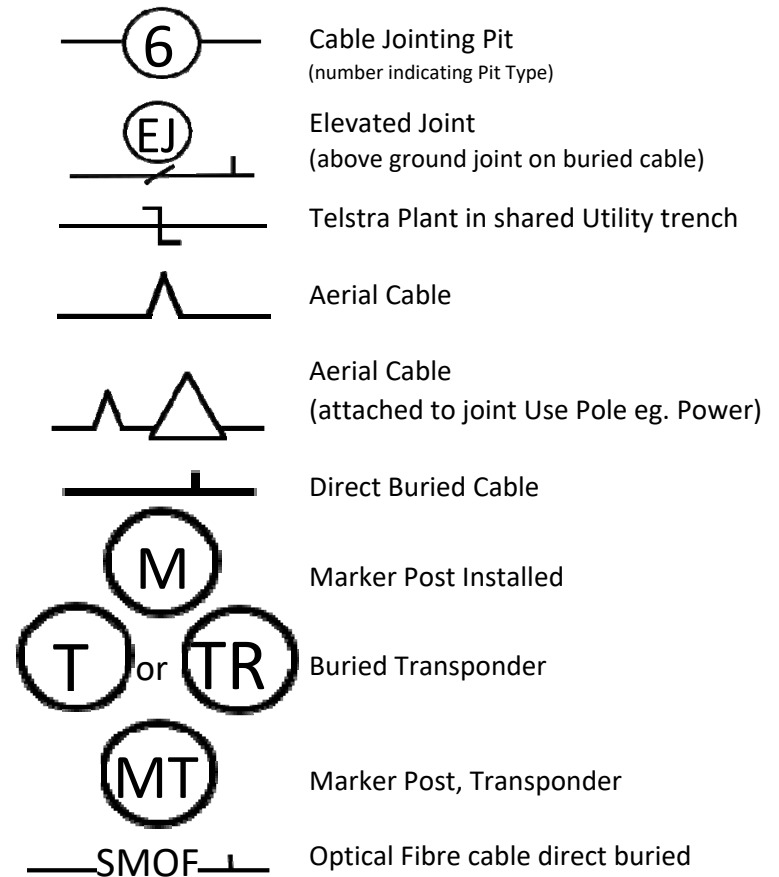
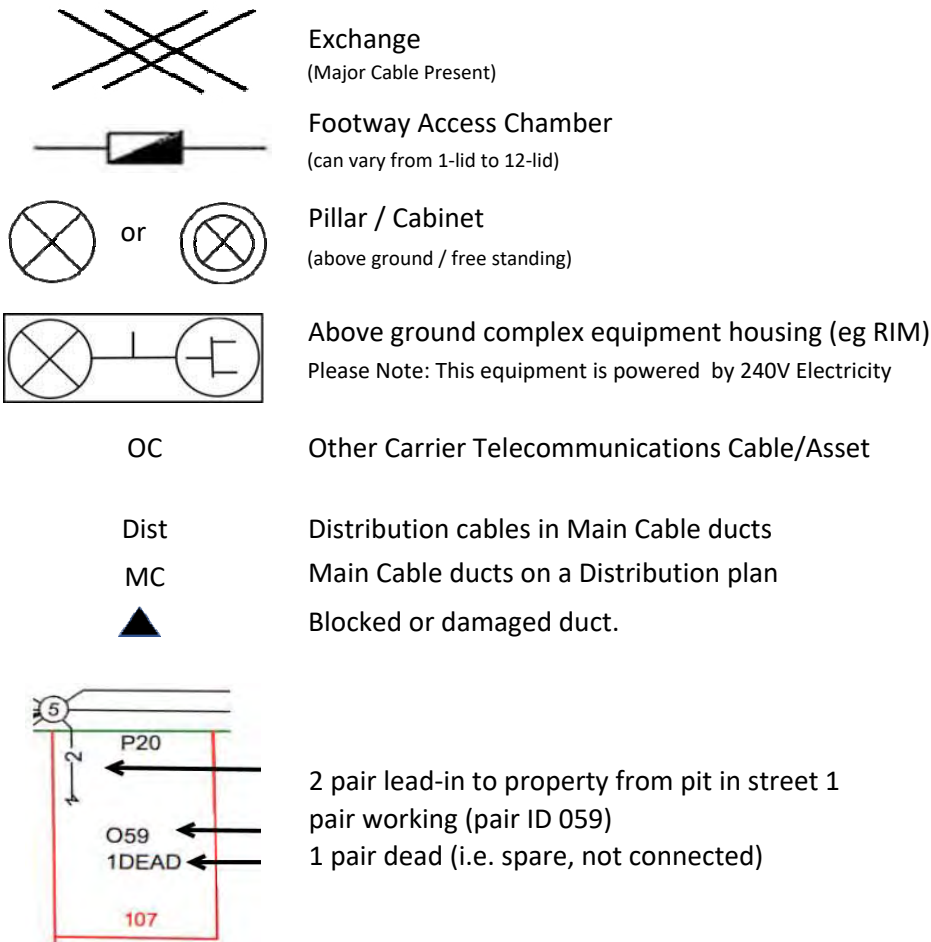
A4 SCALE: 1:22898





LEGEND

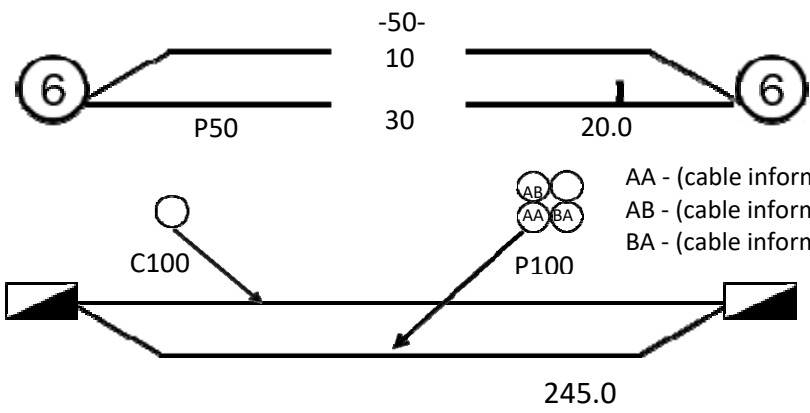
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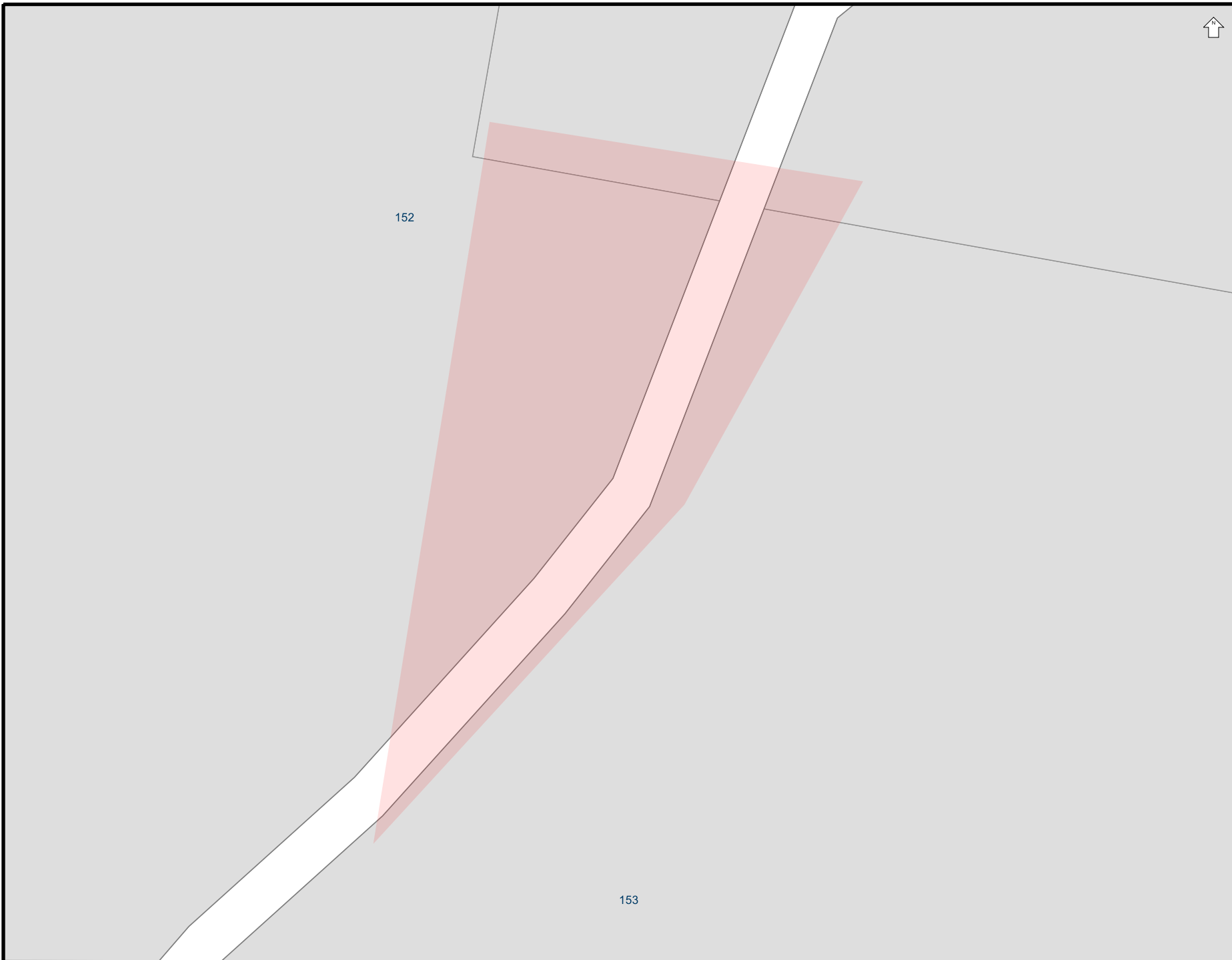
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


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




Overhead wires not shown
LOOK UP & LIVE!


LEGEND

-  LV Underground Cable
-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
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Proposed Works

-  Area of proposed works
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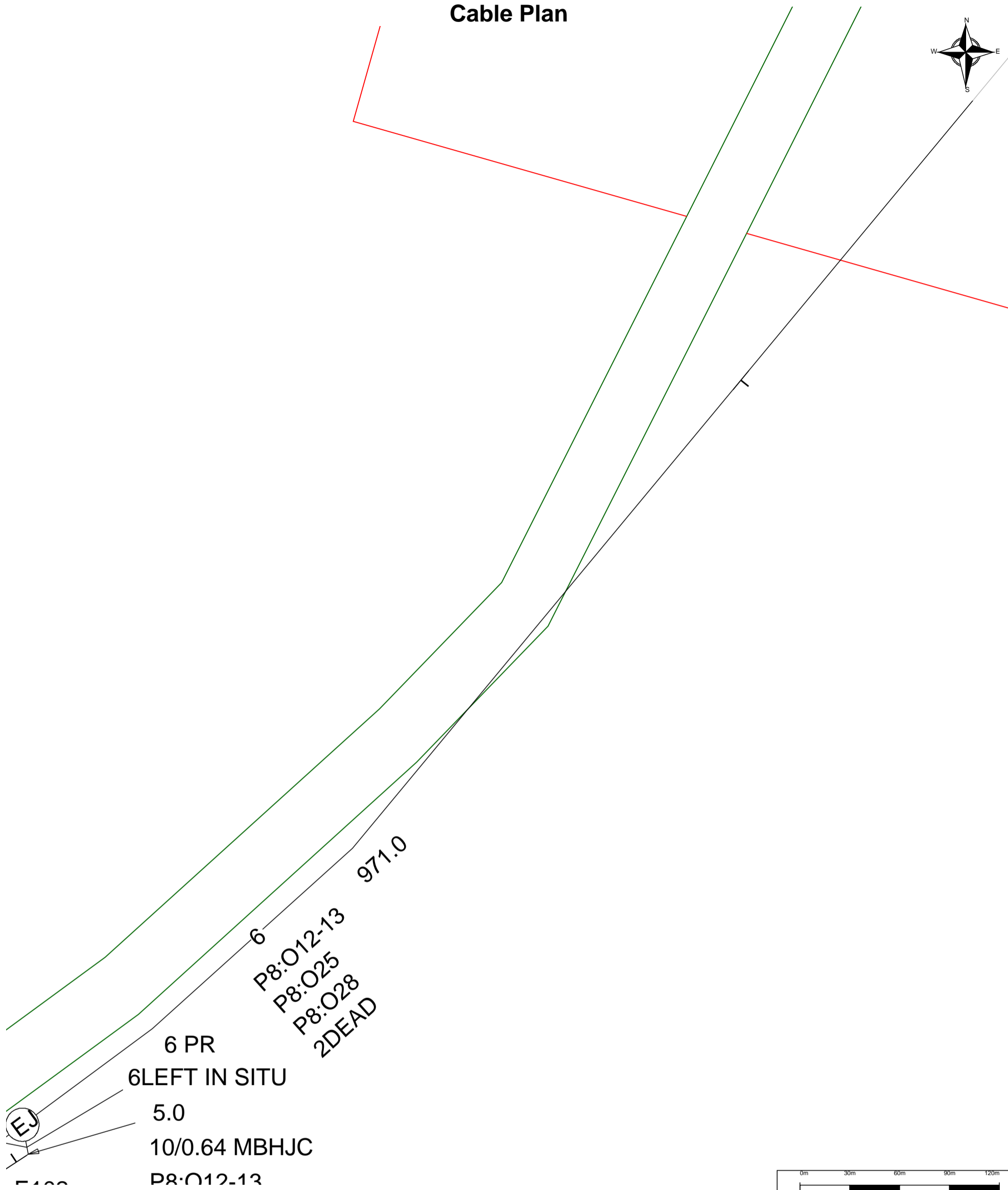
ISSUE DATE: 25/08/2021

You must resubmit your request if you have not started work within 4 weeks of the 'Issue Date' above

A4 SCALE: 1:4271



Cable Plan



For all Telstra DBYD plan enquiries -
 email - Telstra.Plans@team.telstra.com
 For urgent onsite contact only - ph 1800 653 935 (bus hrs)

Sequence Number: 202207448

Please read Duty of Care prior to any excavating

TELSTRA CORPORATION LIMITED A.C.N. 051 775 556

Generated On 25/08/2021 18:41:54

WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

It is your responsibility to locate Telstra's underground plant by careful hand pot-holing prior to any excavation in the vicinity and to exercise due care during that excavation.

Please read and understand the information supplied in the duty of care statement attached with the Telstra plans. TELSTRA WILL SEEK COMPENSATION FOR LOSS CAUSED BY DAMAGE TO ITS PLANT.

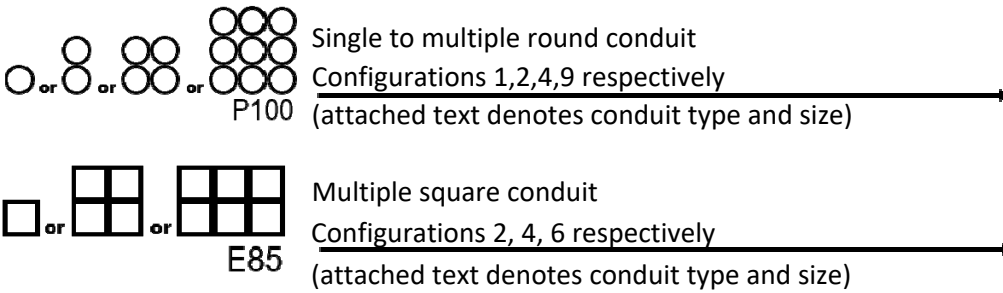
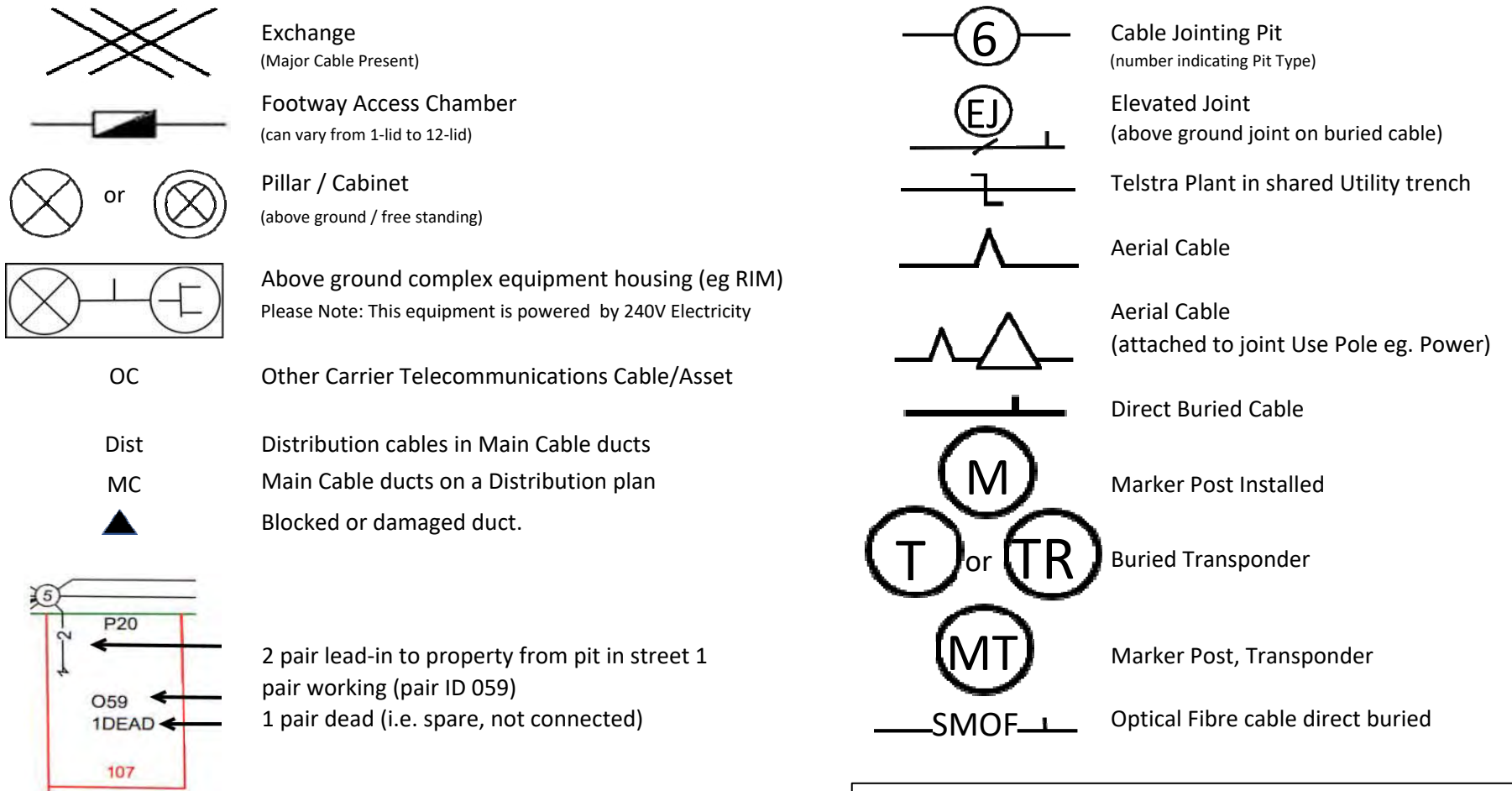
Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.

LEGEND

IT'S HOW WE CONNECT



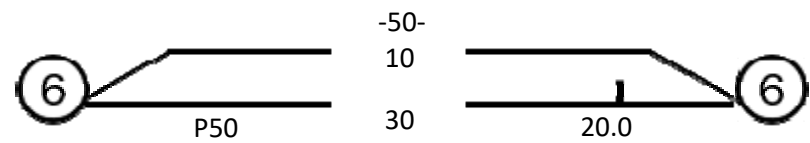
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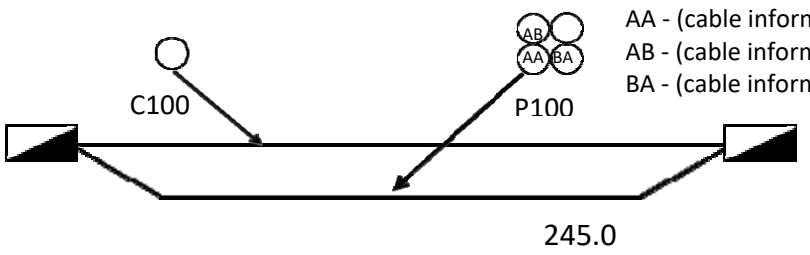
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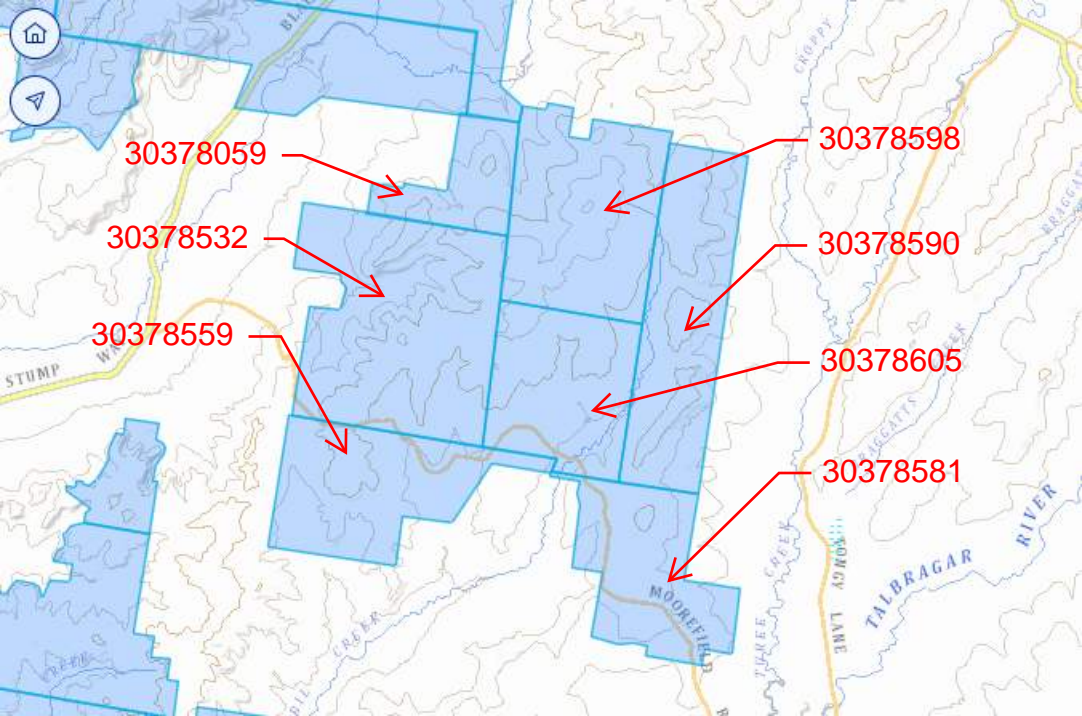


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30378059

30378598

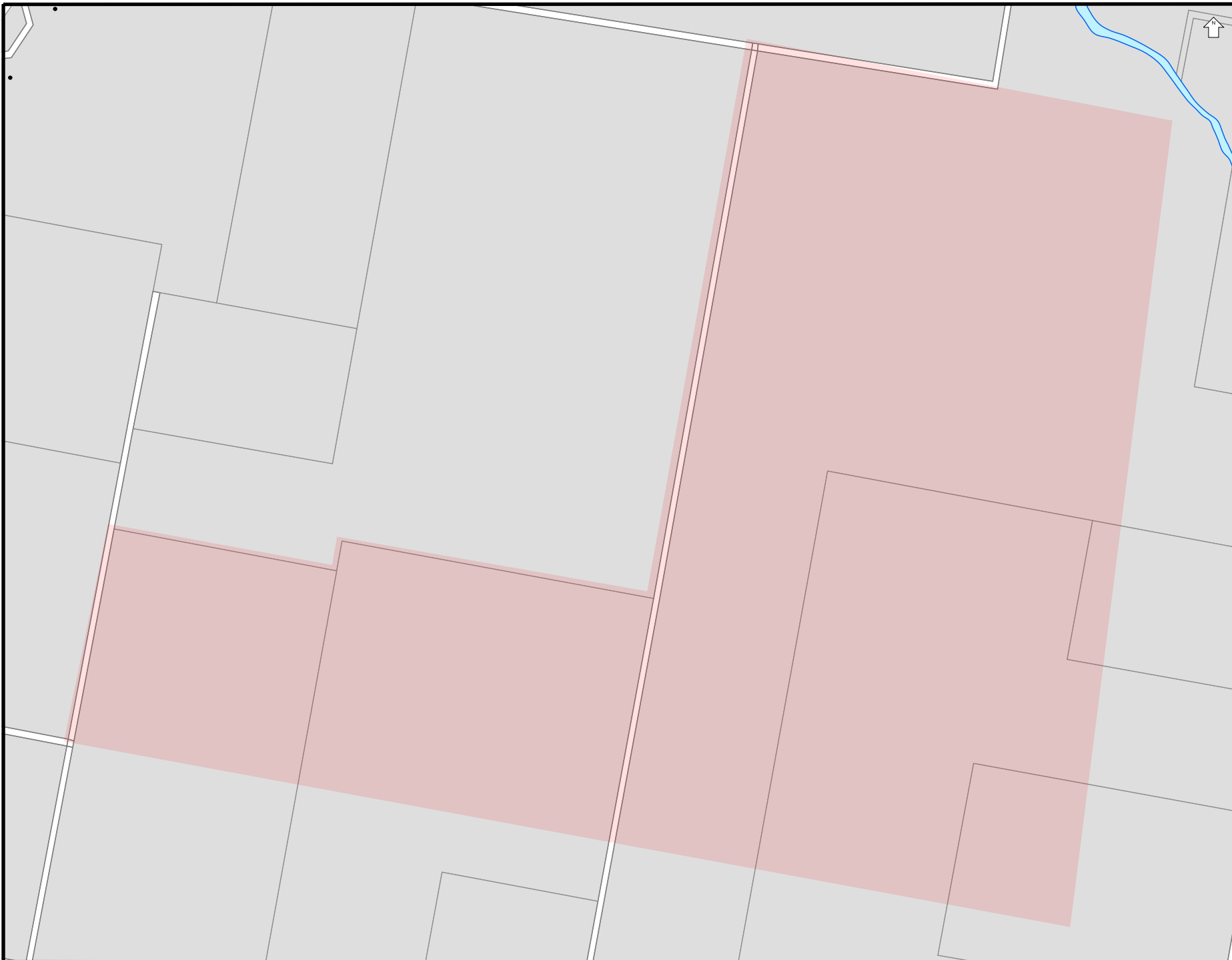
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

30378605

30378581






Overhead wires not shown
LOOK UP & LIVE!


LEGEND

-  LV Underground Cable
-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works
- Proposed assets are shown as orange symbols

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ISSUE DATE: 25/08/2021

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A4 SCALE: 1:14380



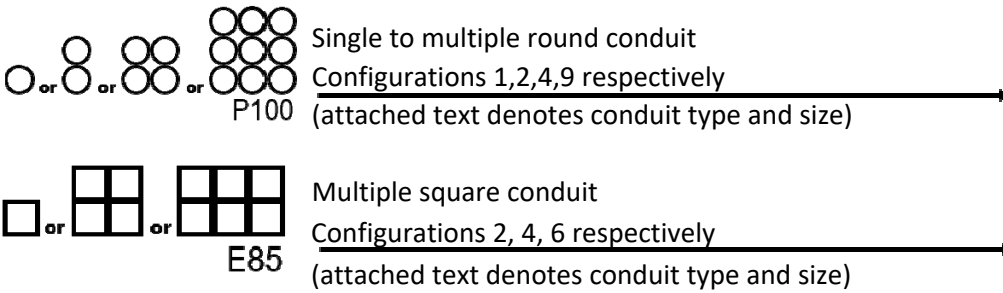
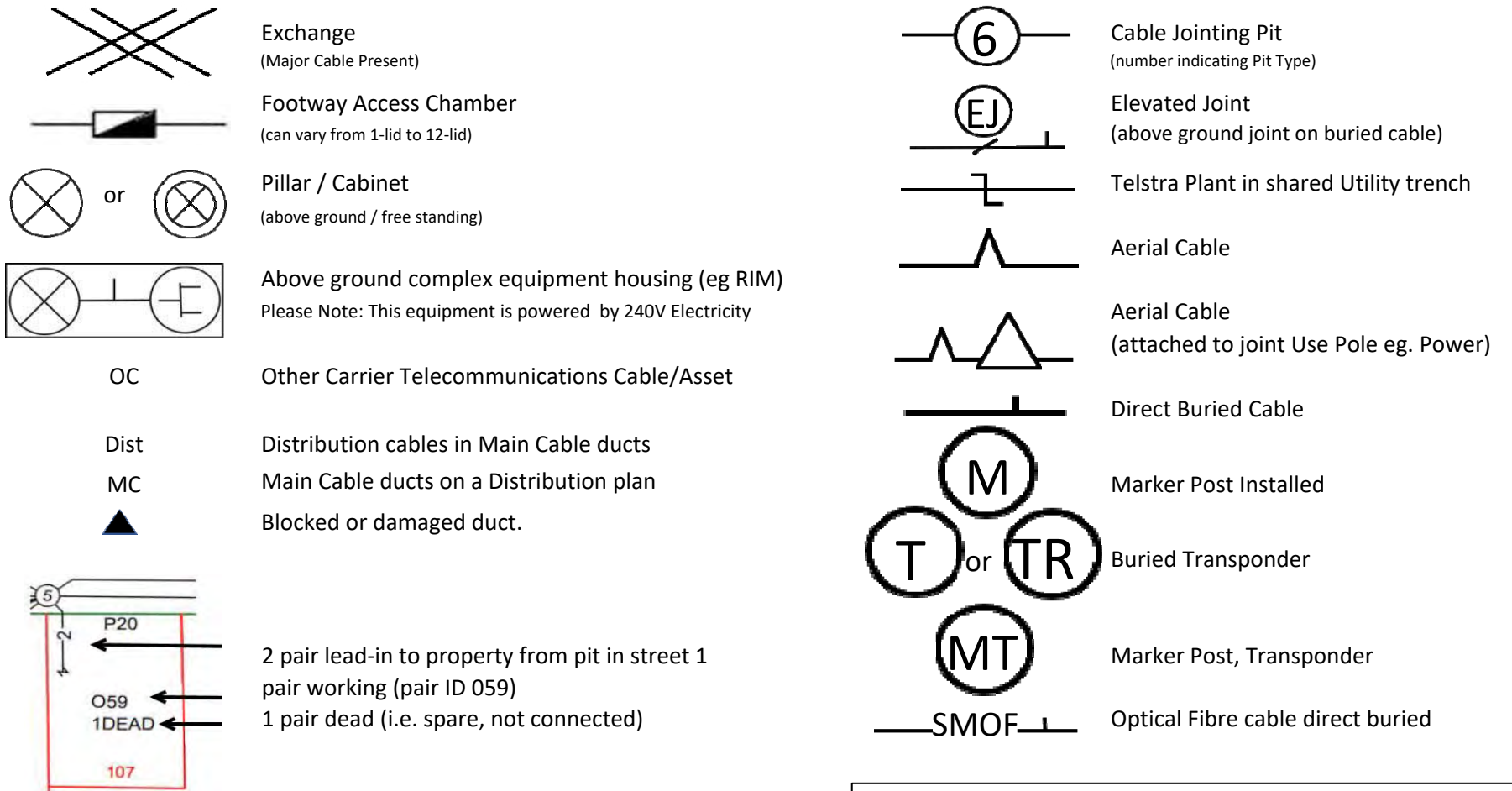


LEGEND

IT'S HOW WE CONNECT



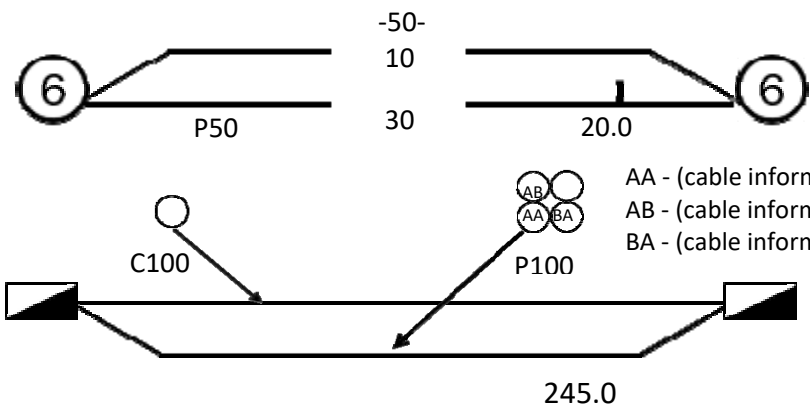
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Some examples of conduit type and size:

A - Asbestos cement, P - PVC / Plastic, C - Concrete, GI - Galanised iron, E - Earthenware
Conduit sizes *nominally* range from 20mm to 100mm
P50 50mm PVC conduit
P100 100mm PVC conduit
A100 100mm asbestos cement conduit

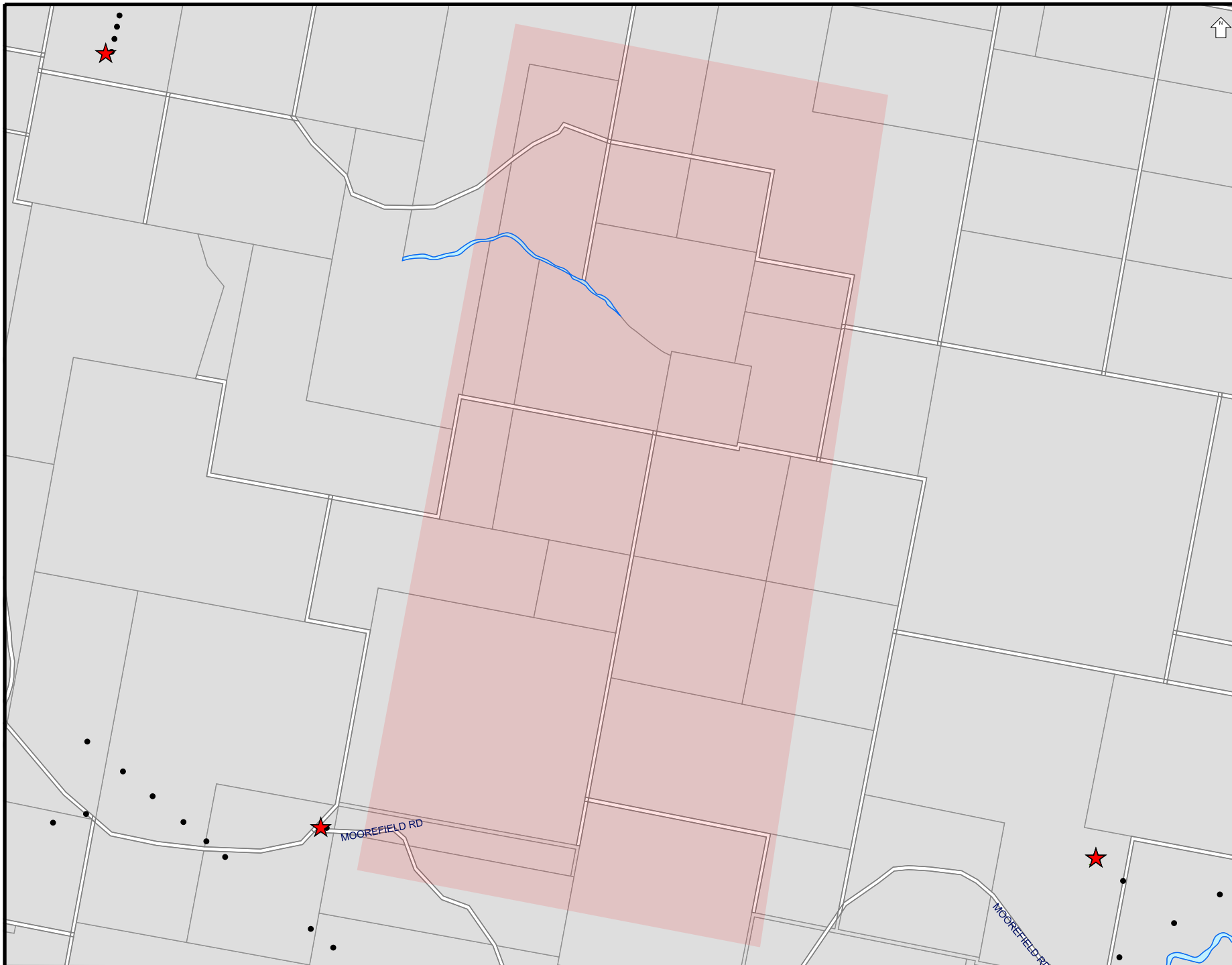
Some Examples of how to read Telstra Plans



One 50mm PVC conduit (P50) containing a 50-pair and a 10-pair cable between two 6-pits. approximately 20.0m apart, with a direct buried 30-pair cable along the same route

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Overhead wires not shown
LOOK UP & LIVE!

LEGEND

- - - LV Underground Cable
- - - HV Underground Cable
- - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊗ Cubicle
- Pit
- Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
- ▨ Zone Substation
- . - . - Underground Cable
- . - . - Underground Fibre

Proposed Works

- ▨ Area of proposed works
- Proposed assets are shown as orange symbols

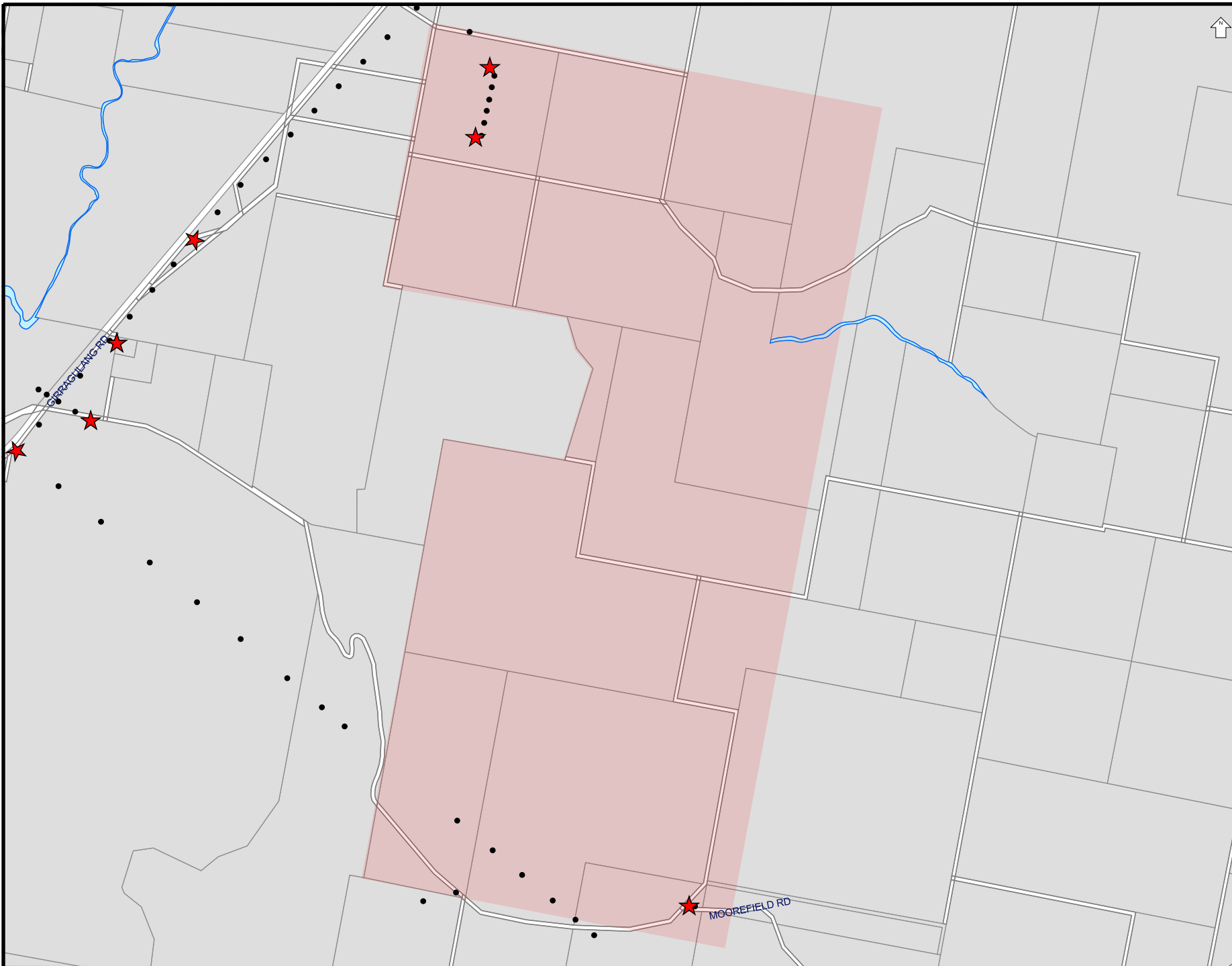
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A4 SCALE: 1:25311





Overhead wires not shown
LOOK UP & LIVE!

LEGEND

- - - LV Underground Cable
- - - HV Underground Cable
- - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊗ Cubicle
- Pit
- Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
- ⊠ Zone Substation
- . - . - Underground Cable
- . - . - Underground Fibre

Proposed Works

- ▭ Area of proposed works
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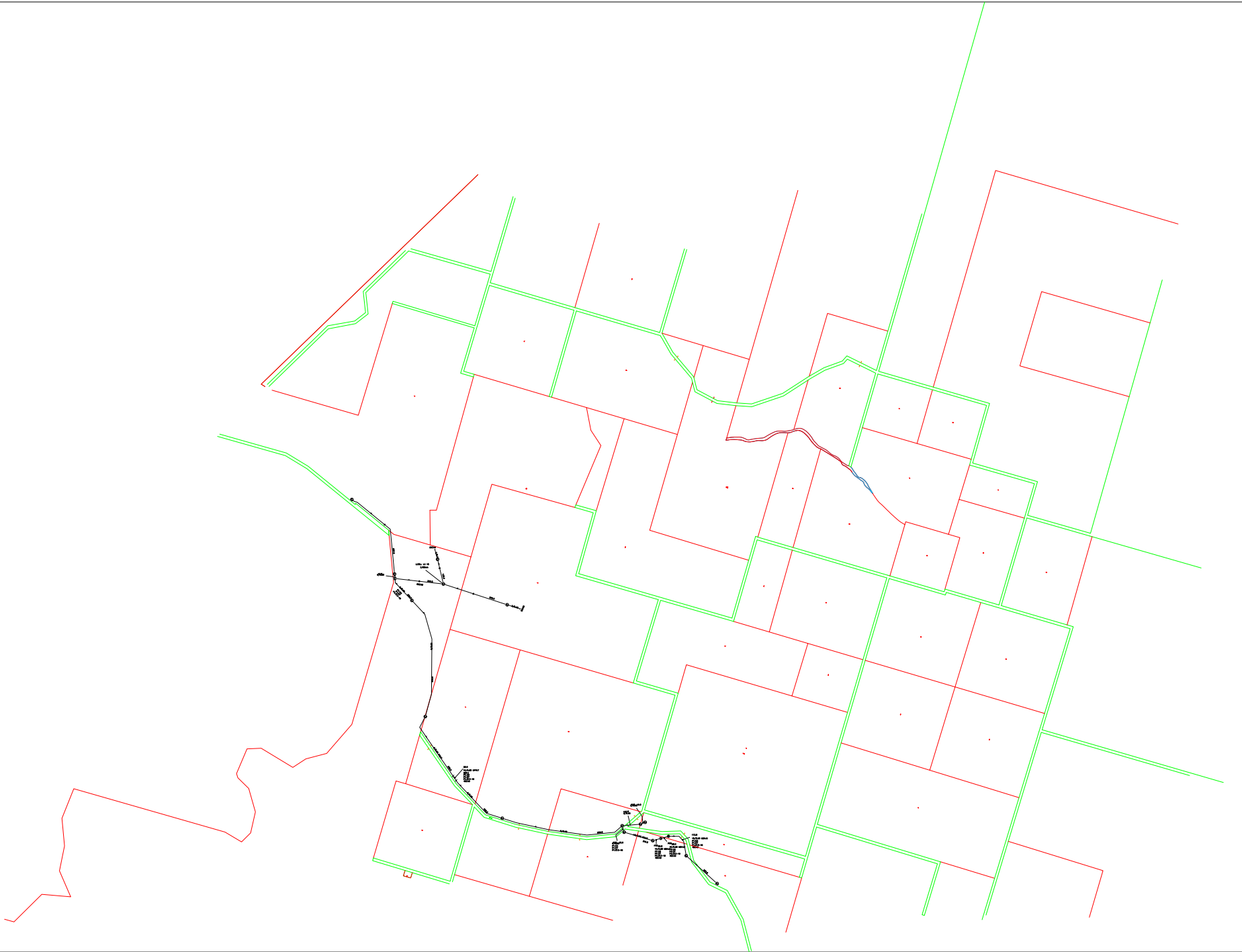
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A4 SCALE: 1:25516



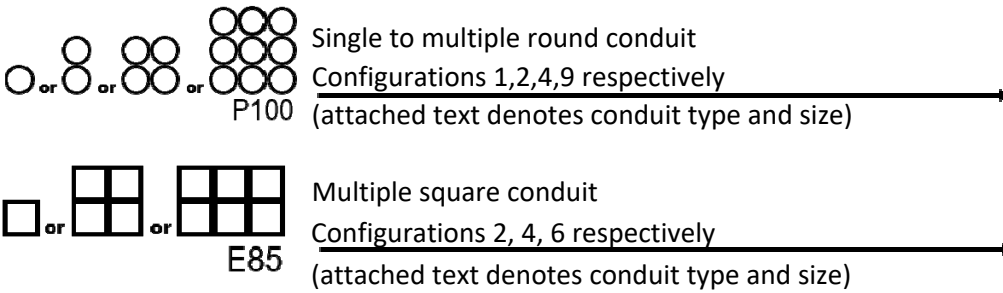
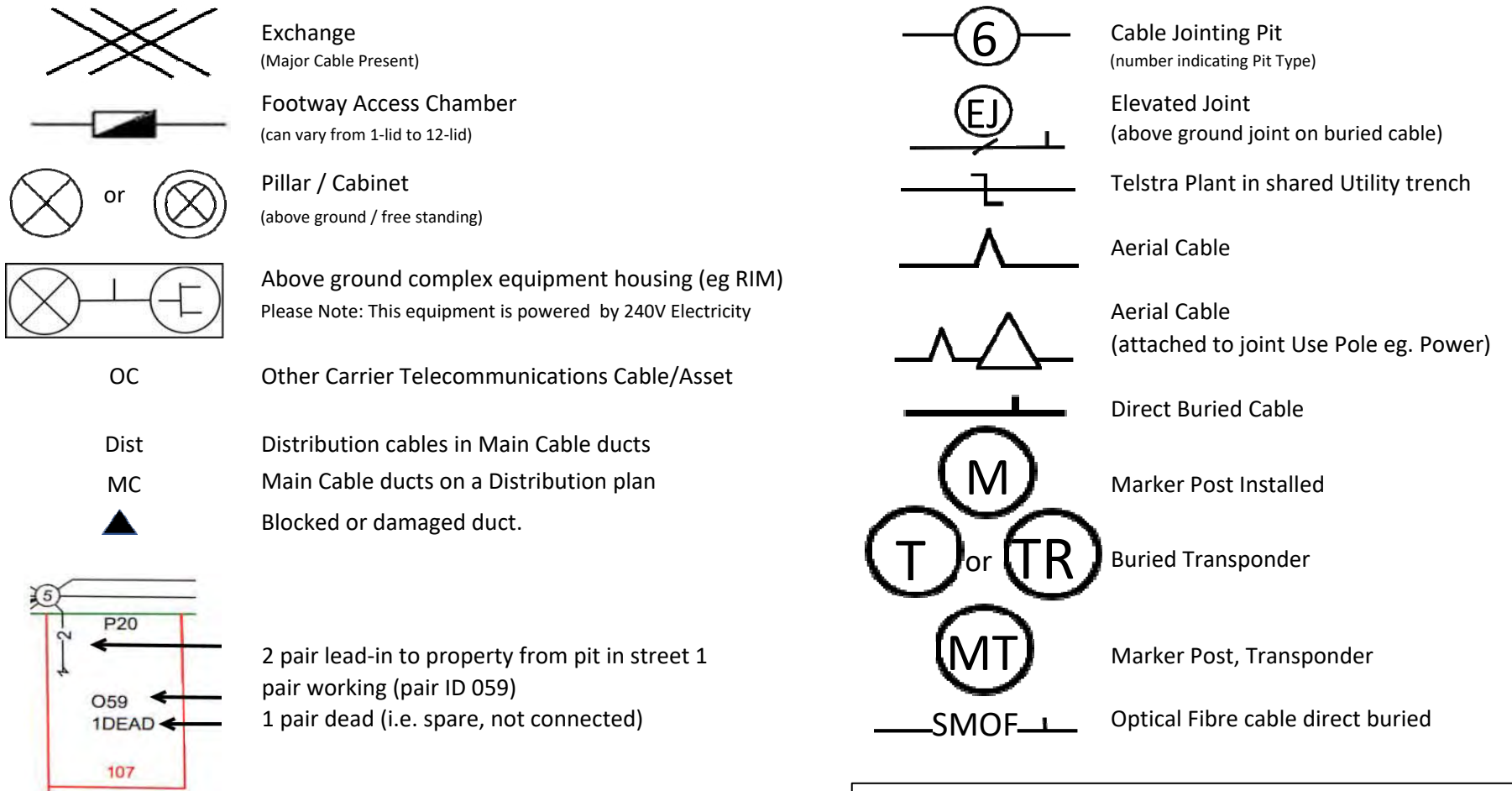


LEGEND

IT'S HOW WE CONNECT



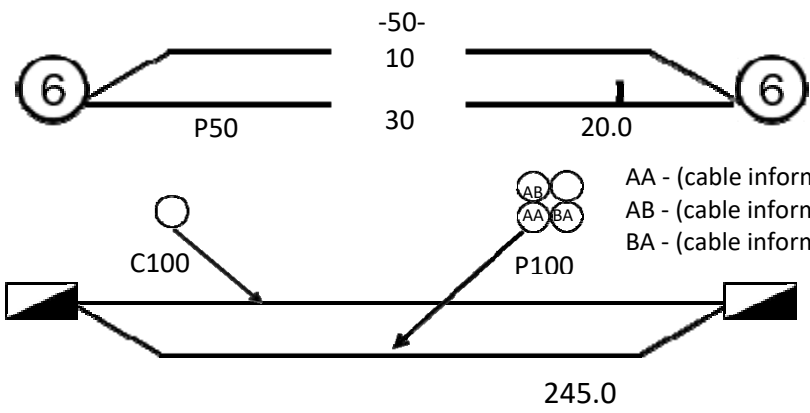
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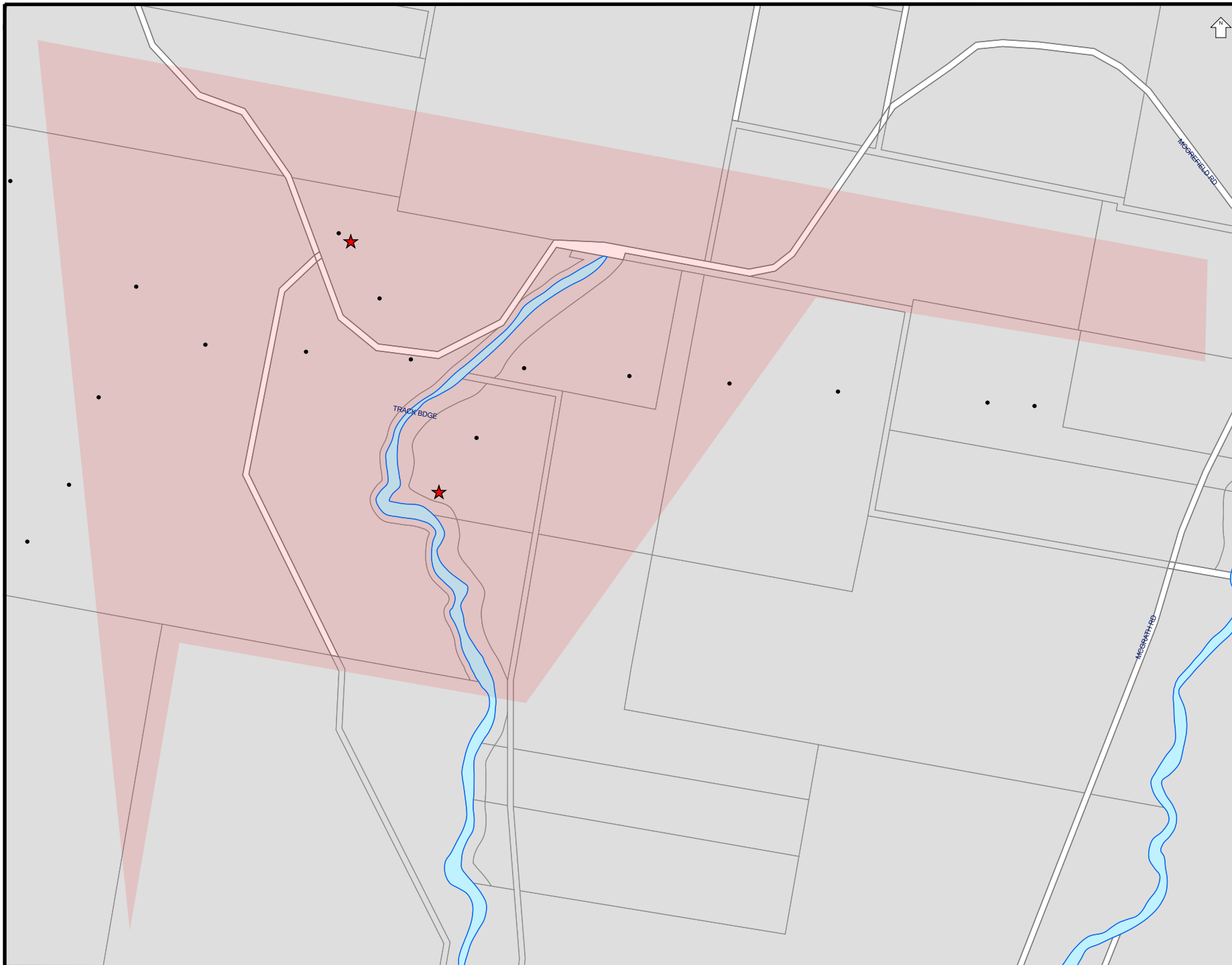
Some Examples of how to read Telstra Plans



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Overhead wires not shown
LOOK UP & LIVE!

LEGEND

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- - - HV Underground Cable
- - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊗ Cubicle
- Pit
- Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
- Zone Substation
- - - Underground Cable
- - - Underground Fibre

Proposed Works

- Area of proposed works

Proposed assets are shown as orange symbols

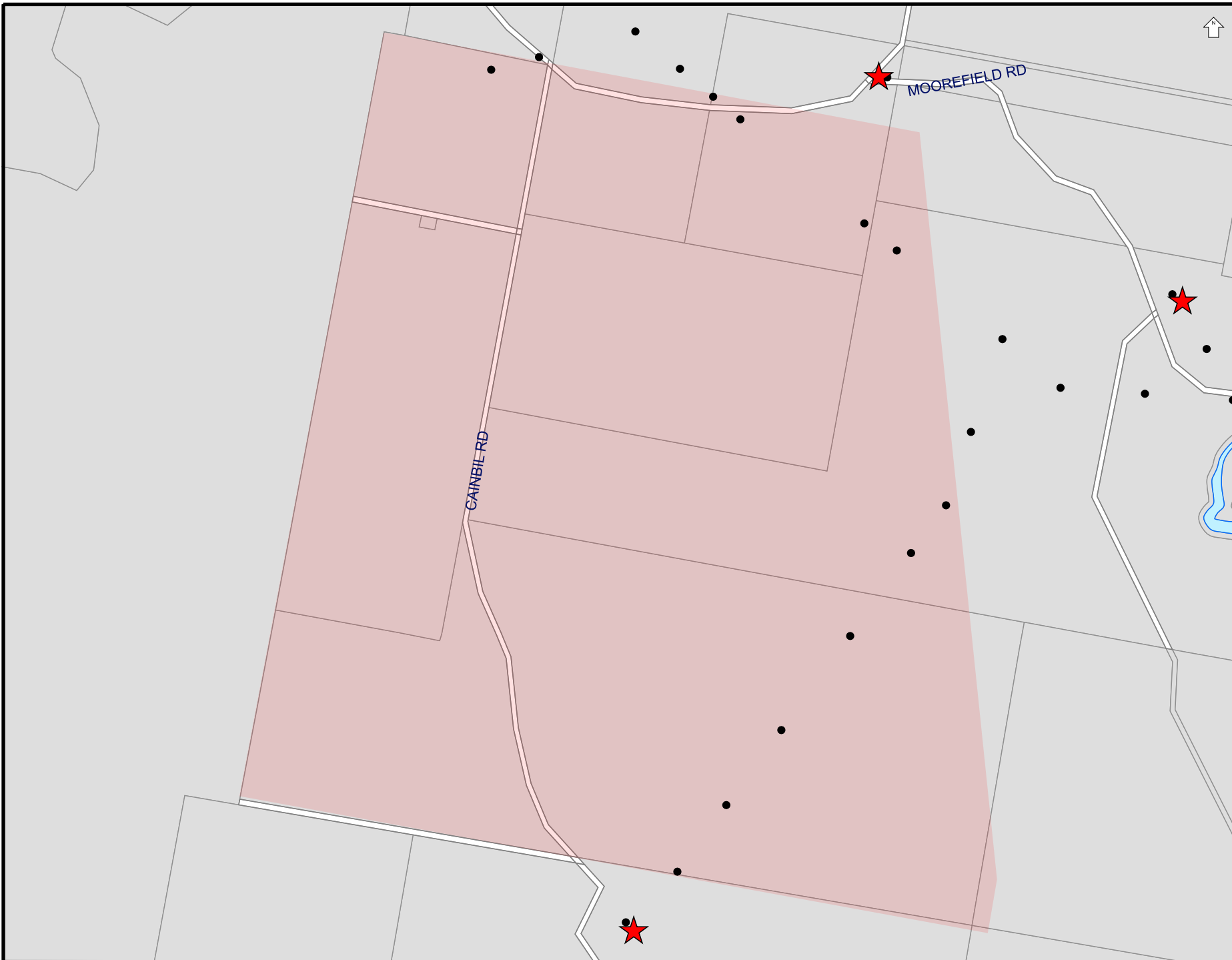
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A4 SCALE: 1:14677





Overhead wires not shown
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LEGEND

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- - - HV Underground Cable
- - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- Cubicle
- Pit
- Area of Interest

Critical Assets

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- Zone Substation
- Underground Cable
- Underground Fibre

Proposed Works

- Area of proposed works
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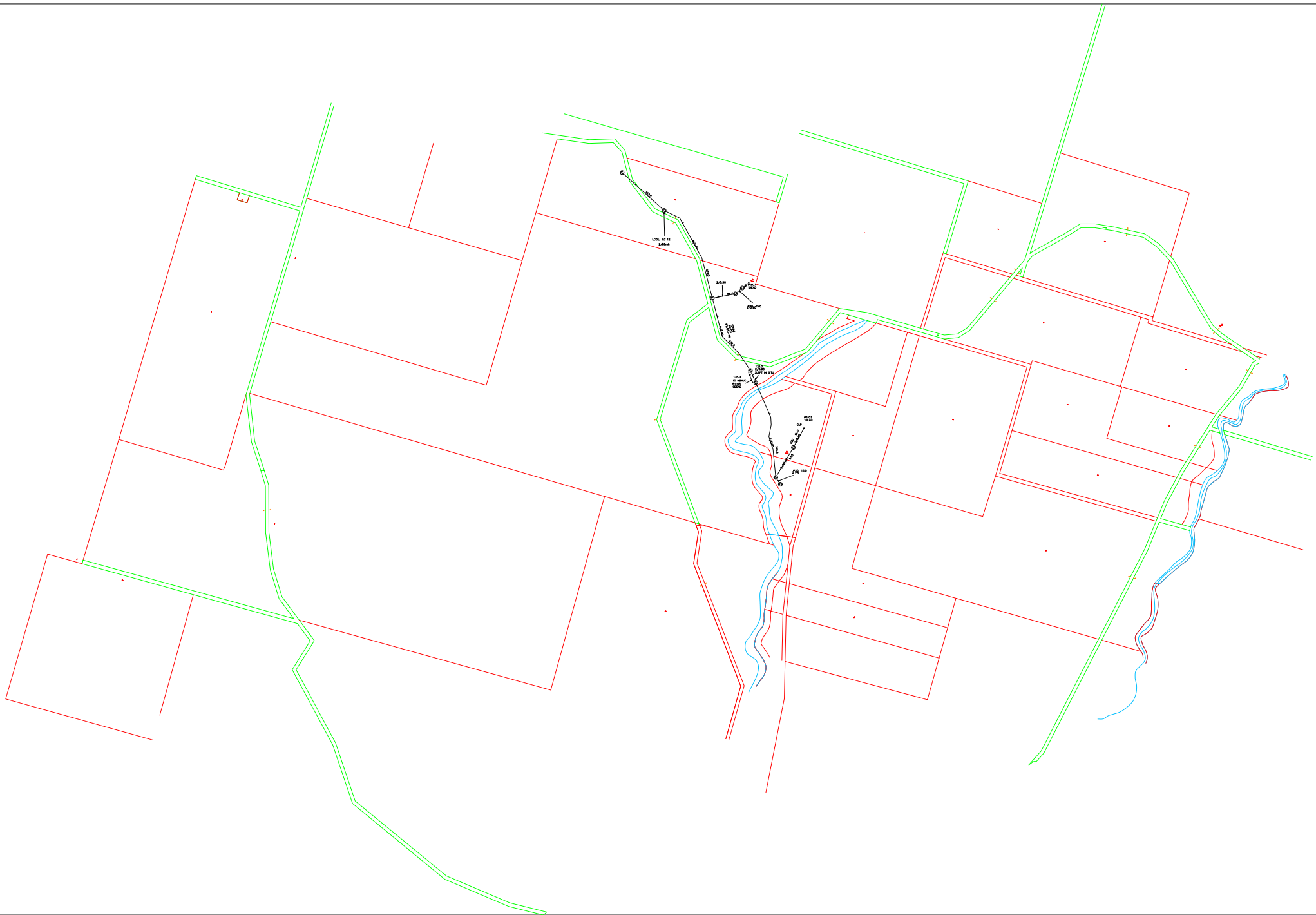
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A4 SCALE: 1:17403



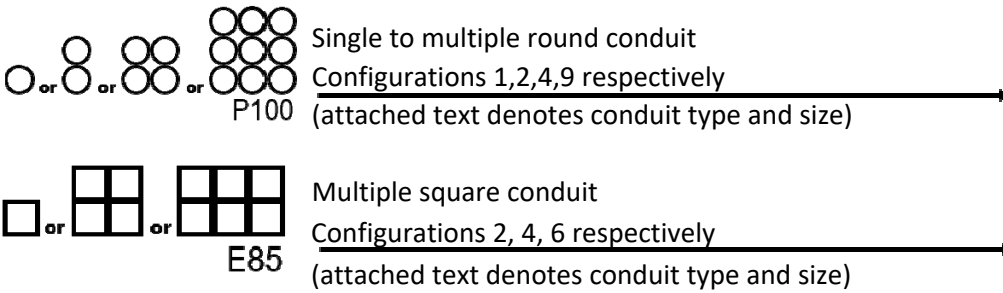
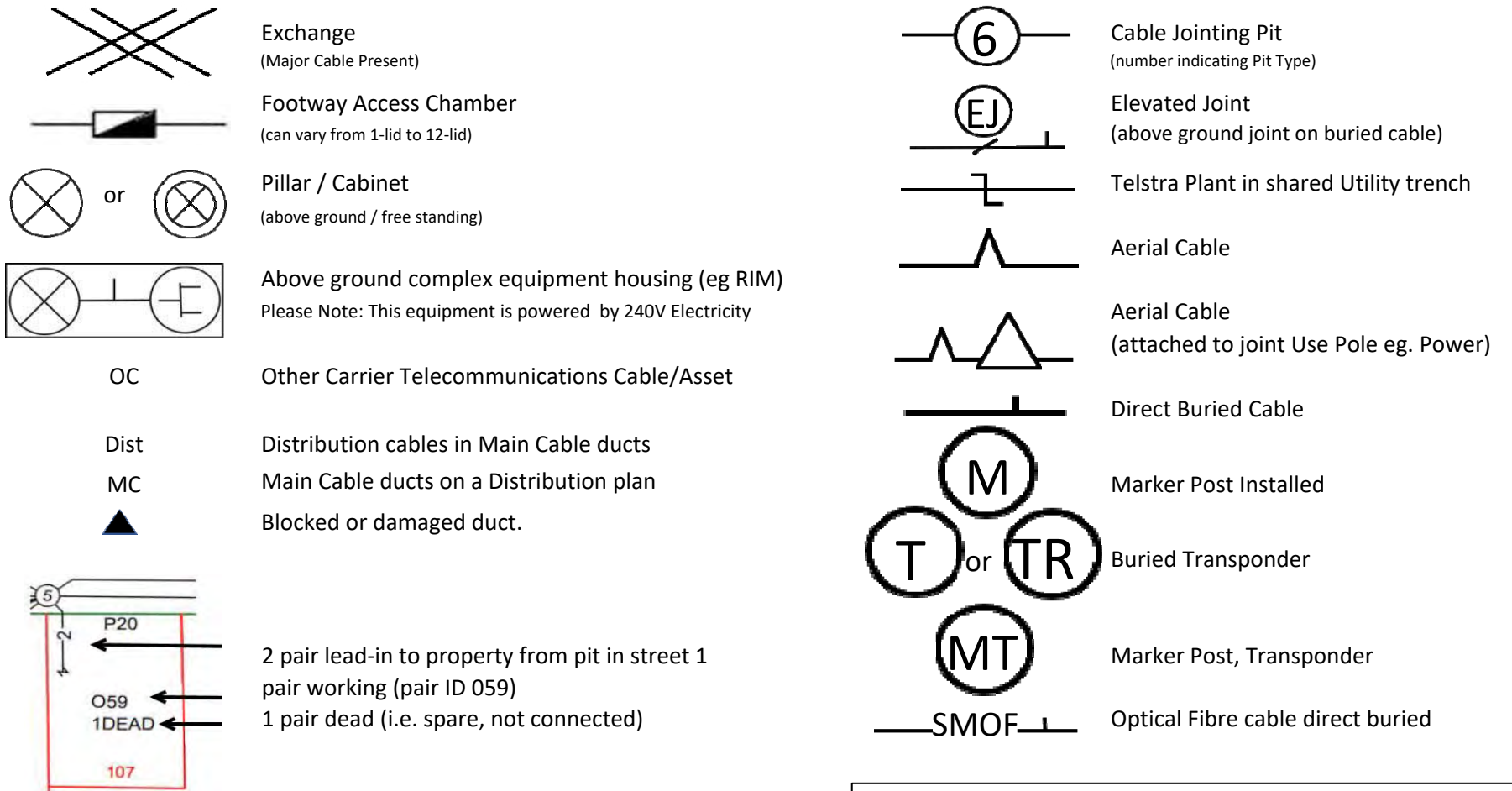


LEGEND

IT'S HOW WE CONNECT



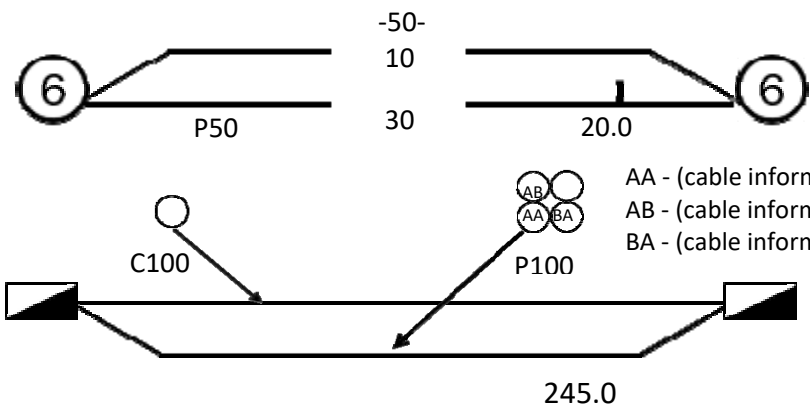
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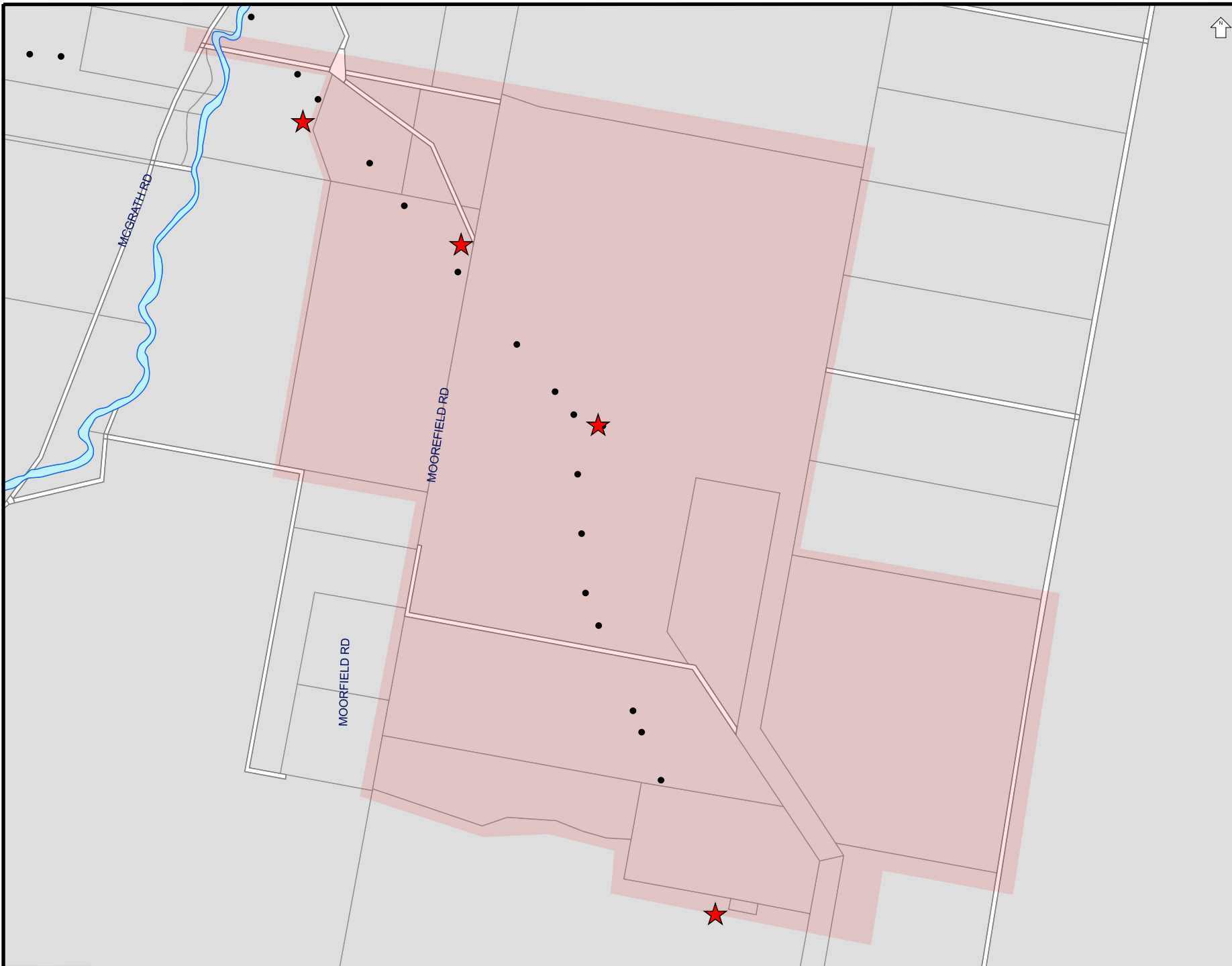
Some Examples of how to read Telstra Plans



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Overhead wires not shown
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LEGEND

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- - - - HV Underground Cable
- - - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- Cubicle
- Pit
- Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
- Zone Substation
- - - - Underground Cable
- - - - Underground Fibre

Proposed Works

- Area of proposed works
- Proposed assets are shown as orange symbols

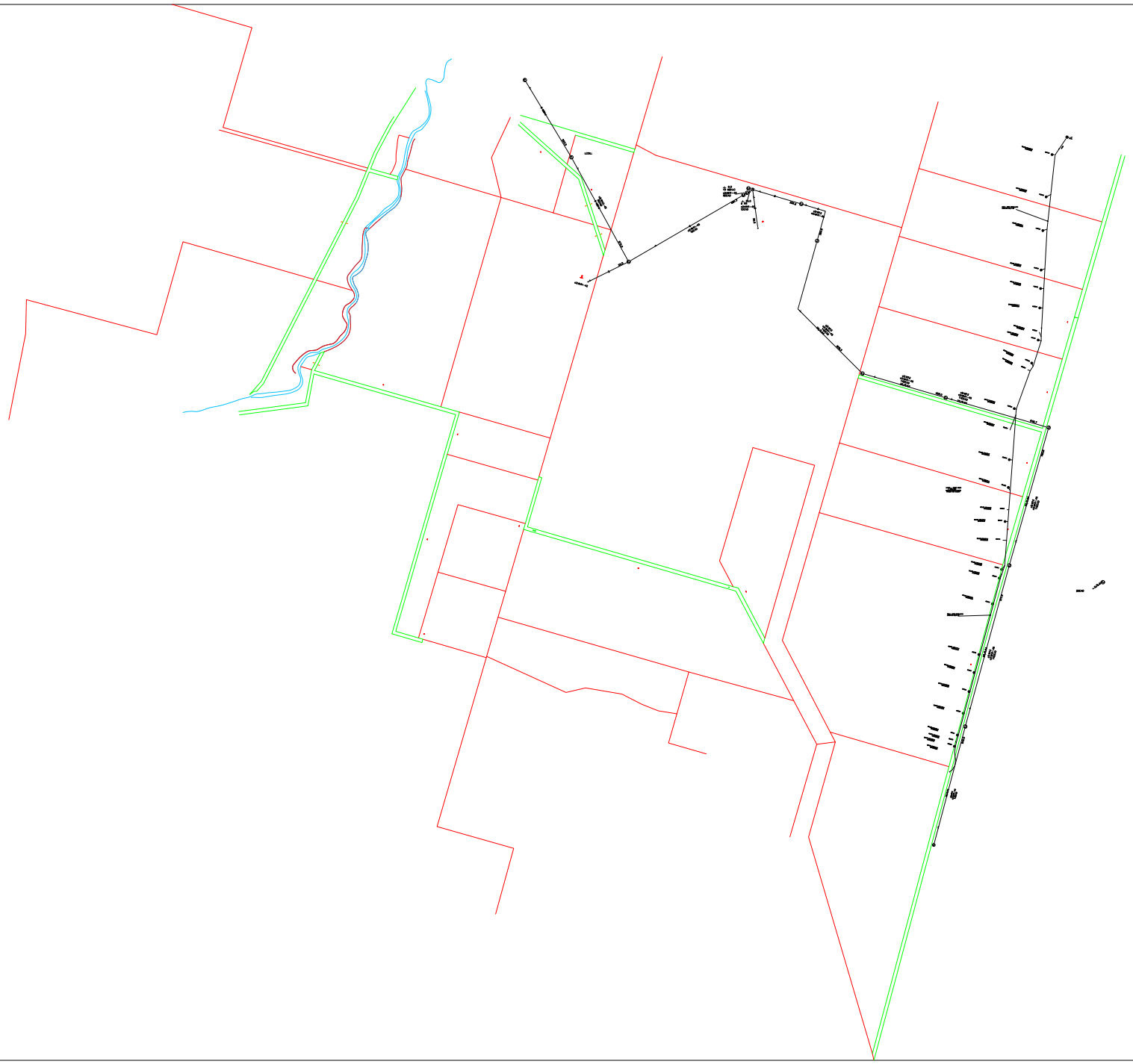
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A4 SCALE: 1:22067



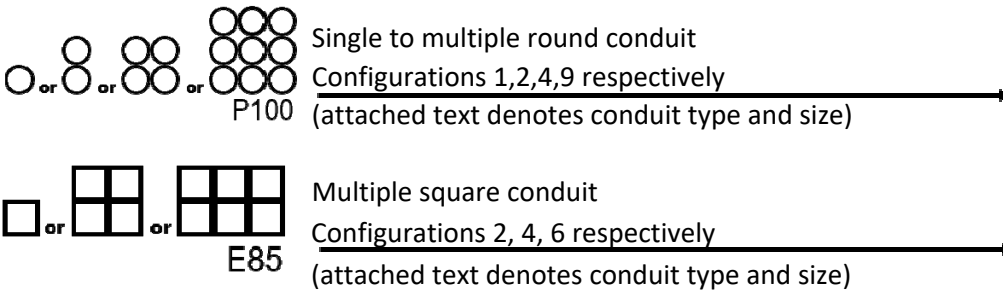
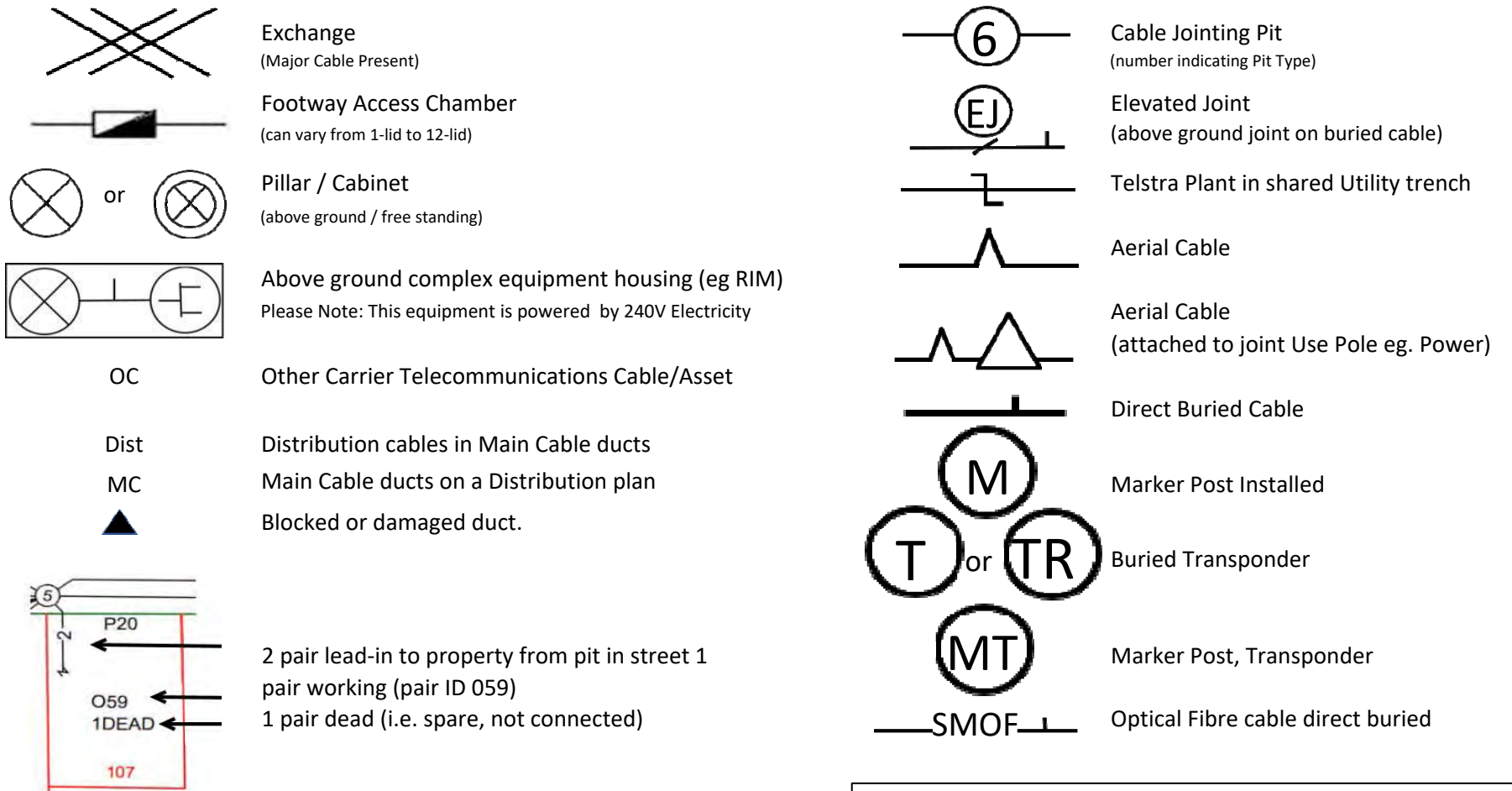


LEGEND

IT'S HOW WE CONNECT



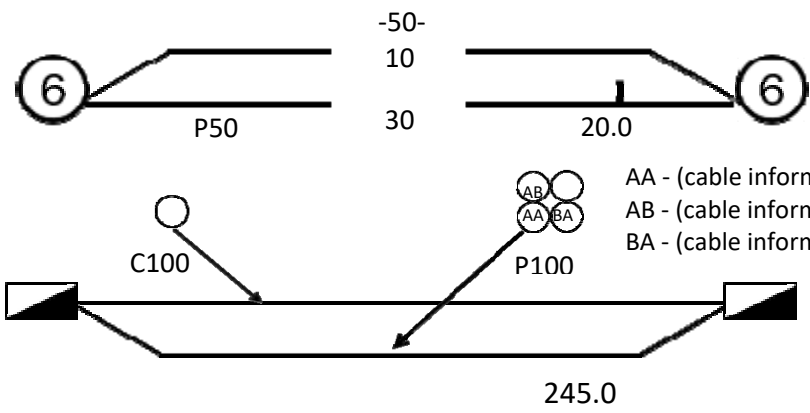
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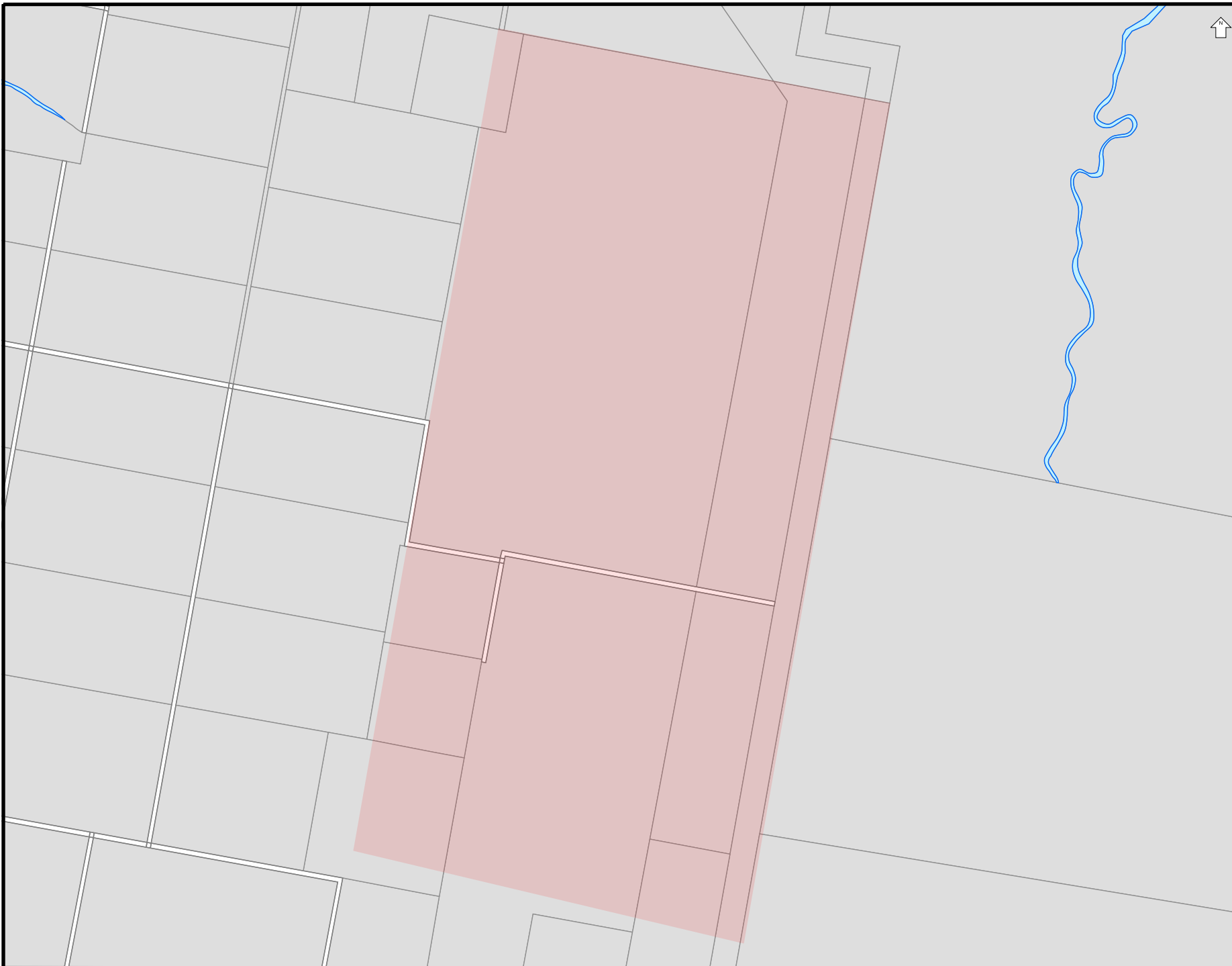
Some Examples of how to read Telstra Plans



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Overhead wires not shown
LOOK UP & LIVE!

LEGEND


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-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

Contact Essential Energy
on 13 23 91

-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works

Proposed assets are shown as
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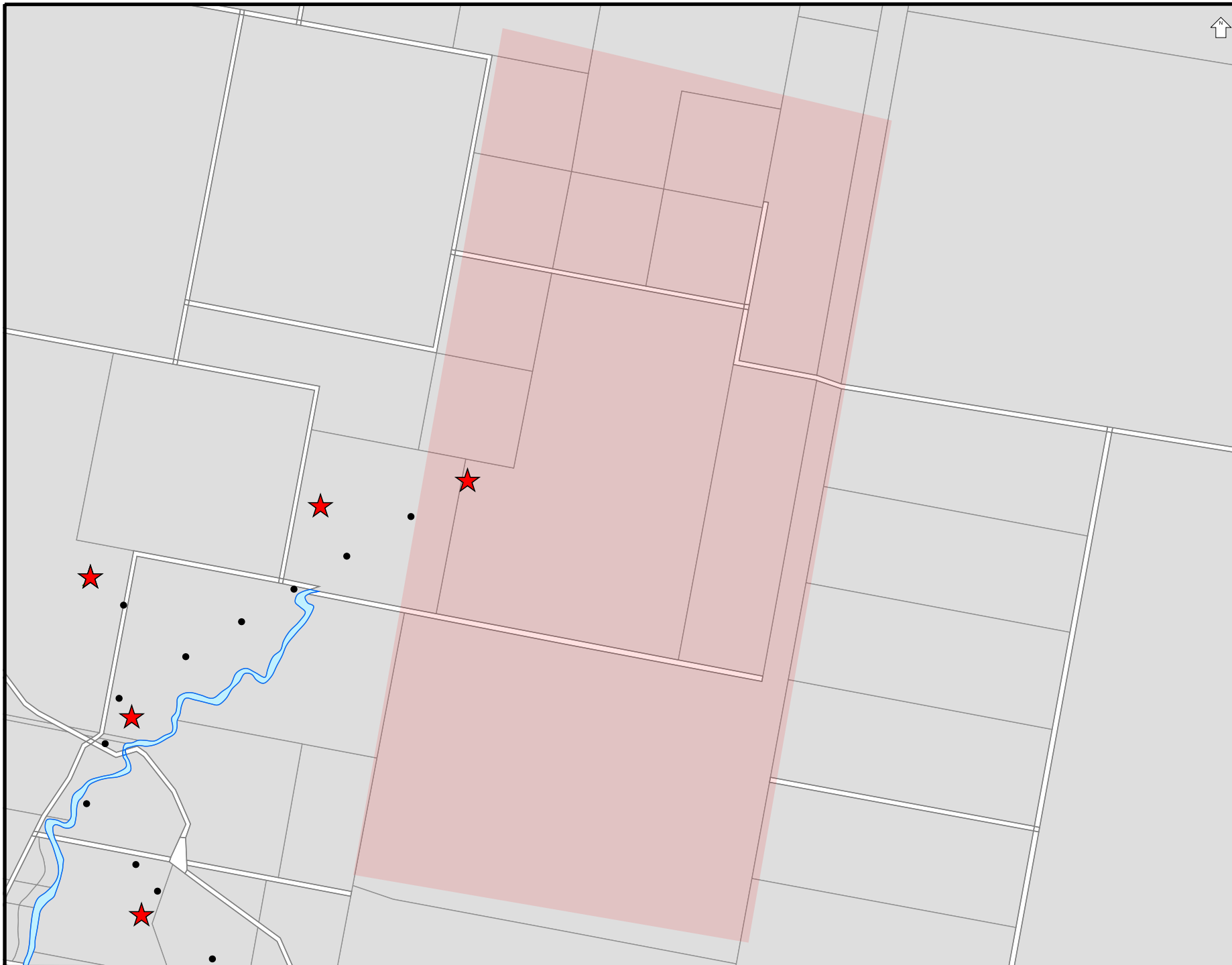
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A4 SCALE: 1:20705





Overhead wires not shown
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LEGEND

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- - - - HV Underground Cable
- - - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- X Cubicle
- Pit
- Area of Interest

Critical Assets

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- Zone Substation
- - - - Underground Cable
- - - - Underground Fibre

Proposed Works

- Area of proposed works

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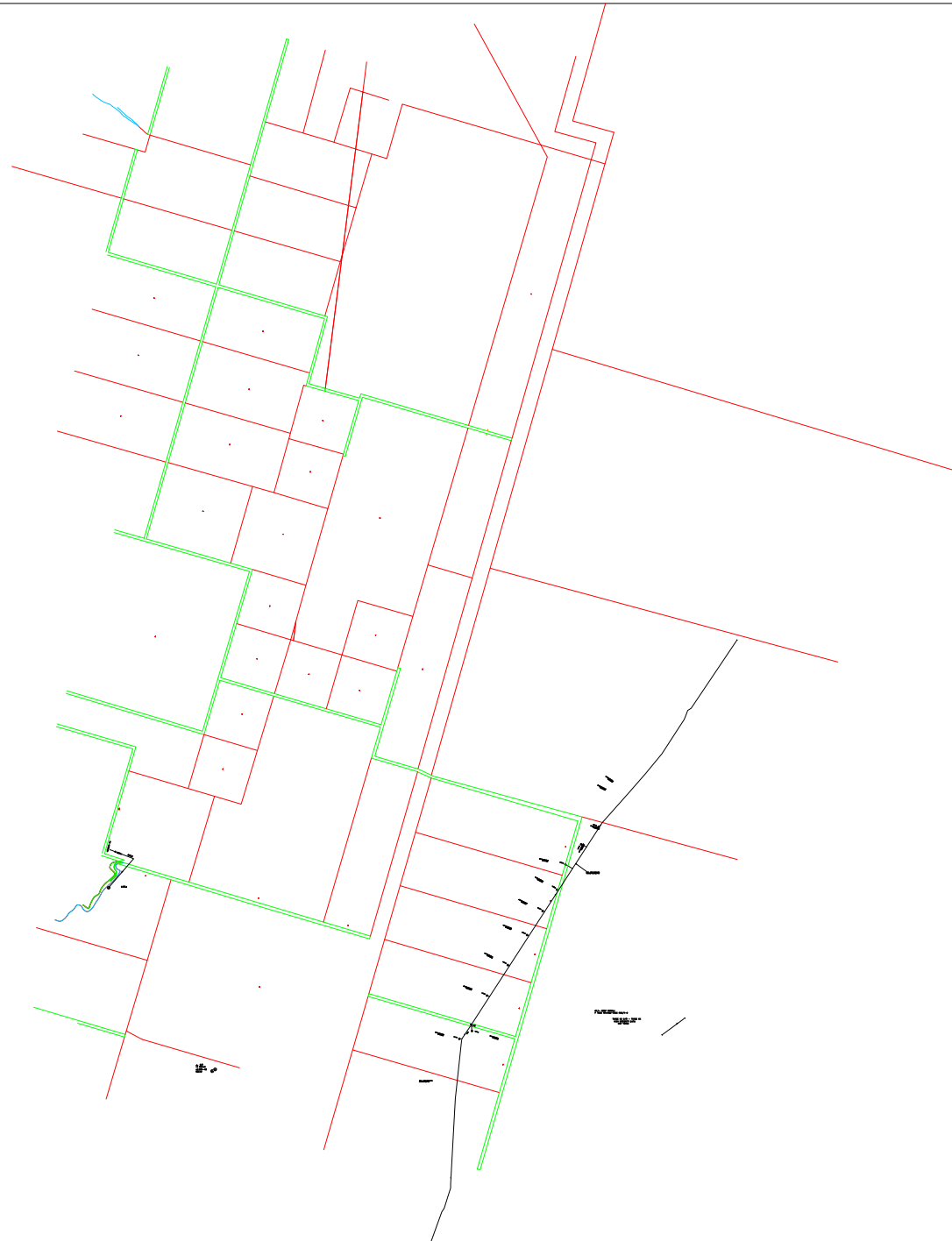
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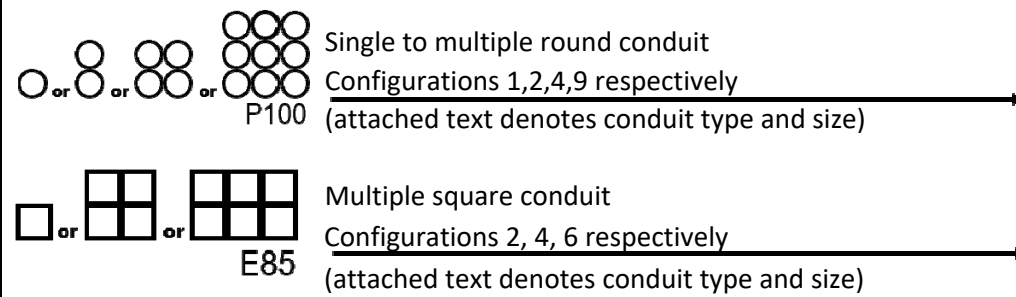
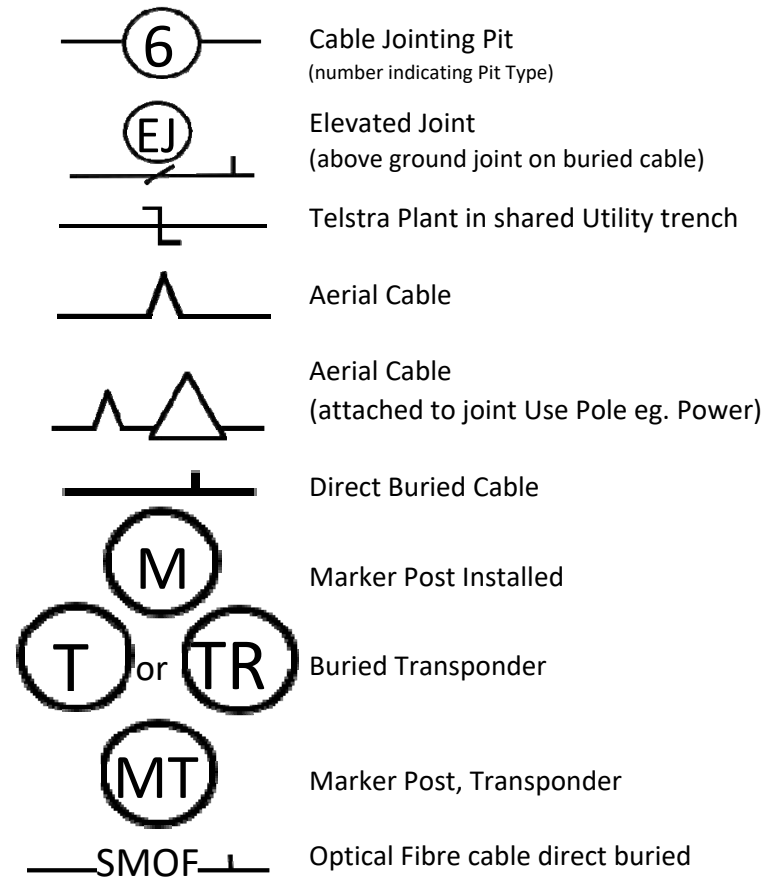
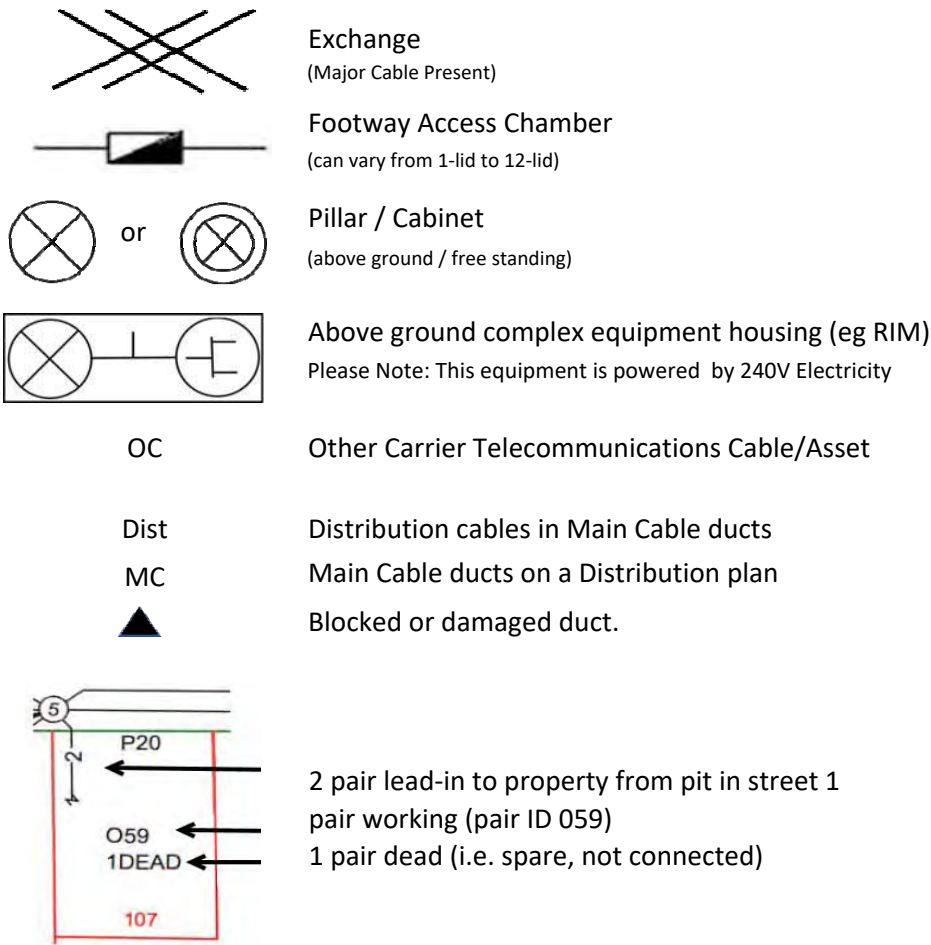
A4 SCALE: 1:20758





LEGEND

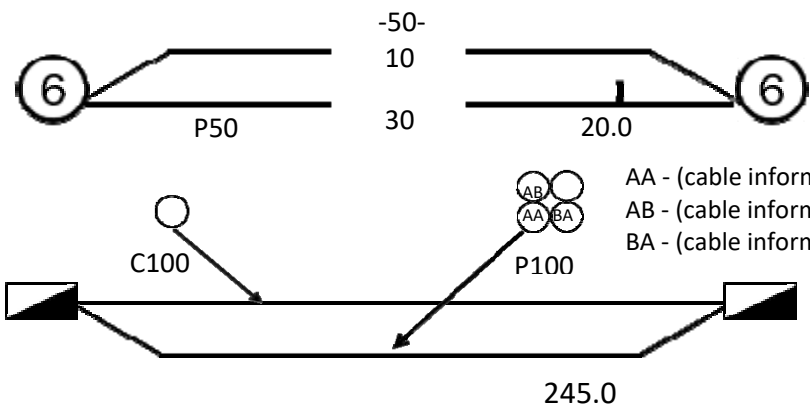
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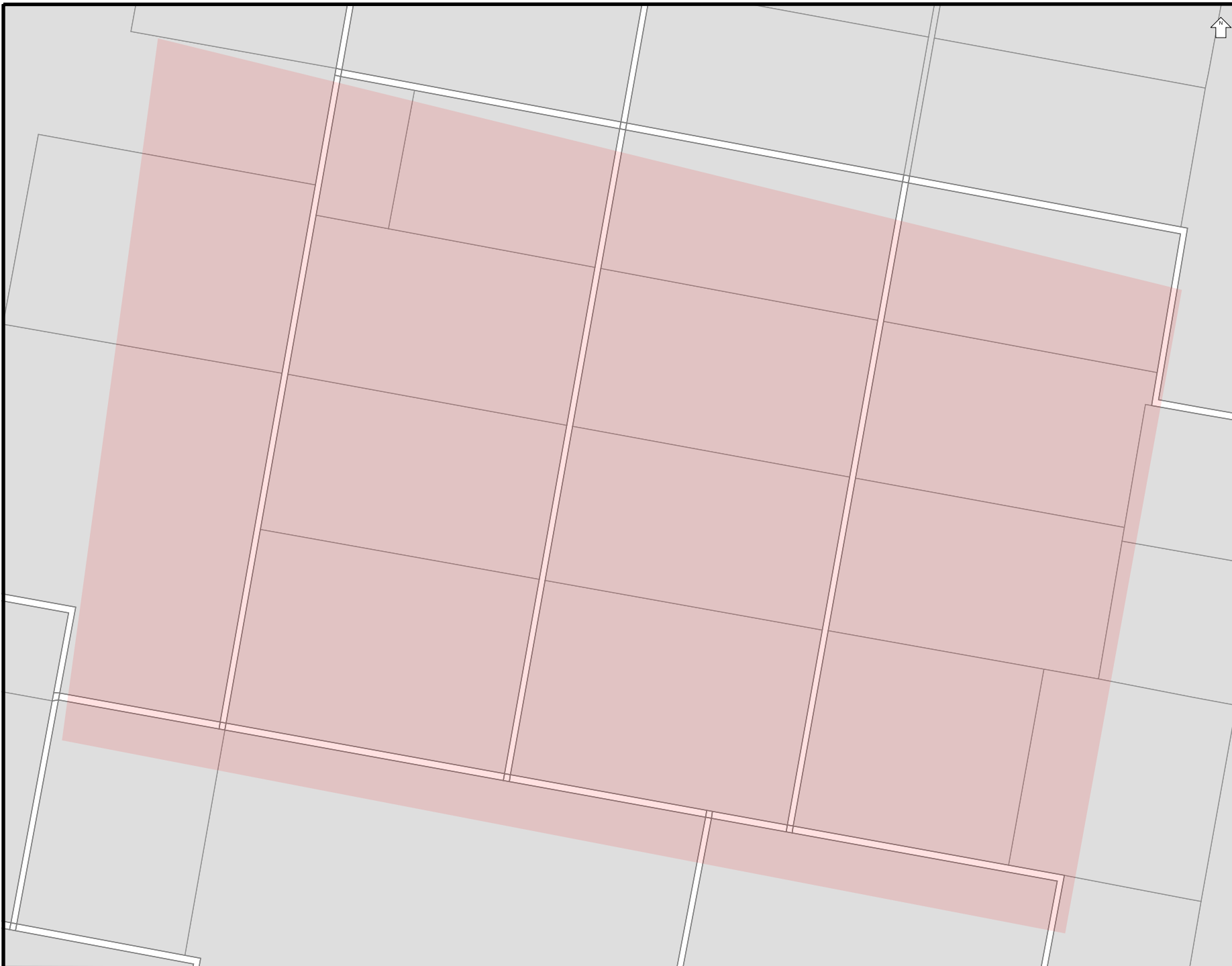
Some Examples of how to read Telstra Plans



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LEGEND


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-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

Contact Essential Energy
on 13 23 91

-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

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A4 SCALE: 1:14628



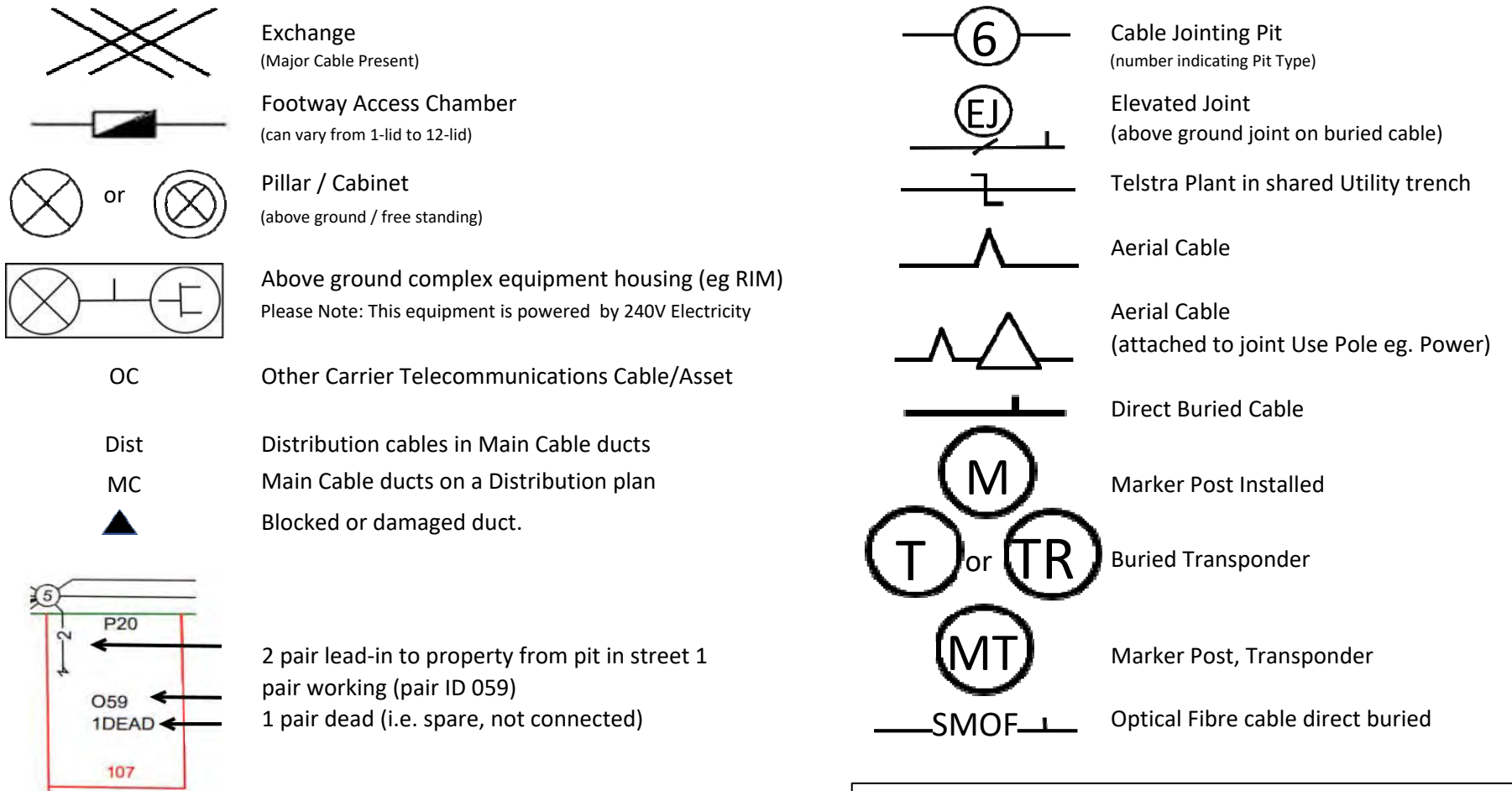


LEGEND

IT'S HOW WE CONNECT



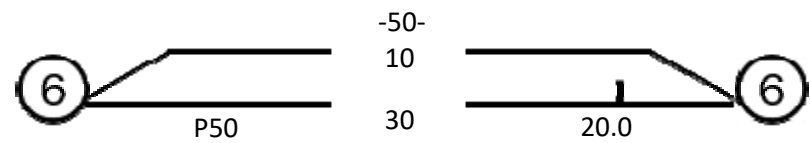
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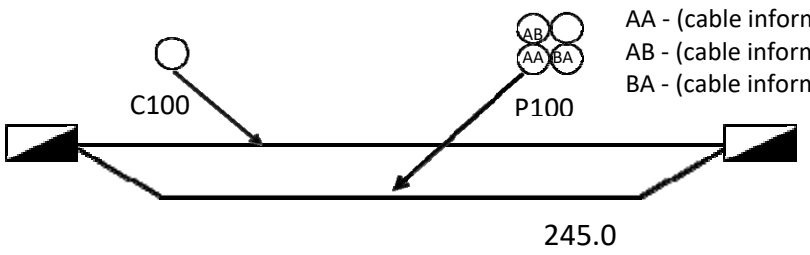
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Some Examples of how to read Telstra Plans

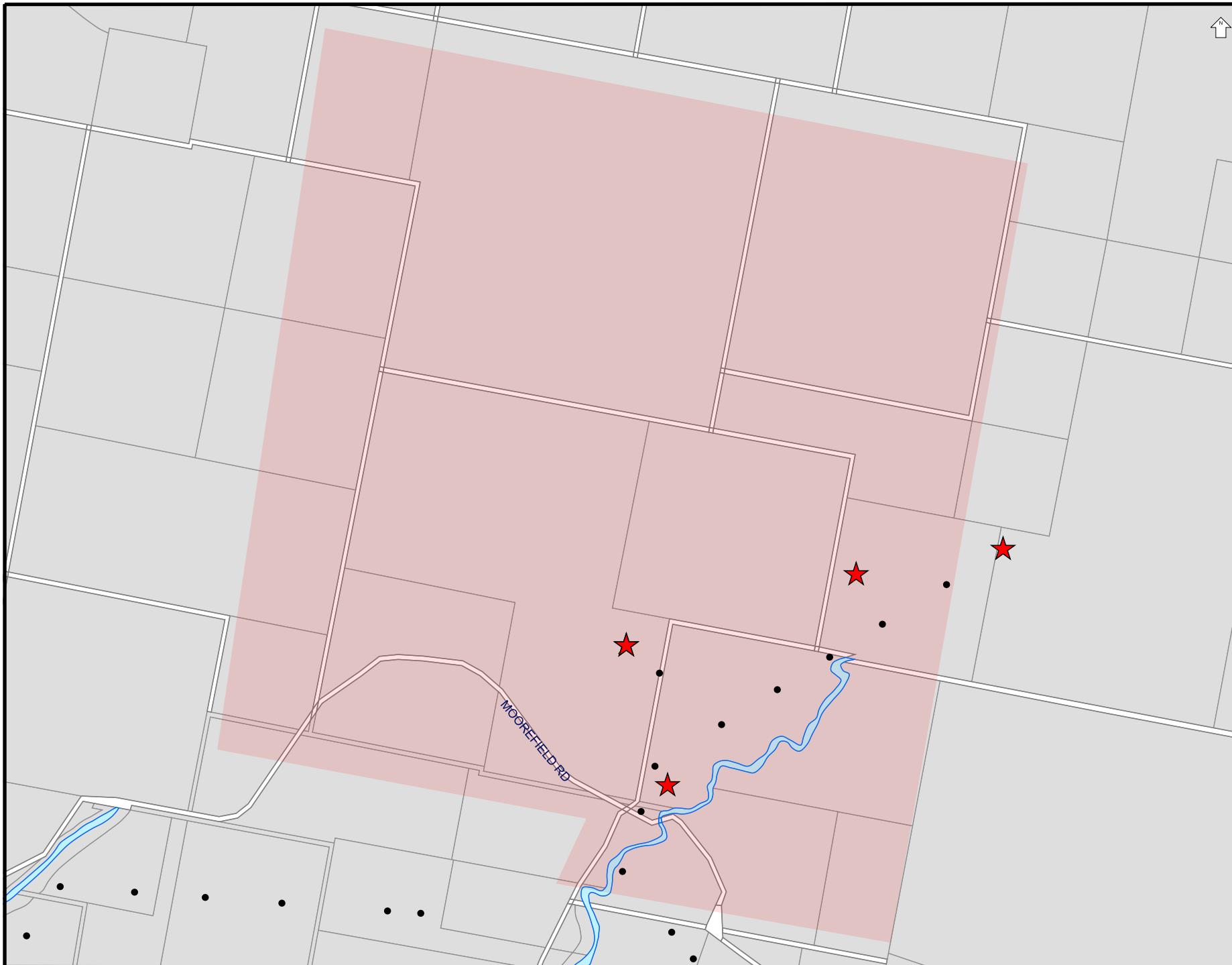


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Overhead wires not shown
LOOK UP & LIVE!

LEGEND

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- - - - HV Underground Cable
- - - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- Cubicle
- Pit
- Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
- Zone Substation
- - - - Underground Cable
- - - - Underground Fibre

Proposed Works

- Area of proposed works

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A4 SCALE: 1:20778



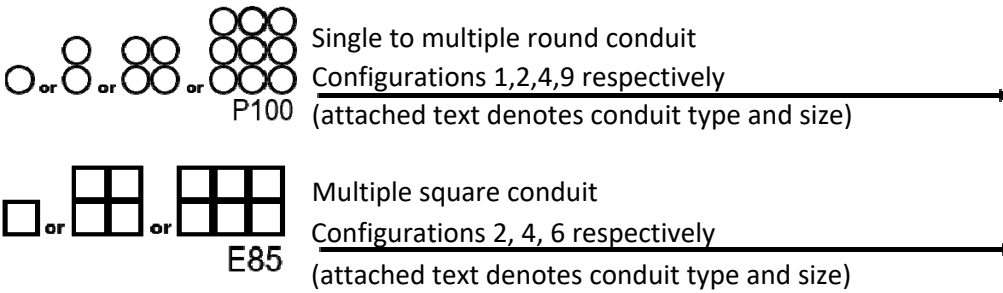
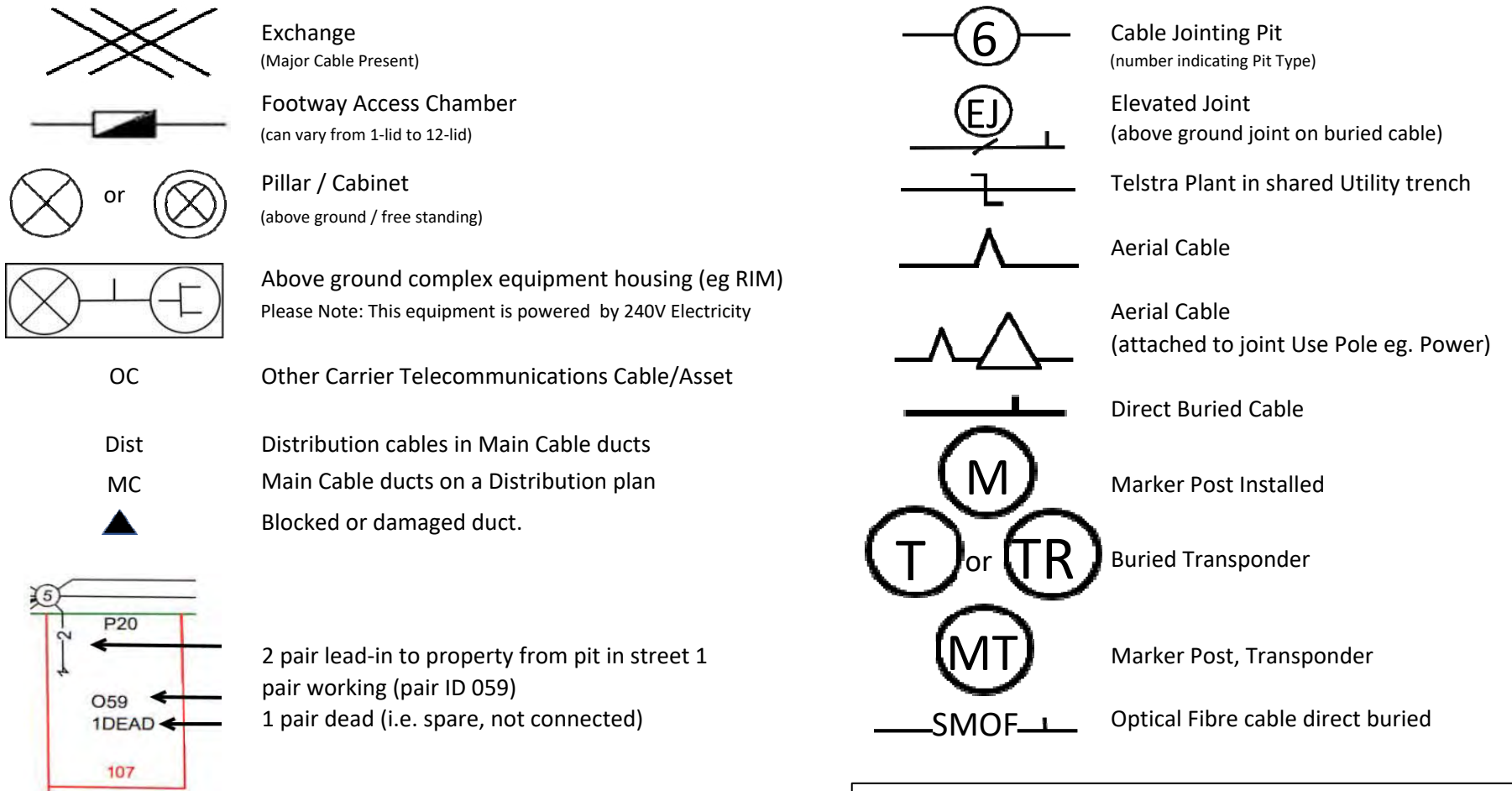


LEGEND

IT'S HOW WE CONNECT



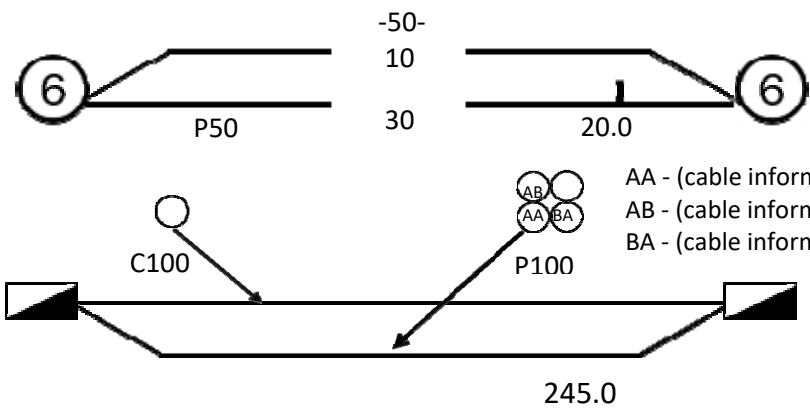
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Some examples of conduit type and size:

A - Asbestos cement, P - PVC / Plastic, C - Concrete, GI - Galanised iron, E - Earthenware
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P100 100mm PVC conduit
A100 100mm asbestos cement conduit

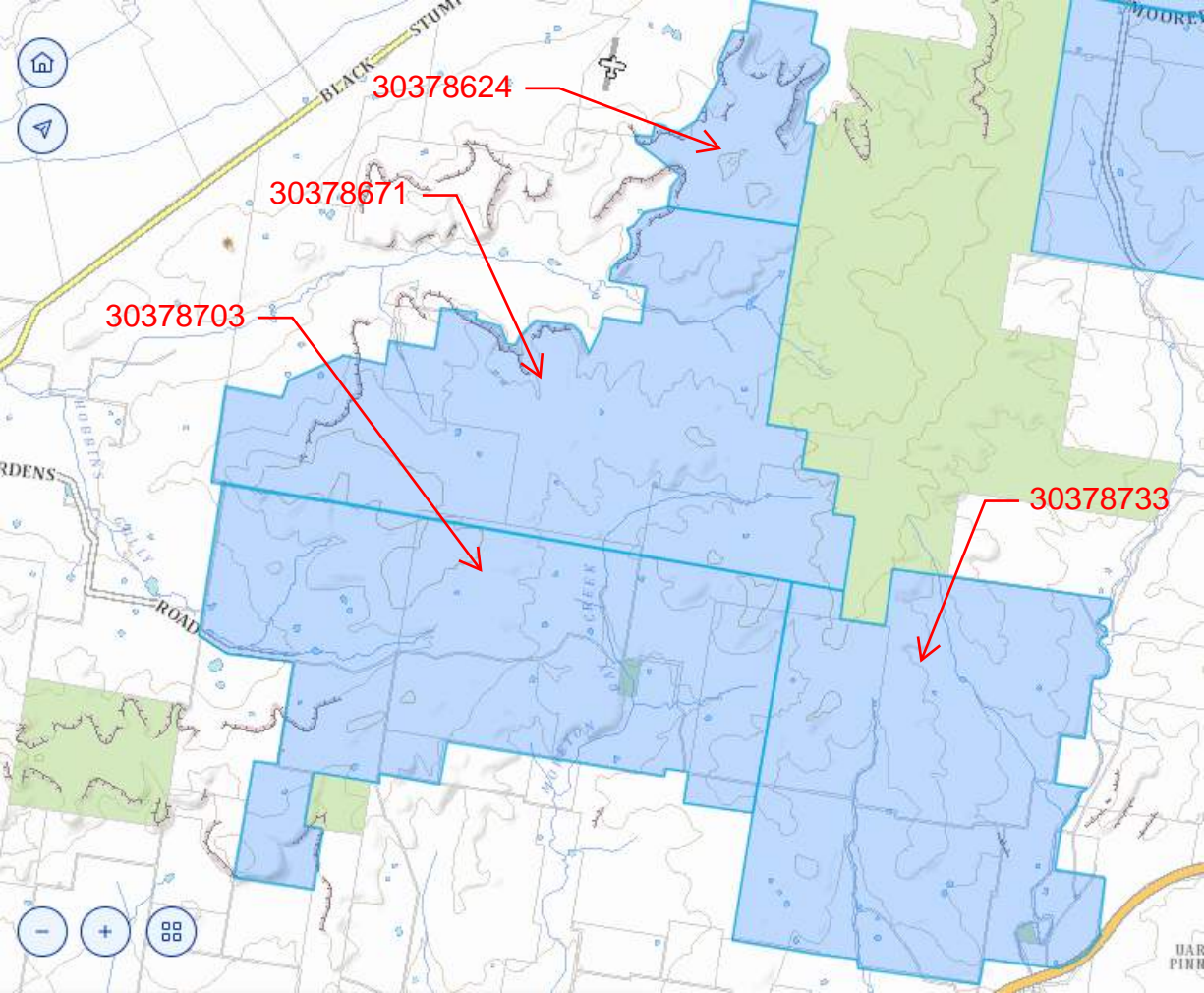
Some Examples of how to read Telstra Plans



One 50mm PVC conduit (P50) containing a 50-pair and a 10-pair cable between two 6-pits. approximately 20.0m apart, with a direct buried 30-pair cable along the same route

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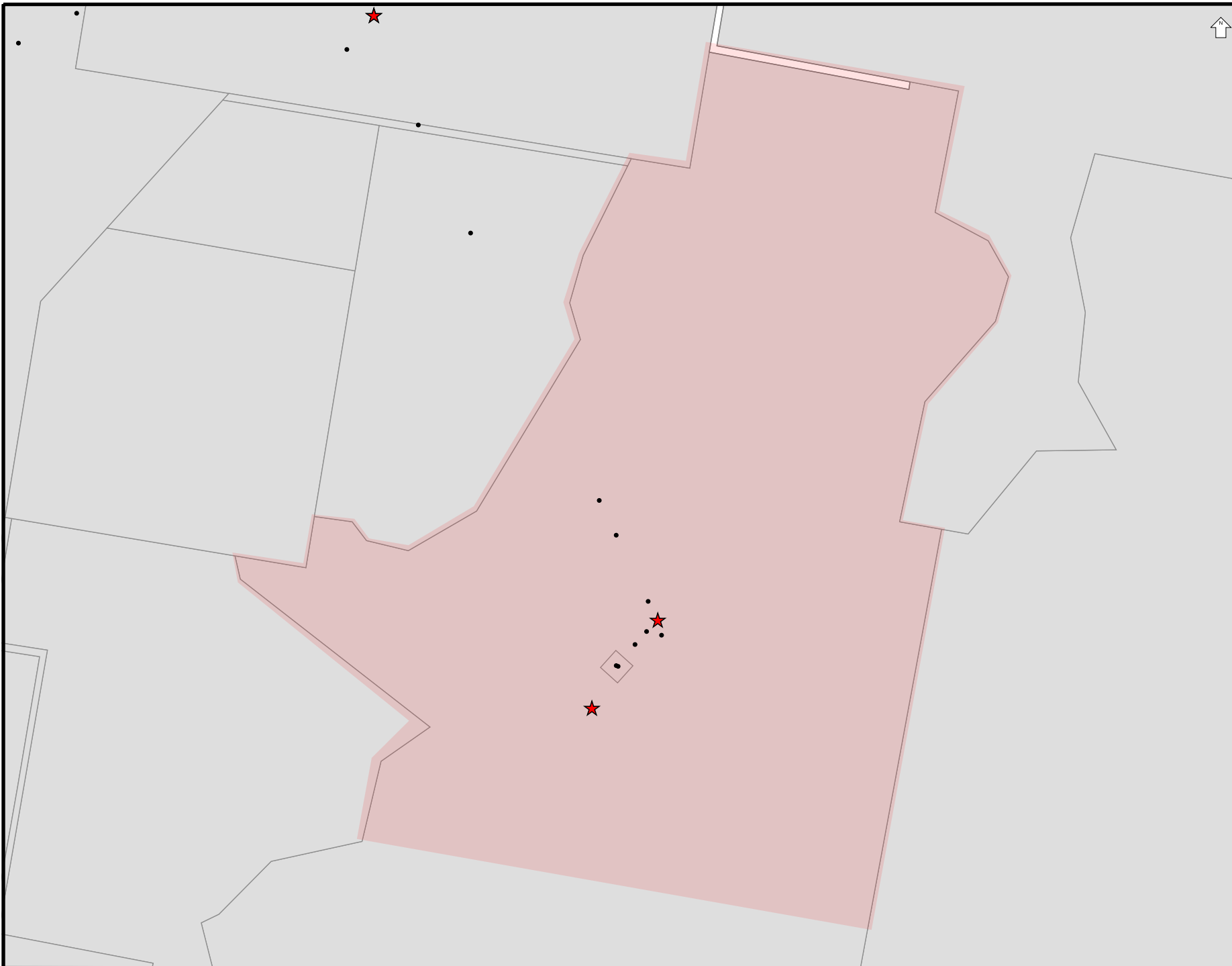


30378624

30378671

30378703

30378733



Overhead wires not shown
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LEGEND

- - - - LV Underground Cable
- - - - HV Underground Cable
- - - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊗ Cubicle
- Pit
- Area of Interest

Critical Assets

Contact Essential Energy
on 13 23 91

- Zone Substation
- . - . - . Underground Cable
- . - . - . Underground Fibre

Proposed Works

- Area of proposed works

Proposed assets are shown as orange symbols

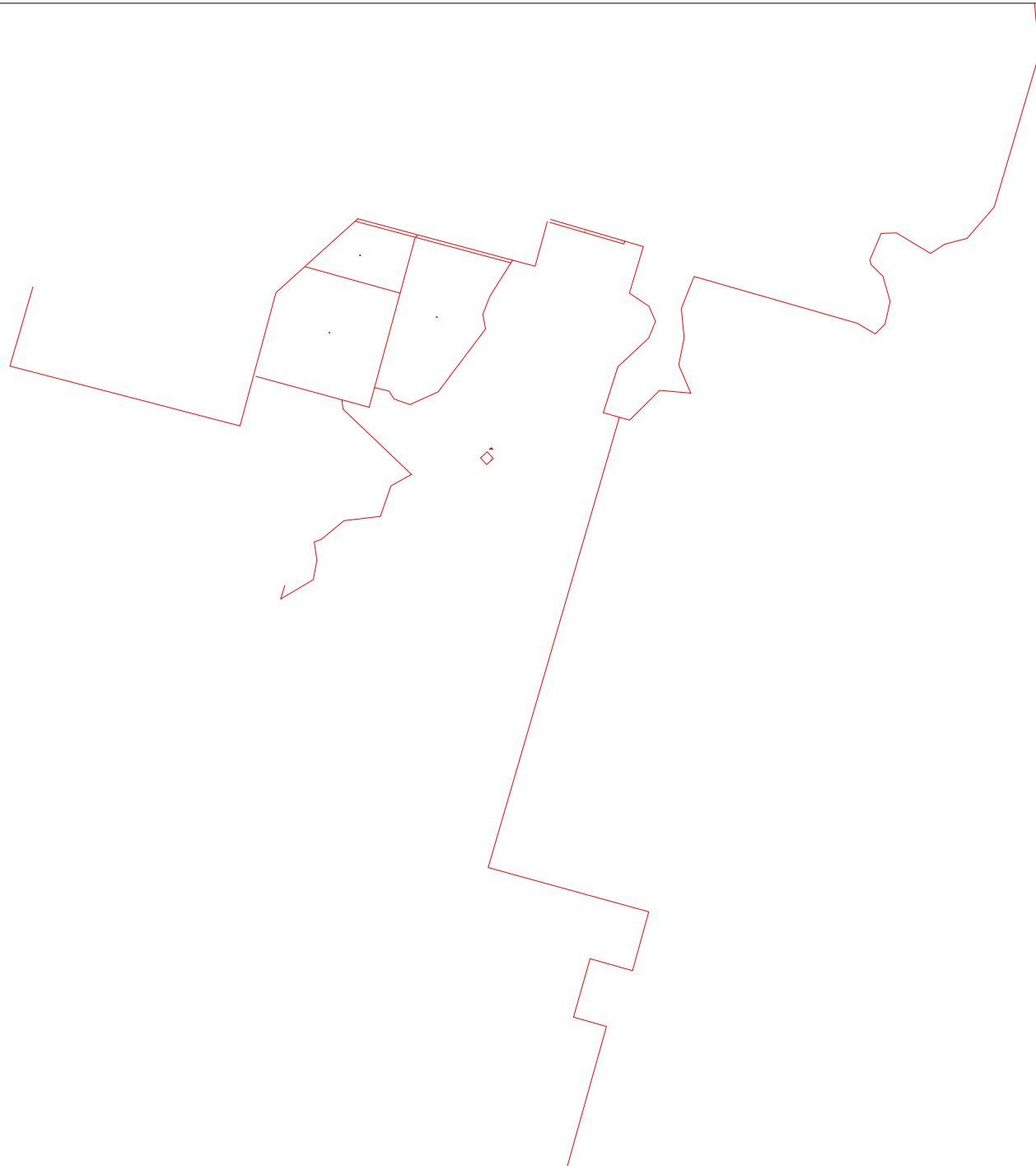
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A4 SCALE: 1:13287



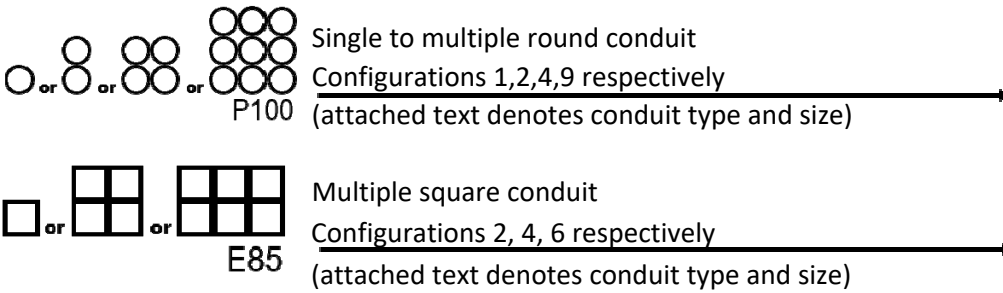
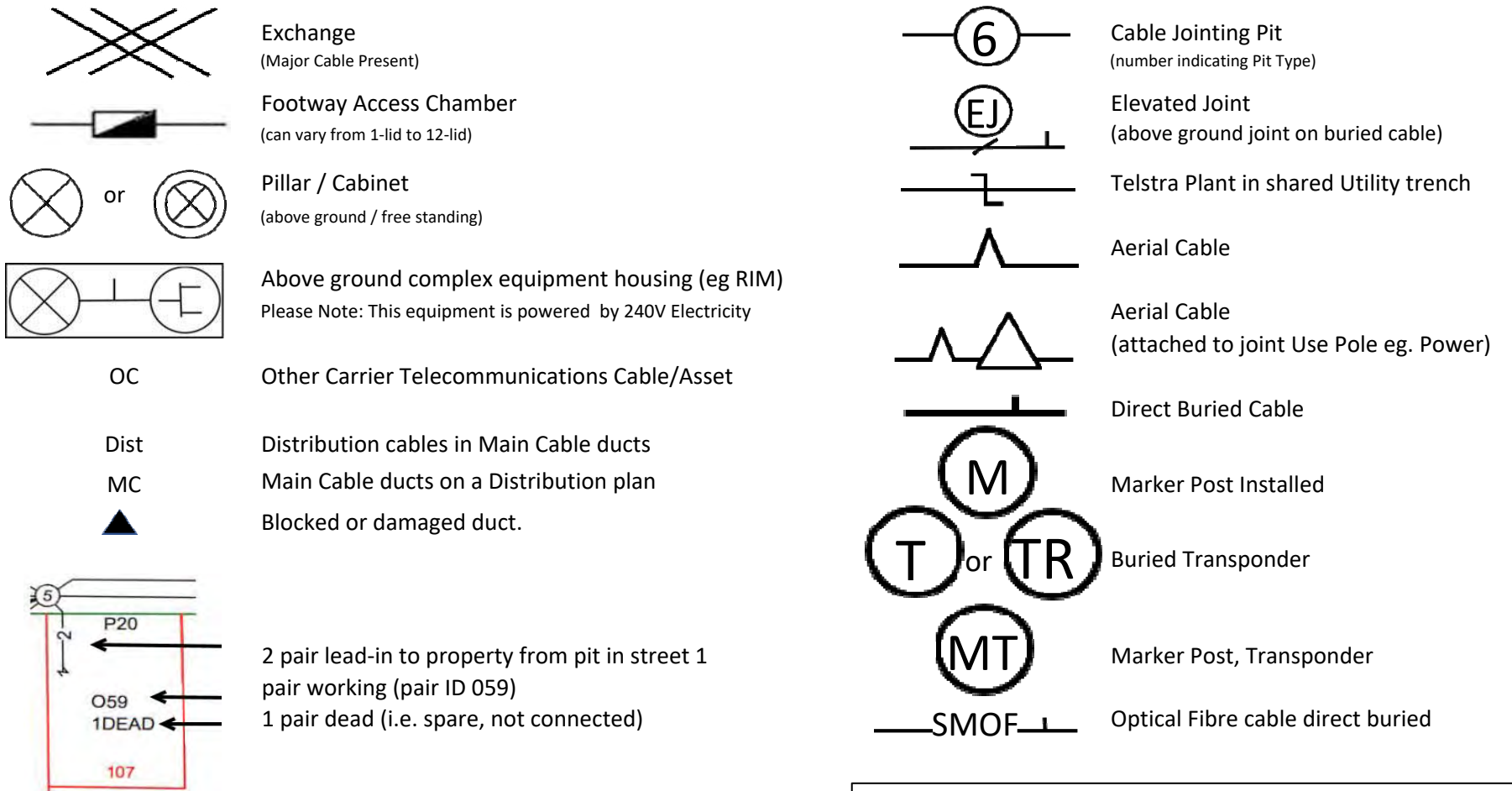


LEGEND

IT'S HOW WE CONNECT



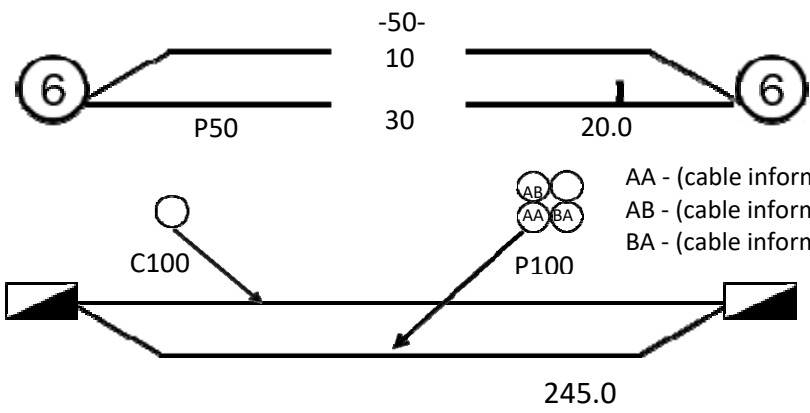
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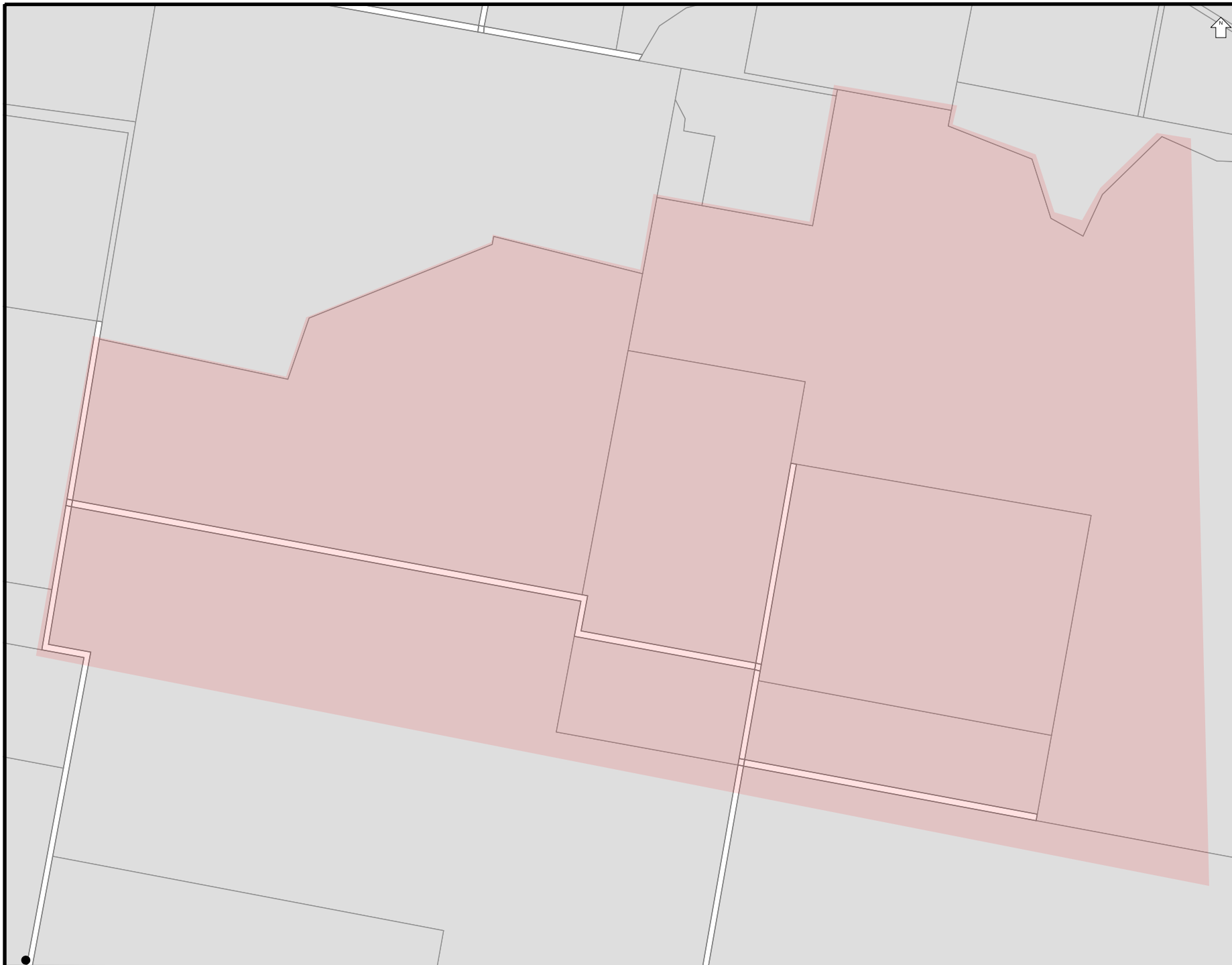
Some Examples of how to read Telstra Plans



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Overhead wires not shown
LOOK UP & LIVE!

LEGEND


-  LV Underground Cable
-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

Contact Essential Energy
on 13 23 91

-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works

Proposed assets are shown as
orange symbols

**THE INFORMATION ON THIS
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ACCURATE.**

If details are
incorrect, please
notify

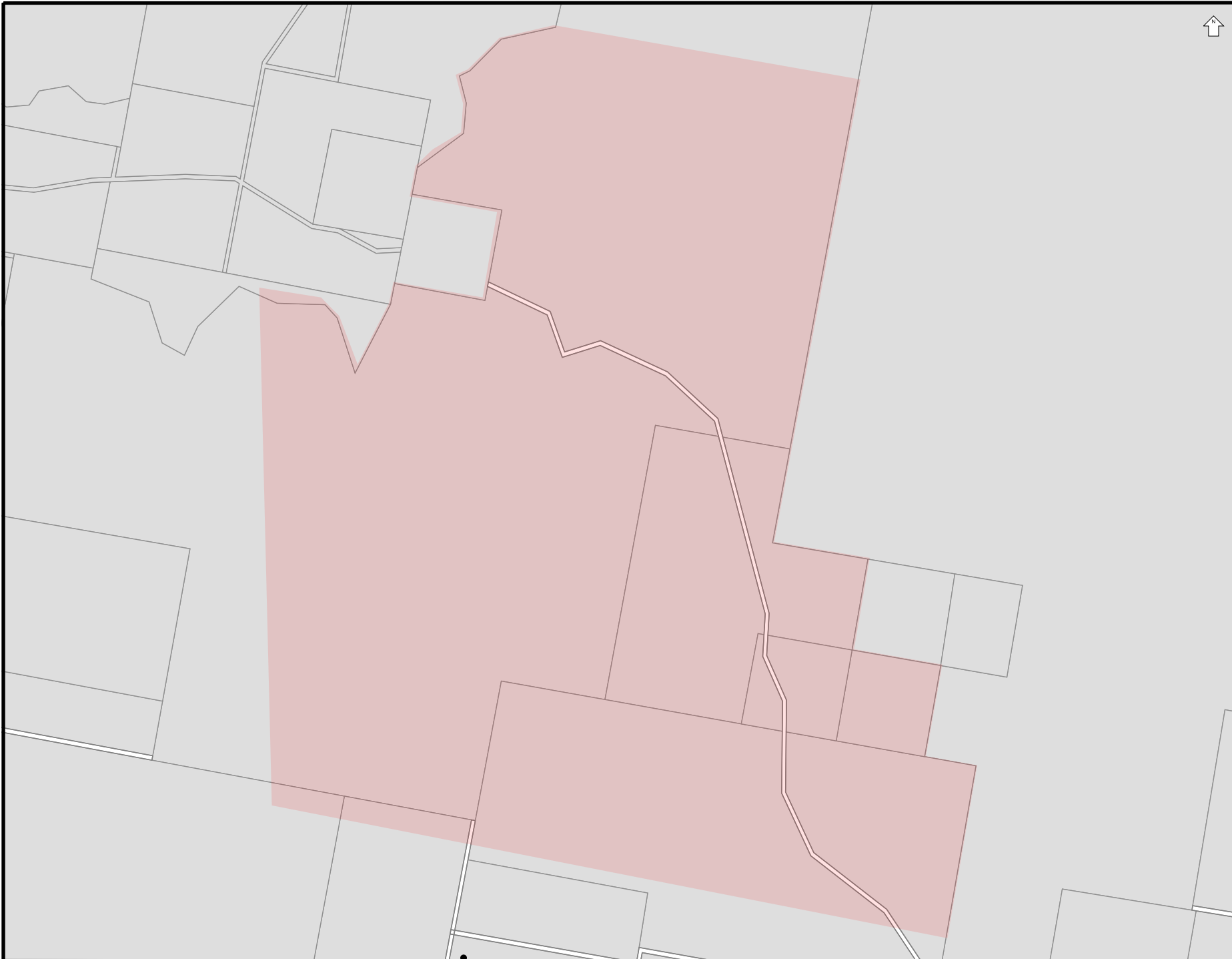
Essential Energy on
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

A4 SCALE: 1:15361








Overhead wires not shown
LOOK UP & LIVE!


LEGEND

-  LV Underground Cable
-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
-  Zone Substation
 -  Underground Cable
 -  Underground Fibre

Proposed Works

-  Area of proposed works

Proposed assets are shown as orange symbols

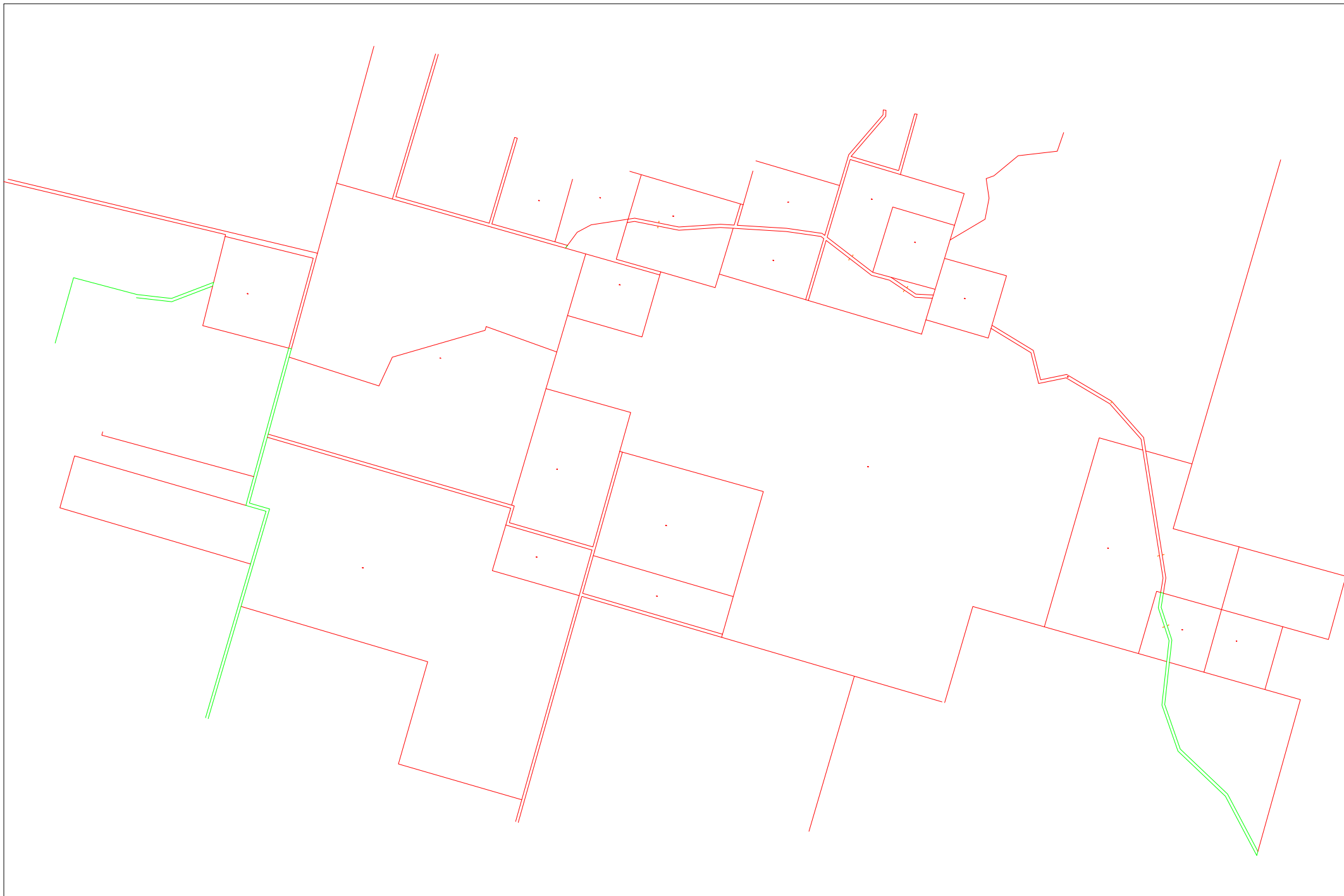
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A4 SCALE: 1:22067



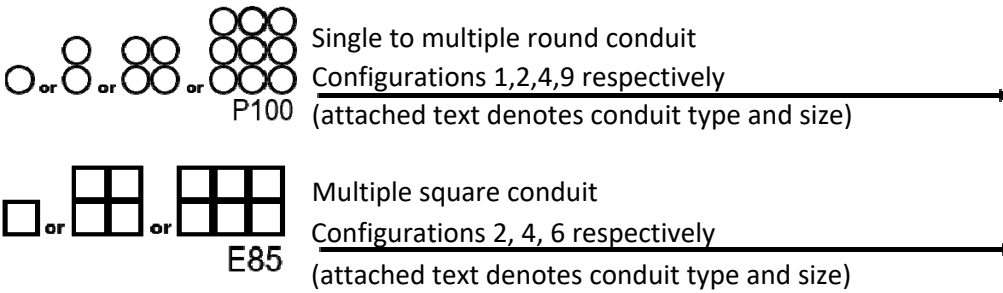
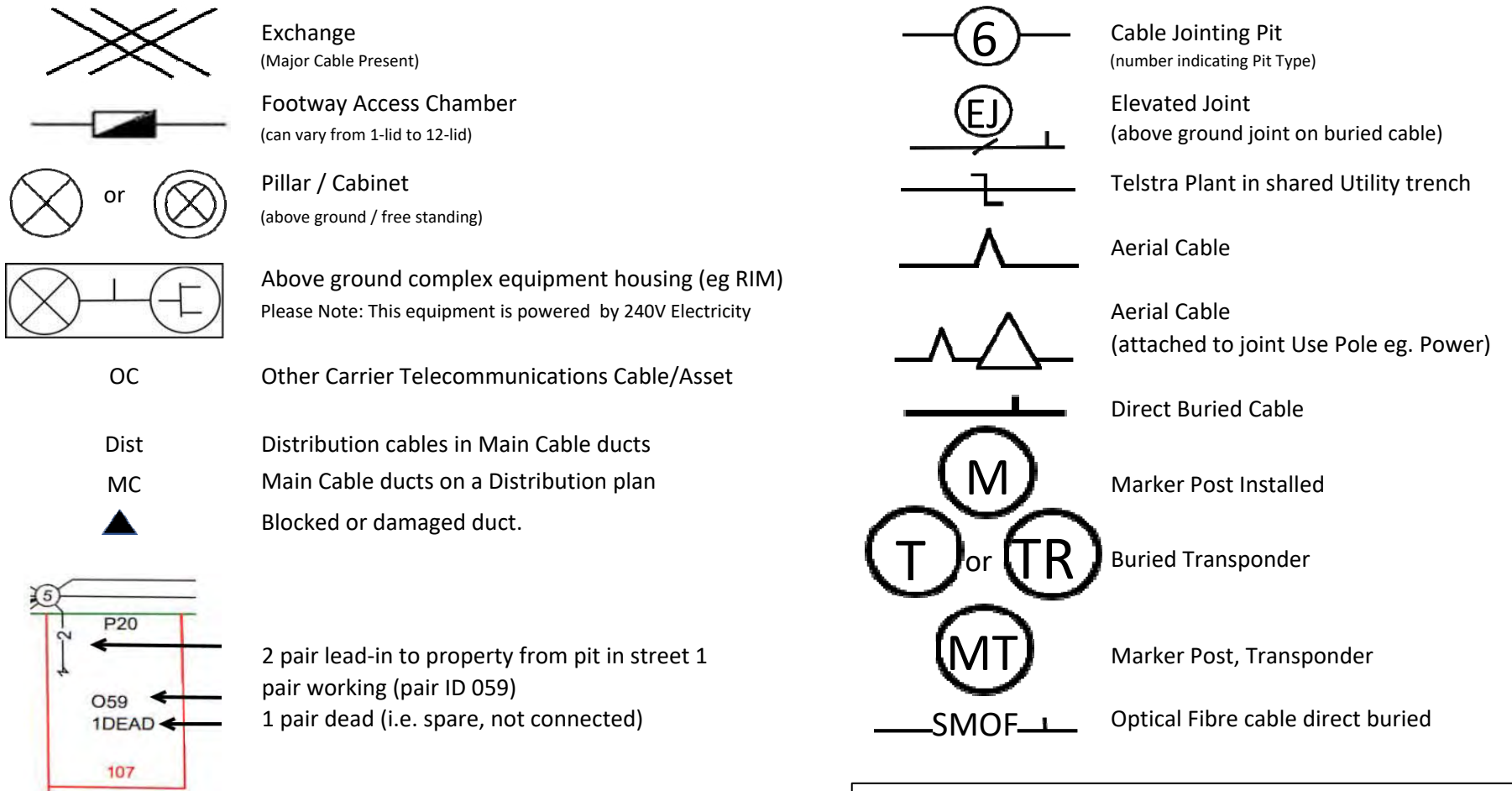


LEGEND

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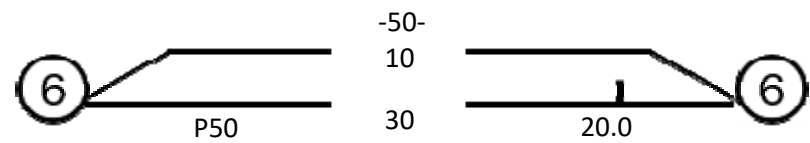
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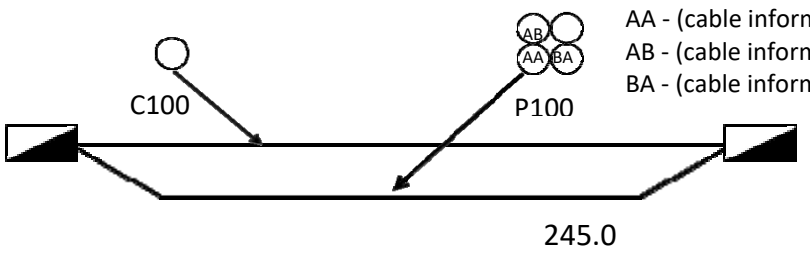
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Some Examples of how to read Telstra Plans

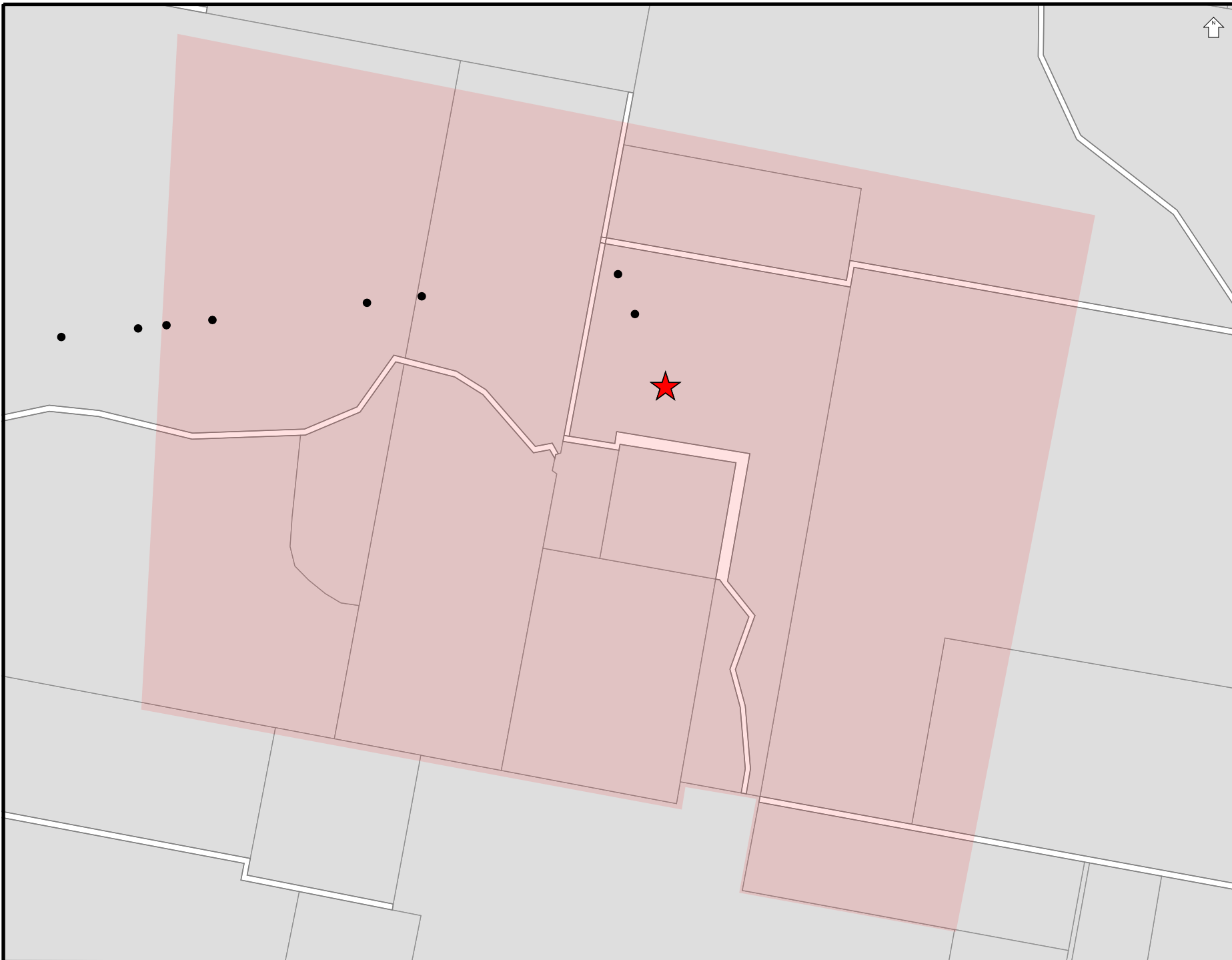


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

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Overhead wires not shown
LOOK UP & LIVE!


LEGEND

-  LV Underground Cable
-  HV Underground Cable
-  Underground Pipe
-  Underground Earth or Wires
-  Ground Substation
-  Pole
-  Cubicle
-  Pit
-  Area of Interest

Critical Assets

- Contact Essential Energy on 13 23 91
-  Zone Substation
-  Underground Cable
-  Underground Fibre

Proposed Works

-  Area of proposed works
- Proposed assets are shown as orange symbols

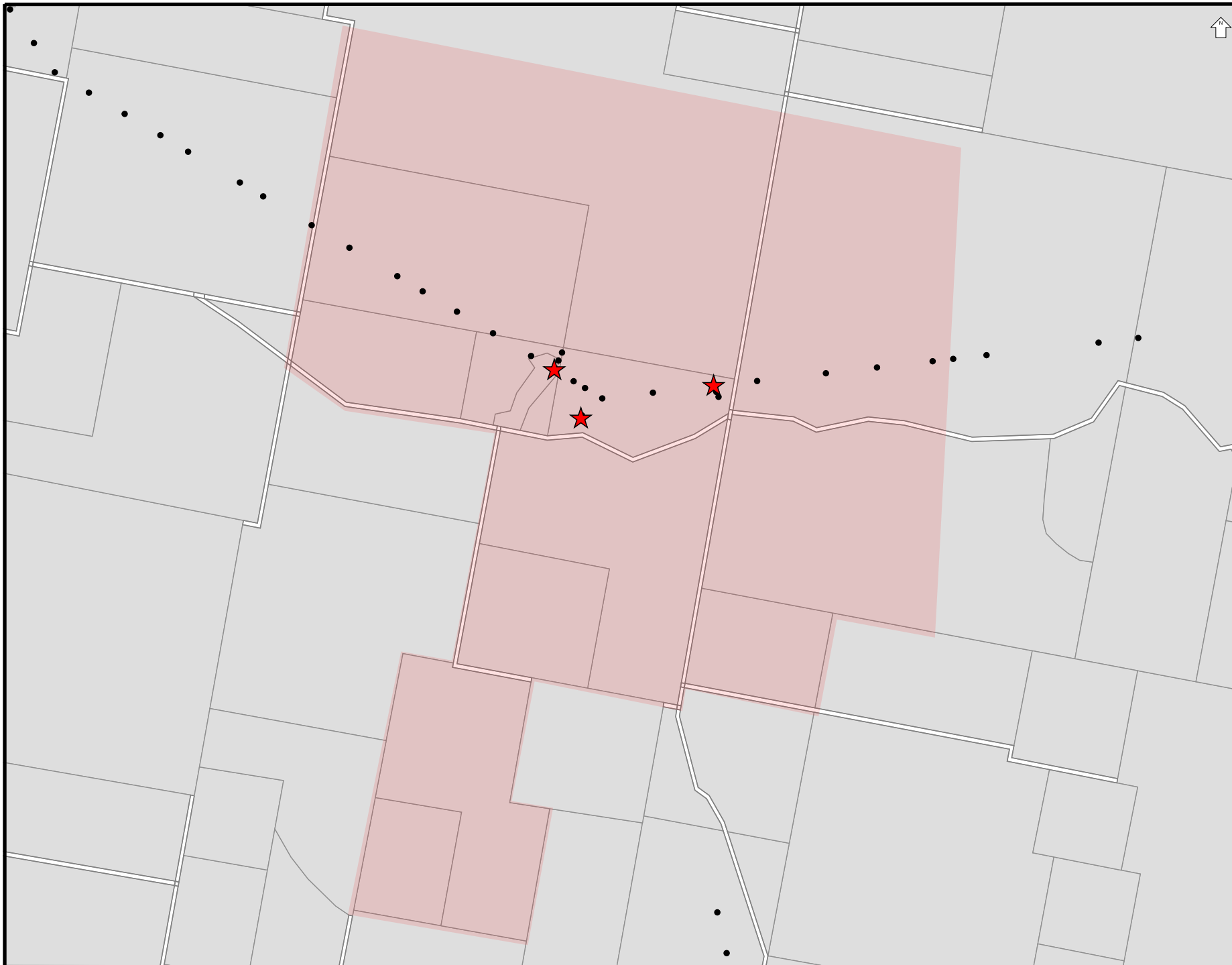
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A4 SCALE: 1:16702





Overhead wires not shown
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LEGEND

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- - - - HV Underground Cable
- - - - Underground Pipe
- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- ⊗ Cubicle
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- Area of Interest

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- - - - Underground Cable
- . - . - . Underground Fibre

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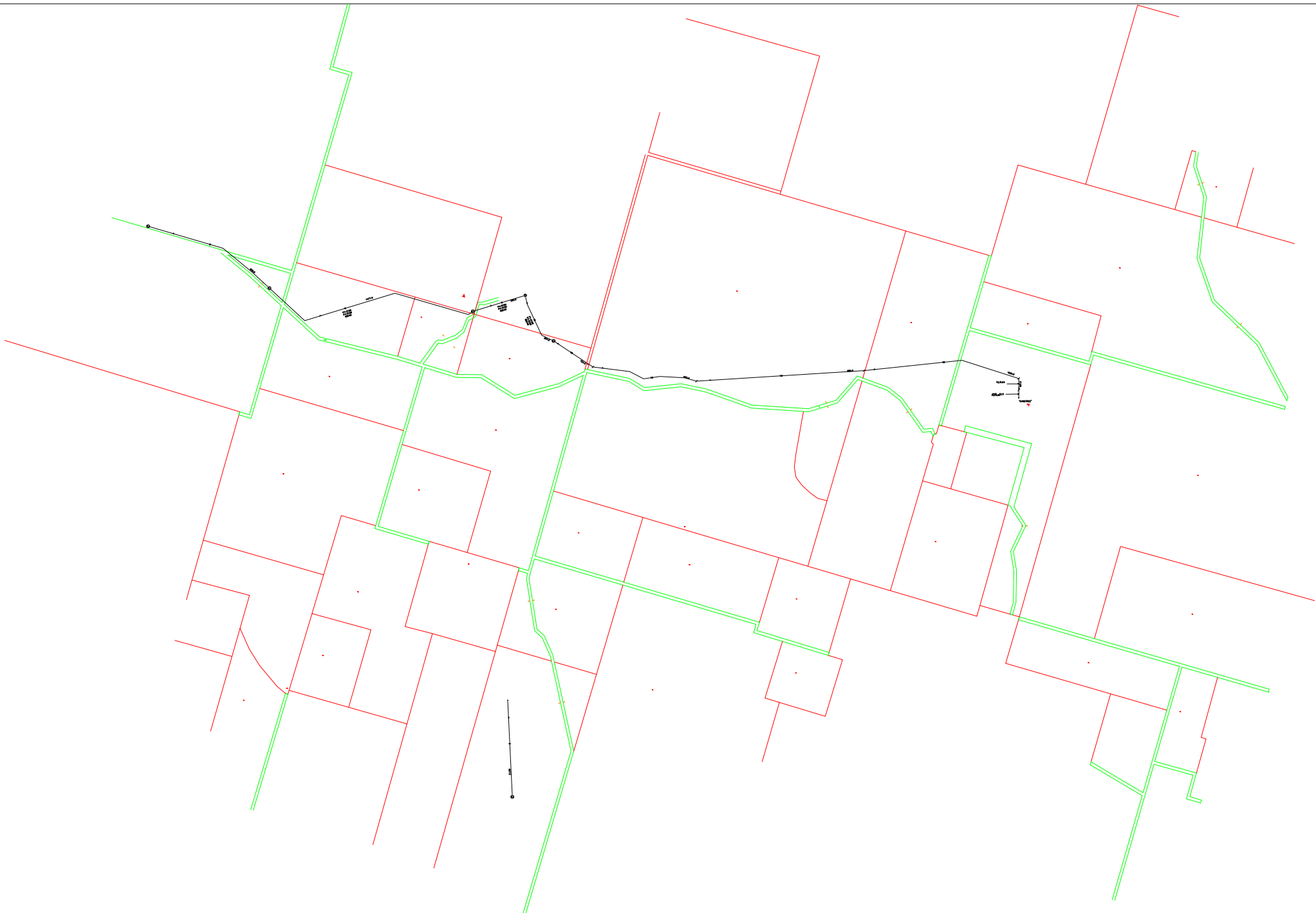
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A4 SCALE: 1:23153



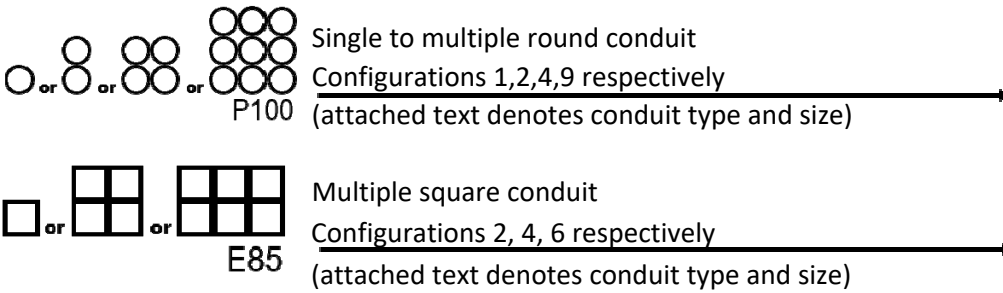
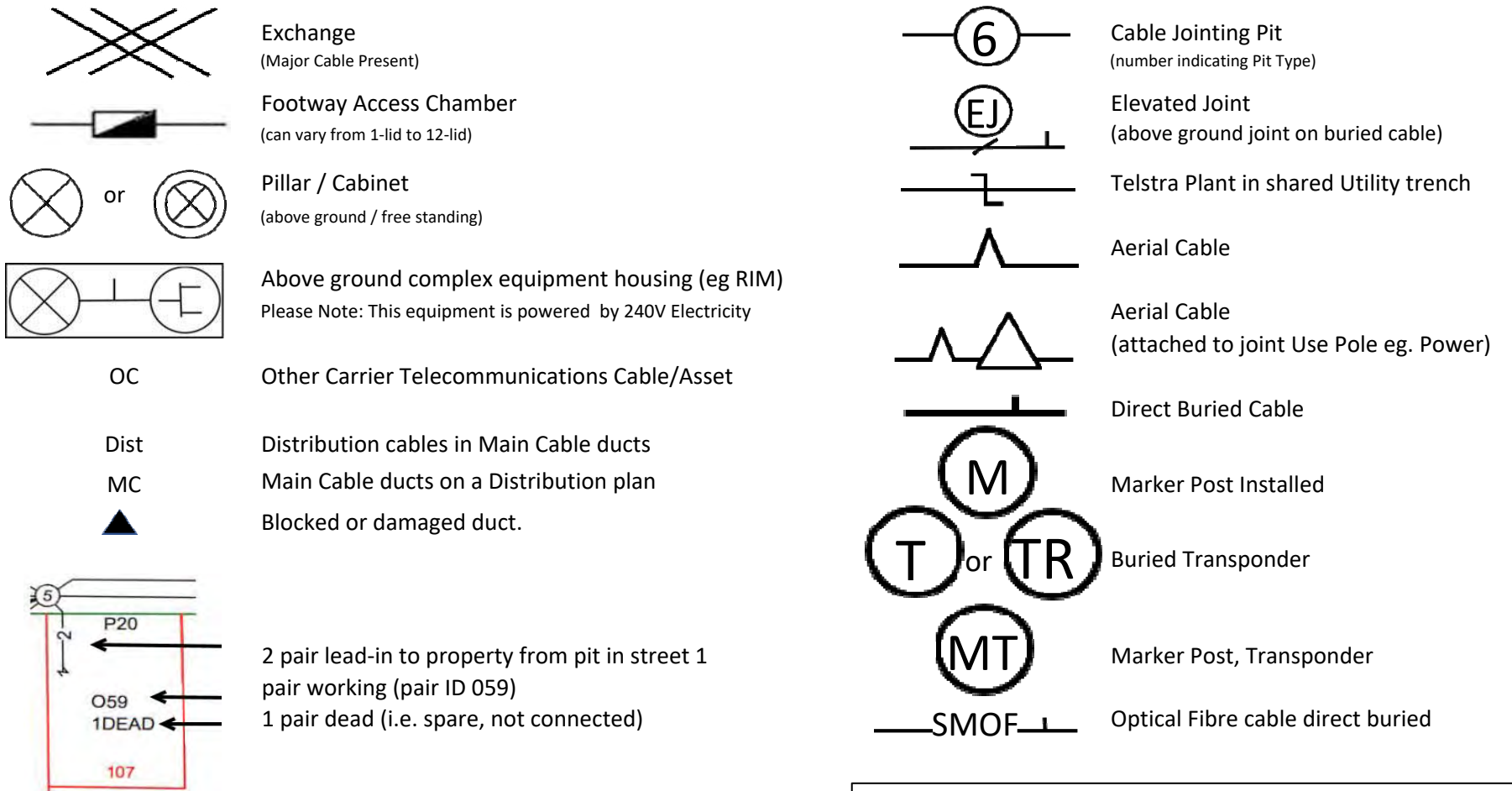


LEGEND

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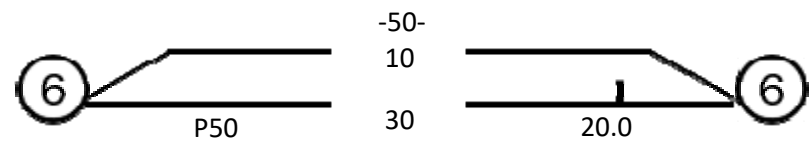
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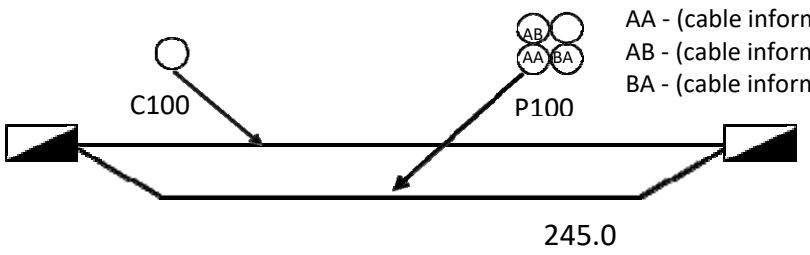
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Some Examples of how to read Telstra Plans

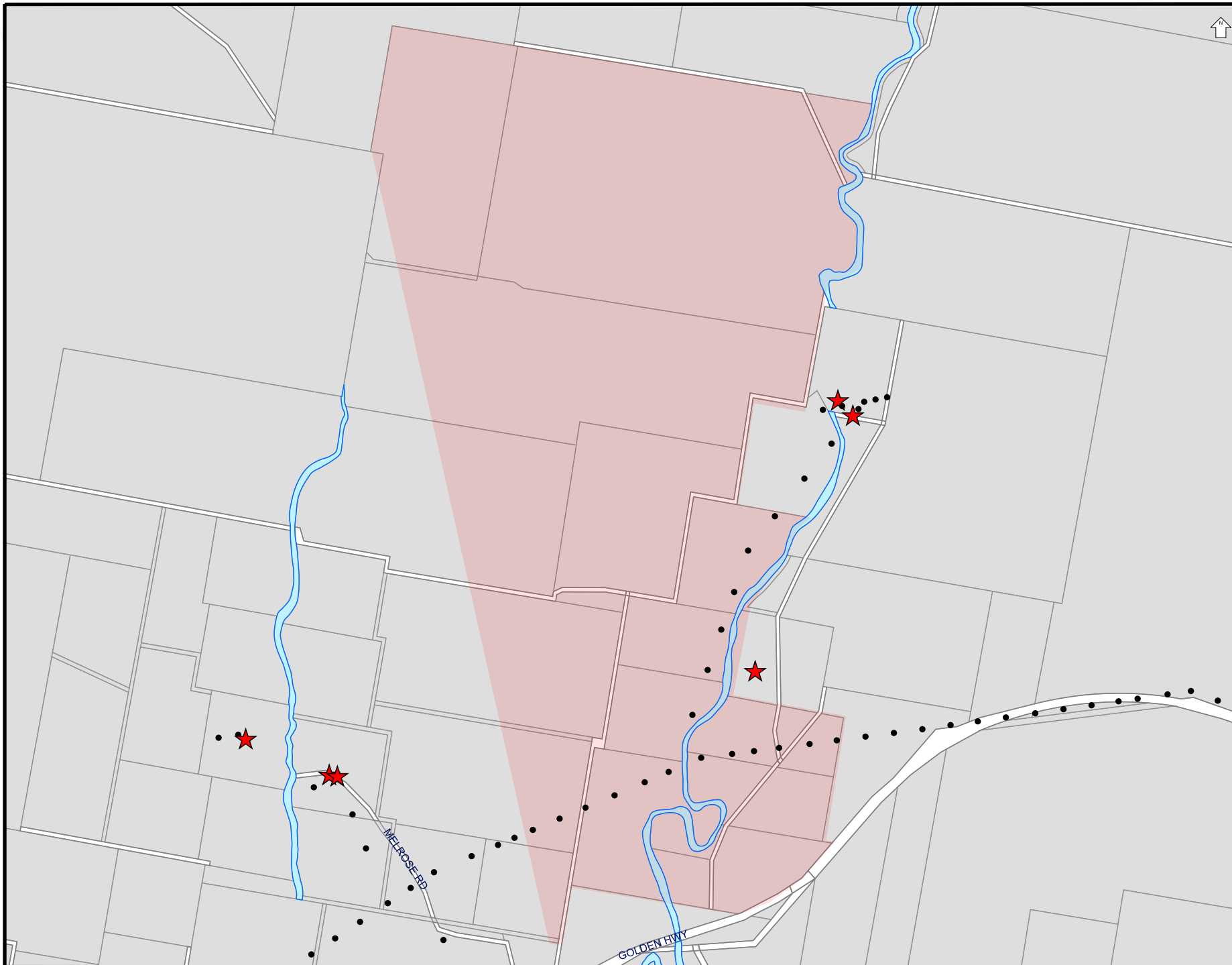


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Overhead wires not shown
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LEGEND

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- ★ Underground Earth or Wires
- ▲ Ground Substation
- Pole
- Cubicle
- Pit
- Area of Interest

Critical Assets

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- Zone Substation
- - - Underground Cable
- - - Underground Fibre

Proposed Works

- Area of proposed works
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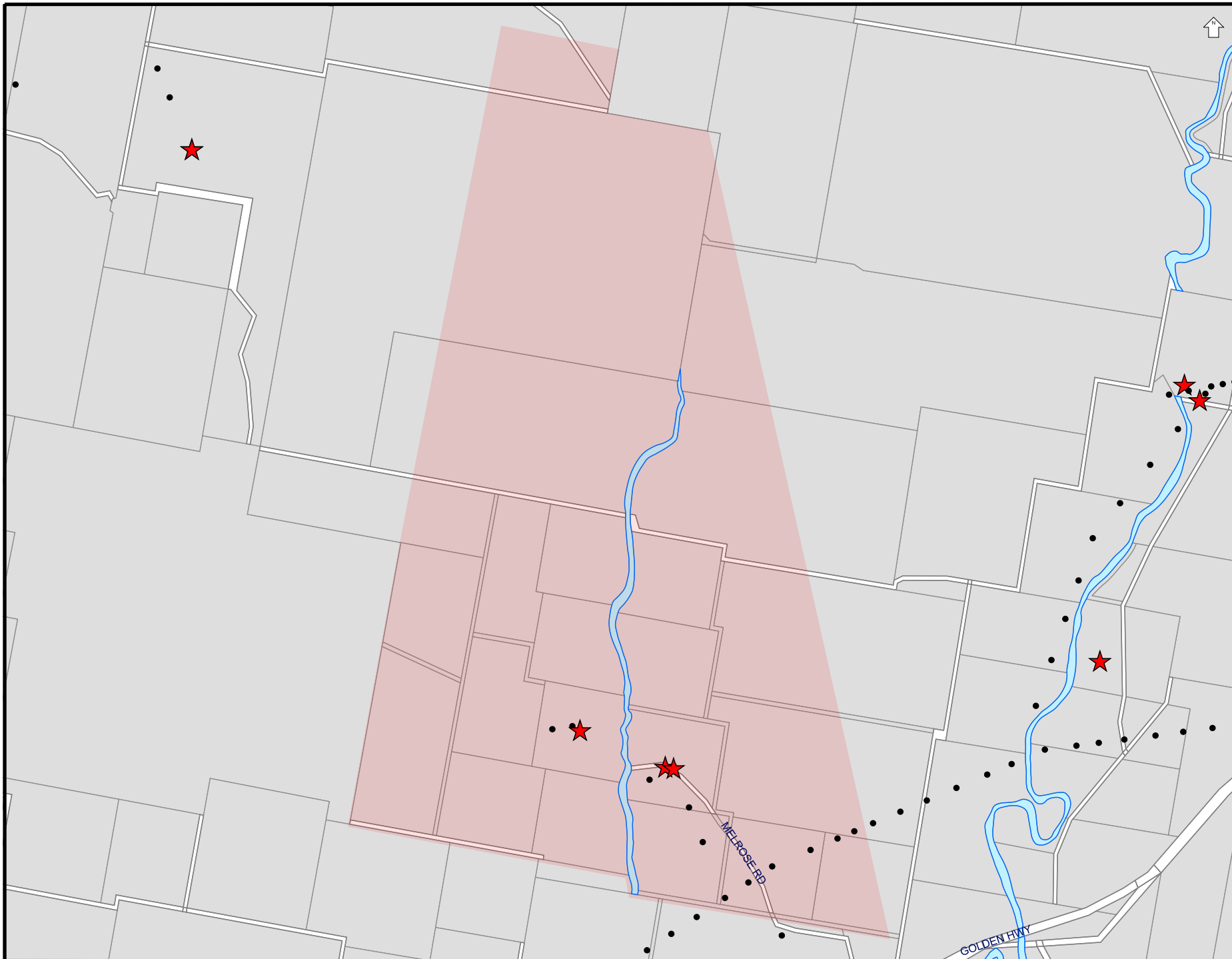
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A4 SCALE: 1:23680





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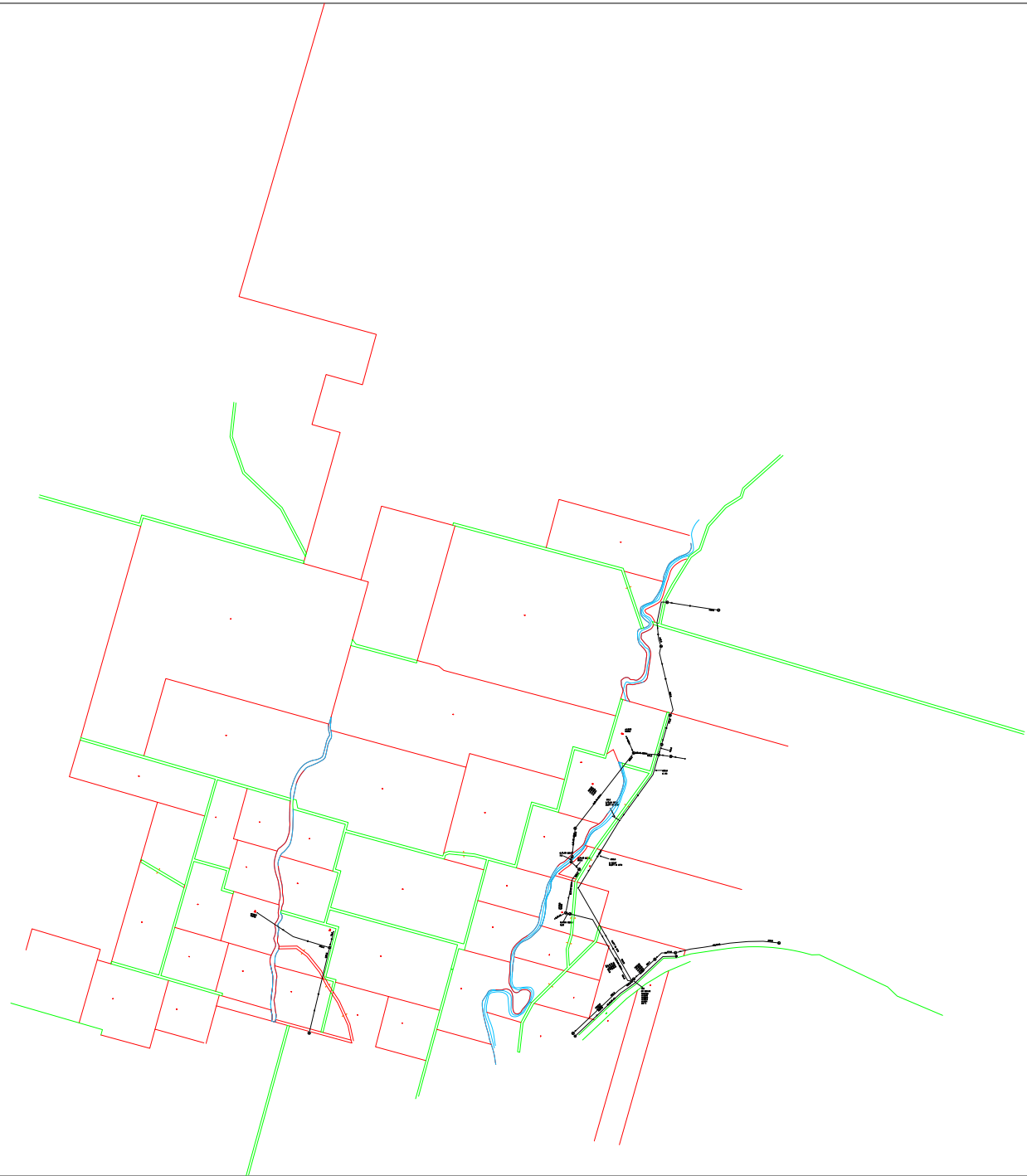
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A4 SCALE: 1:23065



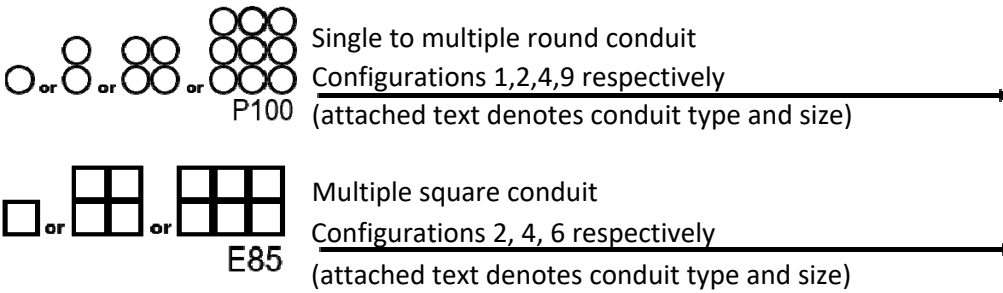
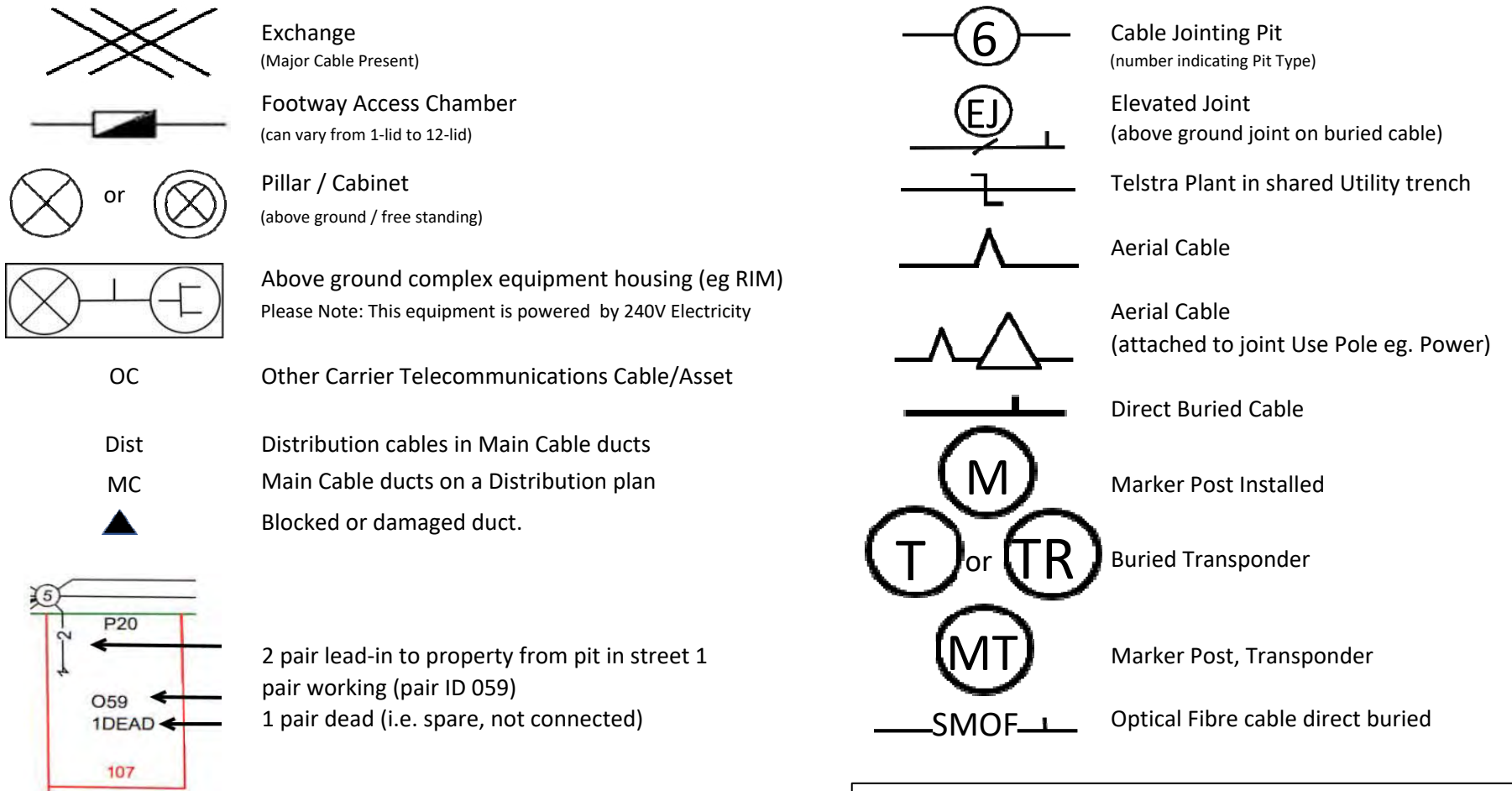


LEGEND

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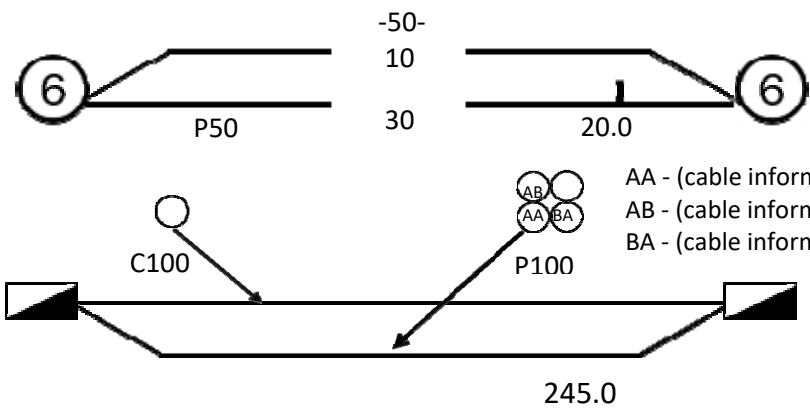
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Appendix E – Material Extraction Process and Estimated Tonnage

As calculated in Appendix B, the Estimated tonnage associated with the pavement construction for the entire project is 685,026t based on the inputs received from ACEN Renewables on the 31st of January 2024, shown below in Figure 1. Based on a 78 week timeline for construction, the annualised rate of extraction would be 456,684t across all quarry locations.

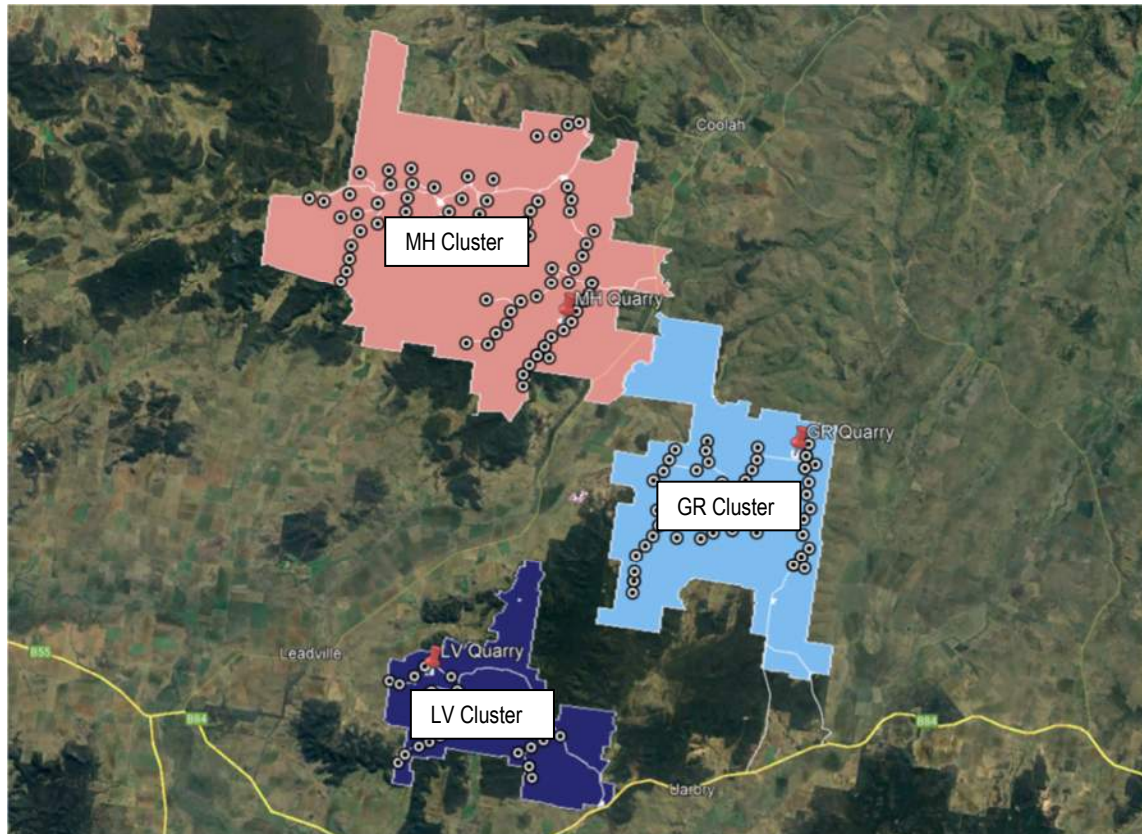


Figure 1: Valley of the Winds Site Layout and Quarry Locations

The estimate tonnage can be further broken down to the WTG clusters to determine the demand for each quarry as shown in Table 1.

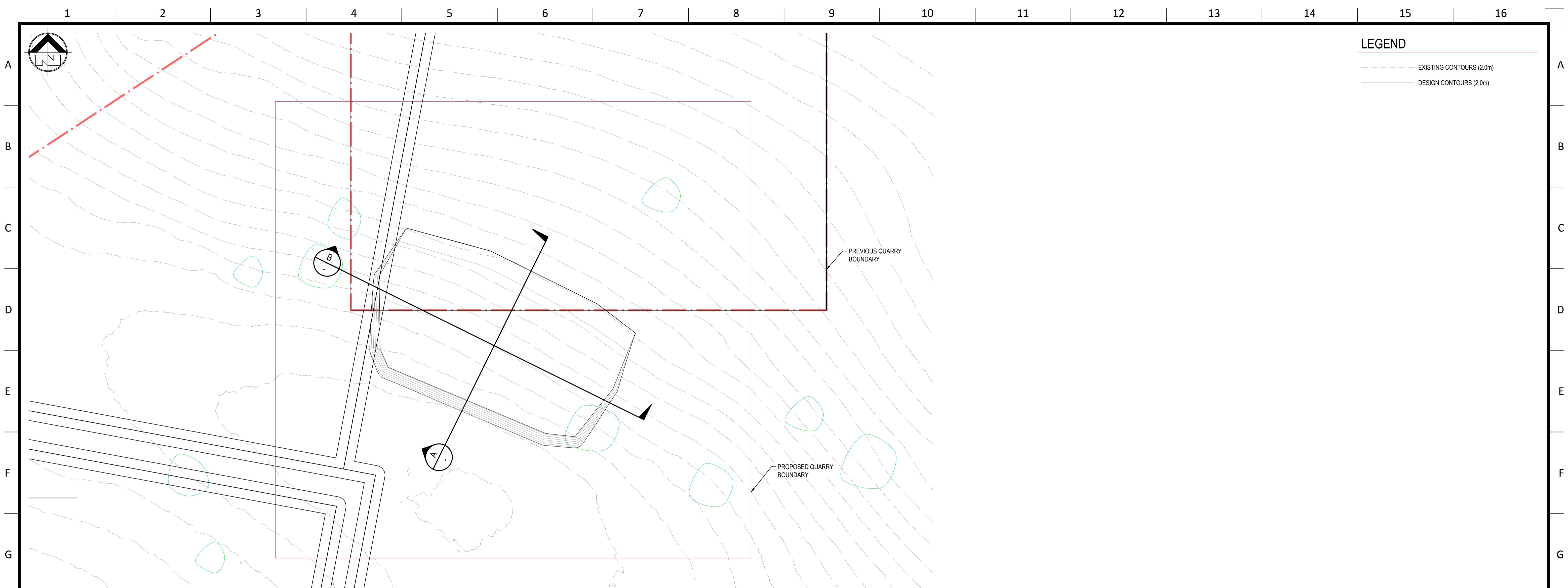
Table 1: Estimated Tonnage for WTG Clusters

Infrastructure	LV Cluster (t)	GR Cluster (t)	MH Cluster (t)	Total (t)
Access Tracks	60,722	113,845	146,692	321,258
WTG Hardstands	31,576	67,662	97,734	196,972
Substation Benches	22,311	65,685	36,801	124,796
O&M Facilities Bench	0	0	4,200	4,200
Concrete Batch Plant Benches	4,200	4,200	4,200	12,600
Construction Compound Benches	8,400	8,400	8,400	25,200
Total	127,208	259,791	298,026	685,026

Noting the limited availability of geotechnical information within the site at the time of writing, a pavement course thickness of 200mm has been assumed for all access tracks and hardstand formations.



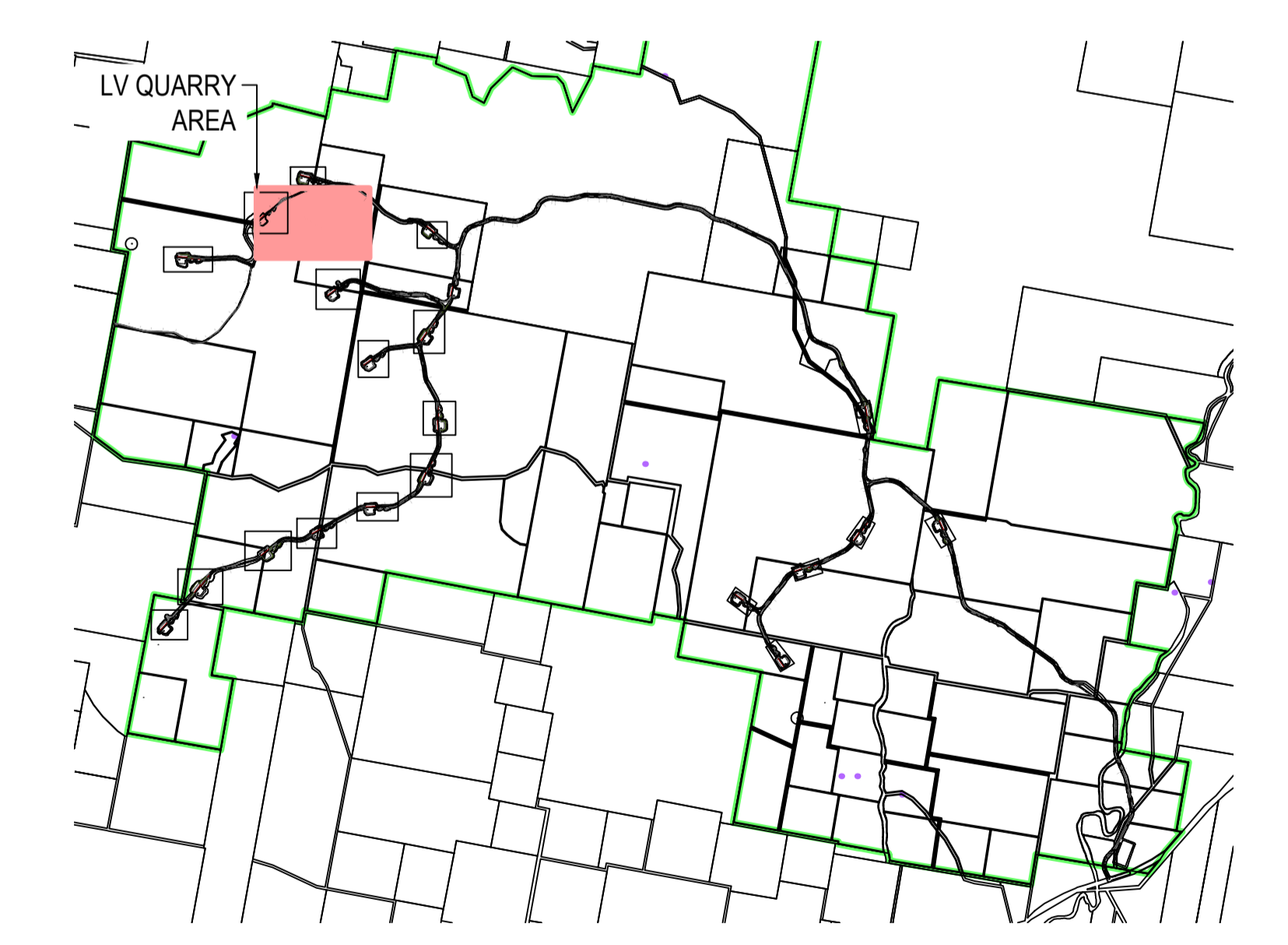
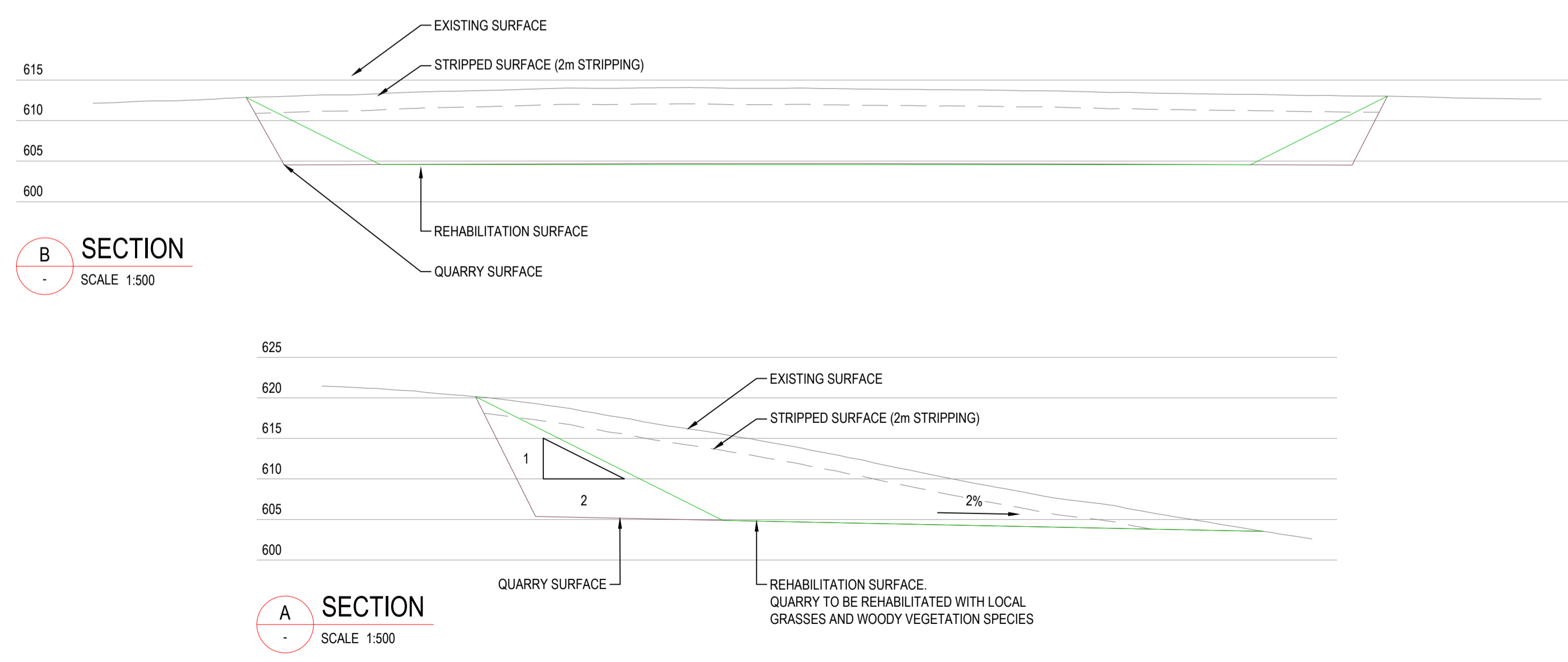
Appendix F – Quarry Rehabilitation Drawings



LEGEND

	EXISTING CONTOURS (2.0m)
	DESIGN CONTOURS (2.0m)

QUARRY LAYOUT (LE)
SCALE 1:1,000



KEY PLAN
NTS

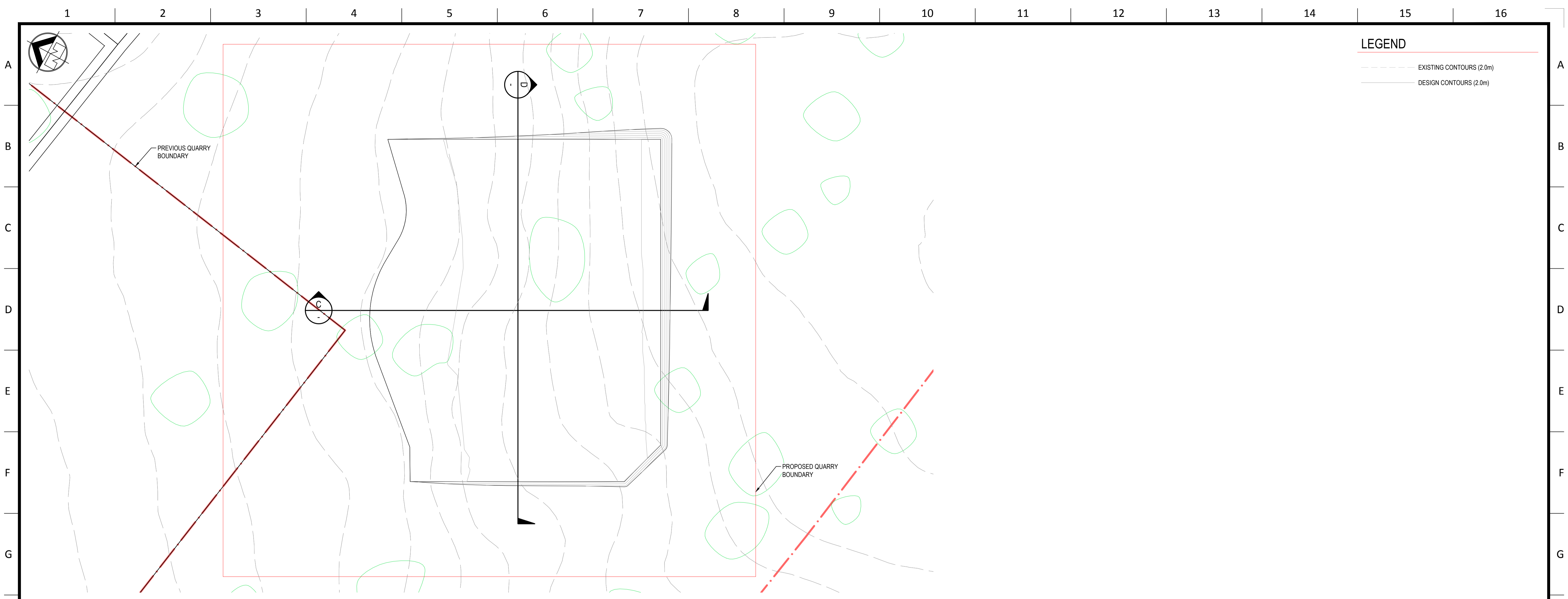
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A	ISSUED FOR INFORMATION					28.02.2024

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ACEN

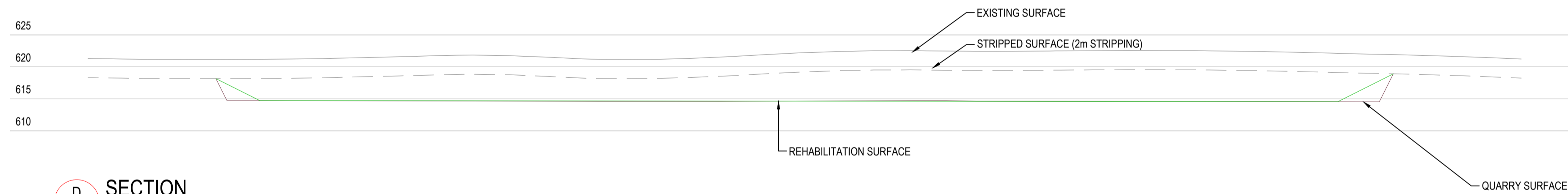
STATUS	FOR REVIEW NOT FOR CONSTRUCTION
SIZE	A1
HEIGHT DATUM	AHD
COORDINATE REFERENCE SYSTEM	GDA202 - MGA 55
	PRINT IN COLOUR

PROJECT	VALLEY OF THE WINDS WIND FARM	
TITLE	QUARRY REHABILITATION PLAN AND SECTIONS LV	
DRAWING No.	21-261-VWWF-DWG-Q001	REV A



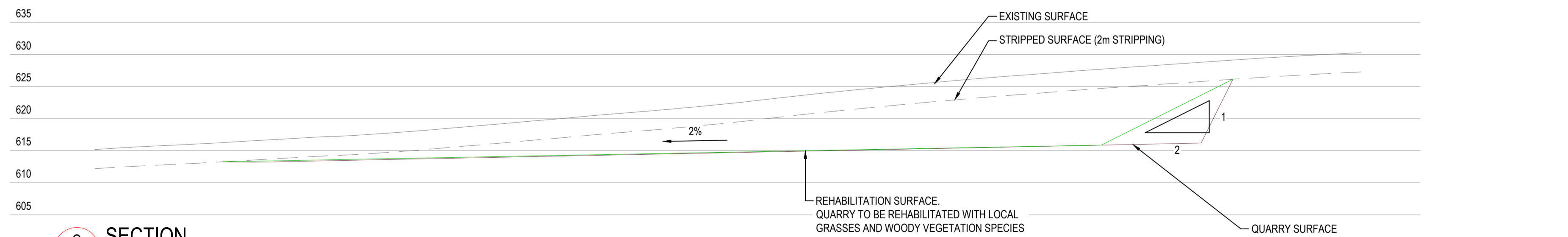
QUARRY LAYOUT (LE)

SCALE 1:1,000



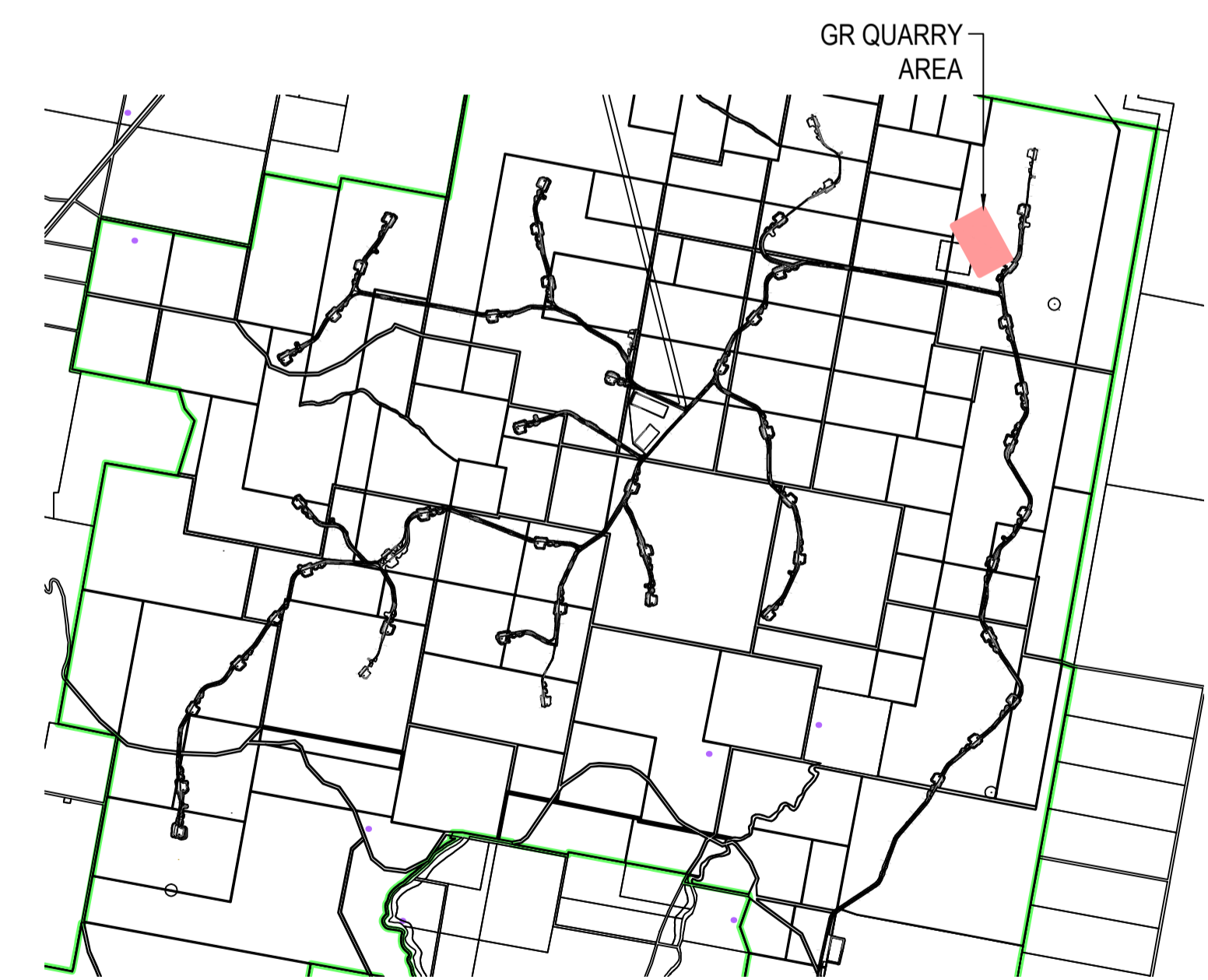
D SECTION

SCALE 1:500



C SECTION

SCALE 1:500



KEY PLAN

NTS

No	DESCRIPTION	O.J. DES	O.J. DRN	N.C. CHK	N.C. APP	DATE
A	ISSUED FOR INFORMATION					28.02.2024

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ACEN

STATUS: **FOR REVIEW**
 NOT FOR CONSTRUCTION

SIZE: **A1** HEIGHT DATUM: **AHD**

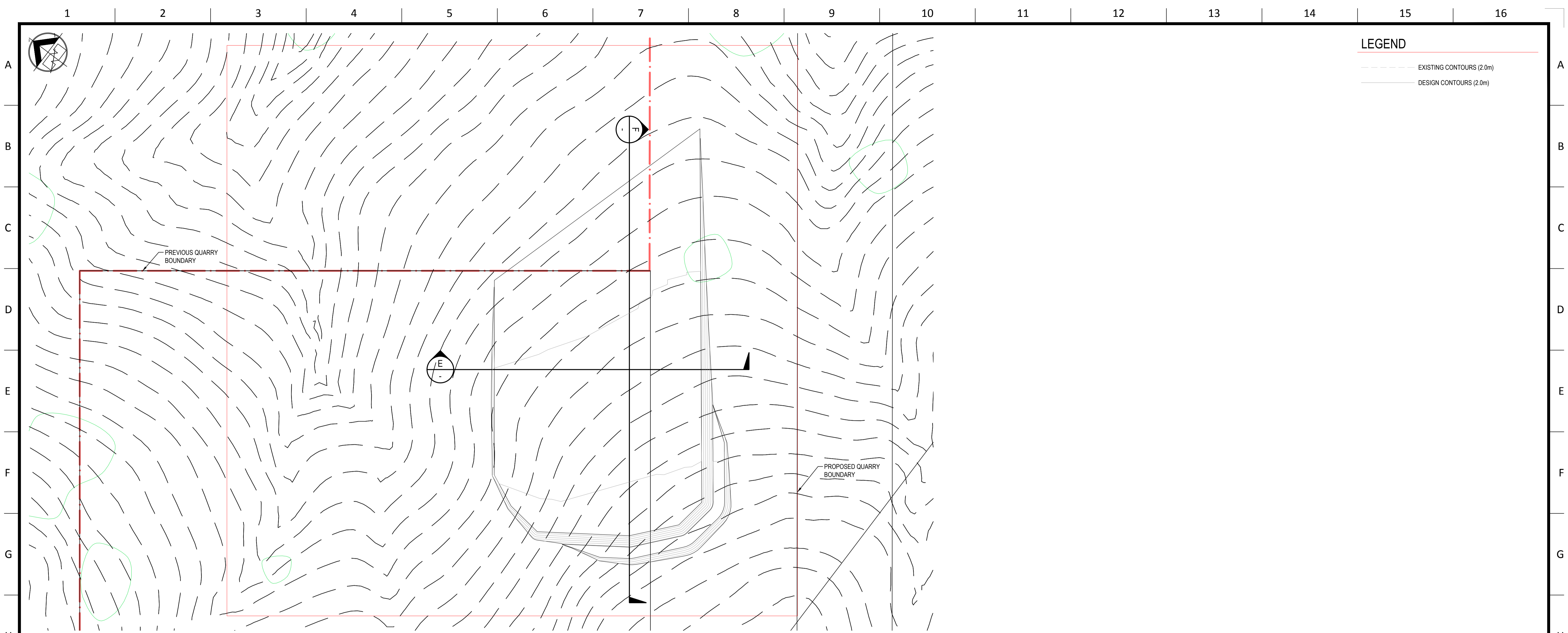
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PRINT IN COLOUR

PROJECT: **VALLEY OF THE WINDS WIND FARM**

TITLE: **QUARRY REHABILITATION PLAN AND SECTIONS GR**

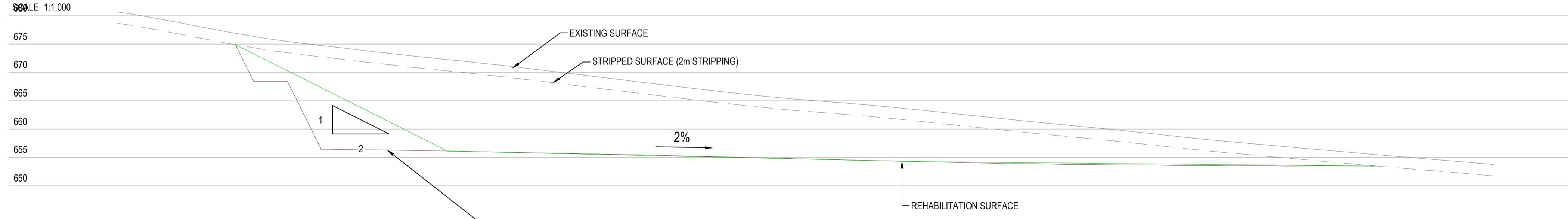
DRAWING No.: **21-261-VWWF-DWG-Q002** REV: **A**



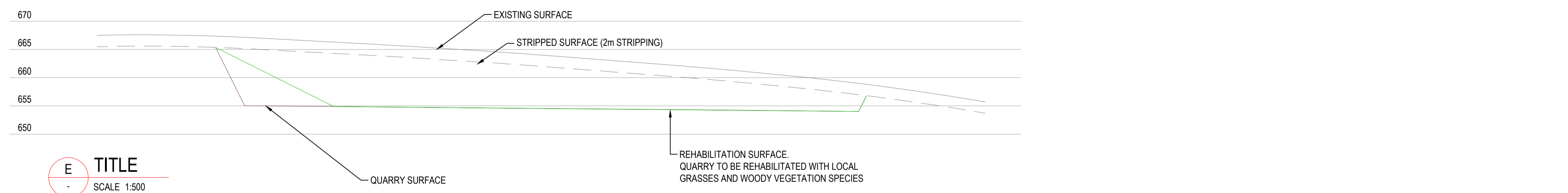
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	EXISTING CONTOURS (2.0m)
	DESIGN CONTOURS (2.0m)

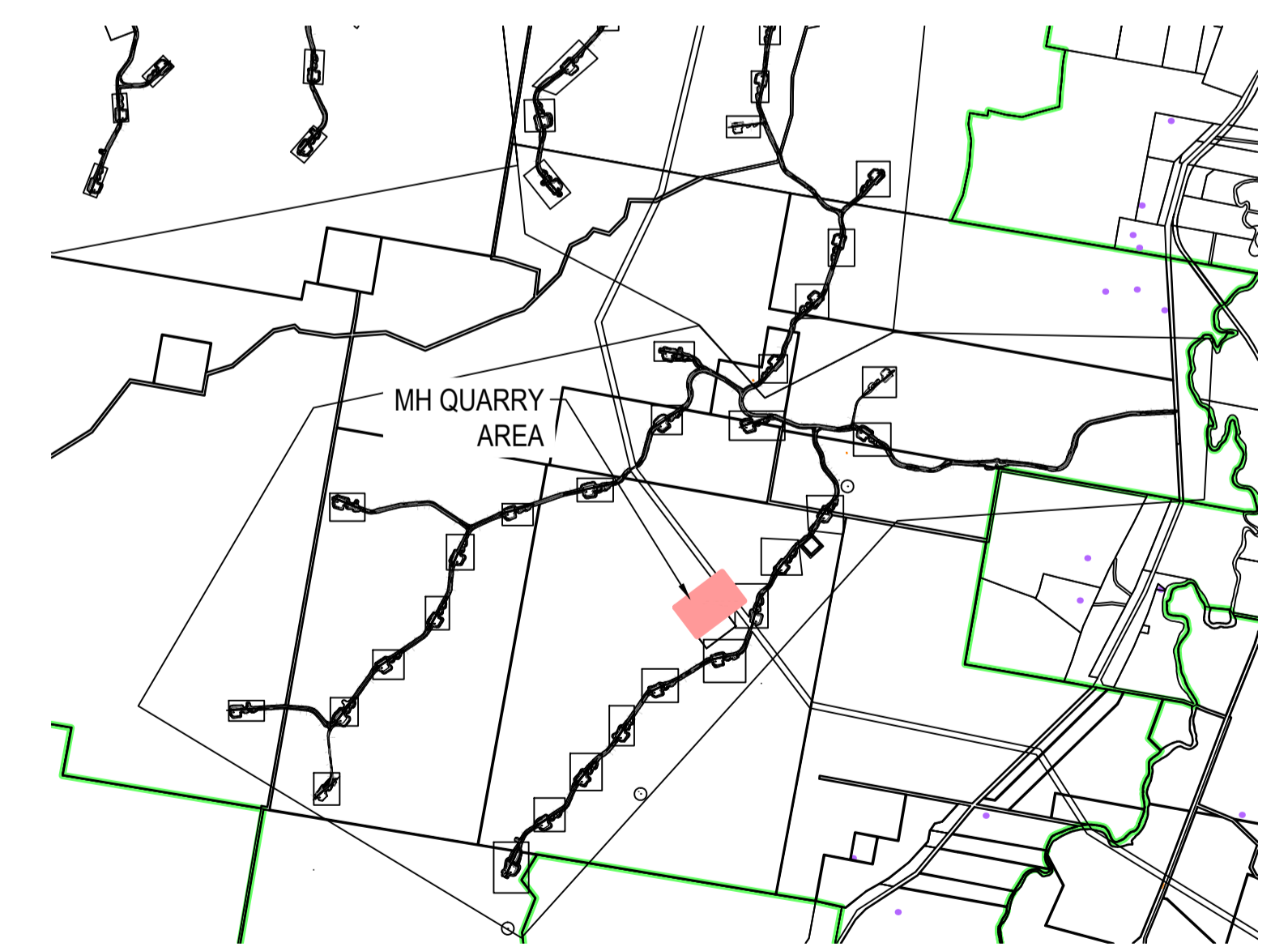
QUARRY LAYOUT (LE)



F TITLE
SCALE 1:500



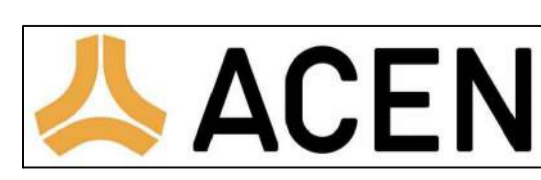
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KEY PLAN
NTS

No	DESCRIPTION	DES	DRN	CHK	APP	DATE
A	ISSUED FOR INFORMATION					28.02.2024

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STATUS	FOR REVIEW NOT FOR CONSTRUCTION
SIZE	A1
HEIGHT DATUM	AHD
COORDINATE REFERENCE SYSTEM	GDA202 - MGA 55
PRINT IN COLOUR	

PROJECT	VALLEY OF THE WINDS WIND FARM	
TITLE	QUARRY REHABILITATION PLAN AND SECTIONS MH	
DRAWING No.	21-261-VWWF-DWG-Q003	REV A