

Farrar West

Engineering Services Plan

Project No: 17-182



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- Appendix One: Electrical and Communications Assessment
- Appendix Two: Geotechnical Investigation
- Appendix Three: Preliminary Civil Design Drawings
- Appendix Four: Headworks Sketch.

Revision	Description	Author	Checked	Date
0	Engineering Services Plan	JC	FO	25/09/2026

1 Introduction

1.1 Purpose of this Document

Colliers has been engaged by the Larrakia Development Corporation (LDC) to prepare an engineering services/infrastructure assessment report to support the Development Application for the proposed development site at Farrar West. The intent of this report is to demonstrate engineering due diligence for the whole of the site and provide a summary of proposed infrastructure elements to service the development.

1.2 Background

This report summarises the proposed water, sewer and drainage infrastructure planning and design, along with commentary regarding other engineering aspects, such as earthworks, roads and pathways for the proposed Farrar West Development Project, located in Palmerston, Northern Territory as shown in Figure 1 below. The project proposes to subdivide the existing gazetted and undeveloped lots 13256 and 13257 into approximately 250 individual lots, comprised mostly of Low and Low to Medium Density residential housing, in accordance with zoning presented within the Palmerston Eastern Suburbs Planning Principles and Area Plan. Currently gazetted lot 13260 is also included in the masterplan.

The development is proposed to include reticulation of services infrastructure typical of broadacre greenfield subdivision, including water, power, sanitary sewage, stormwater, communications, lighting, as well as road and pathways to service the residential development.

Electrical and communication assessment and preliminary design has been undertaken by Promant Electrical Engineers, with their technical memorandum and sketches included in Appendix One.

Stormwater assessment and preliminary design has been coordinated with flood and hydrologist engineers, WRM Water and Environment, along with the preliminary earthworks design. Further details and assessment for drainage are included within the separate Stormwater Management Plan – part 1, which is required under the NTG subdivision guidelines, and includes the flood impact assessment.

A site specific geotechnical investigation and recommendations report has been completed by CMW Geosciences and is included in Appendix Two.



Figure 1: Site Aerial (Nearmap, 2025)

1.3 Key Documents and Supplied Information

The following are key documents, as a minimum, have been used to guide the preliminary design:

- WSAA 02-2014 Gravity Sewers
- WSAA 03-2011 Water Supply
- PWC Northern Territory Supplement to WSAA 02 (2010)
- PWC Northern Territory Supplement to WSAA 03 (2010)
- ADG Land Use Planning Study (2022)
- Byrne Consulting Farrar West Works Plan (2025)
- Aurecon Roystonea Avenue Duplication Design Report T20-2421 (2023)
- Roystonea Avenue Upgrade, Terry Drive to Lambrick Avenue, R22-1729 to R22-1913 (2026)
- Northern Territory Subdivision Development Guidelines, July 2026
- City of Palmerston existing development information including the Palmerston Health Precinct, the Yarrowonga Development area, along with existing Farrar Developments stage A and B on the north/east side of Farrar Boulevard.

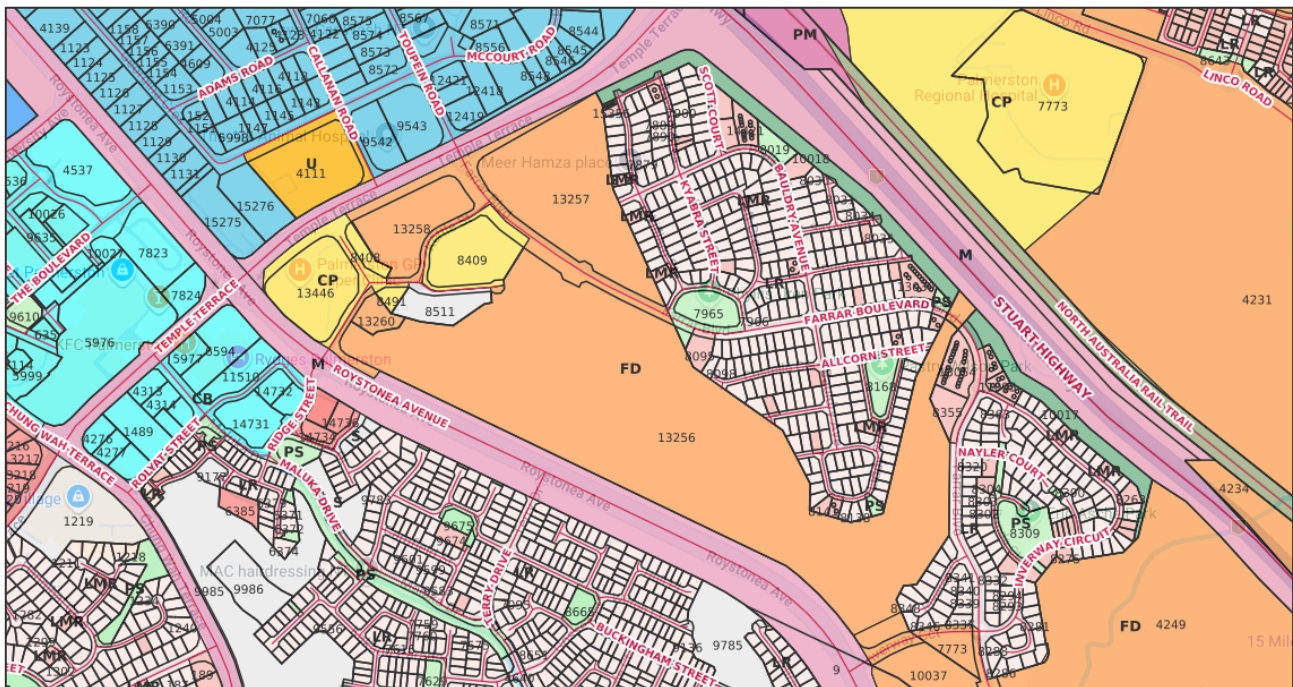
In addition, the following information has been sourced by LDC to inform preliminary design and engineering assessment:

- Geotechnical investigation (CMW, 2026)
- Survey (EJA, 2026)
- Flood and Hydrology (WRM 2026)

2 Site

2.1 Site Location

The allotments are located at the junction of Temple Terrace, Roystonea Avenue and Farrar Boulevard within the City of Palmerston. The total site area across the three allotments is approximately 42.4ha. The existing land titles and details for each lot are given in table 1 below. Approximately 15ha of this total area are occupied by drainage reserve:



Title	Lot 13256	Lot 13257	Lot 13260
Street Address	Farrar Blvd, Farrar NT 0830	Farrar Blvd, Farrar NT 0830	6 Gurd St, Farrar NT, 0830
Site Area	34.65Ha	7.27Ha	0.5Ha

Figure 2: Proposed Development Site (NR Maps, 2026)

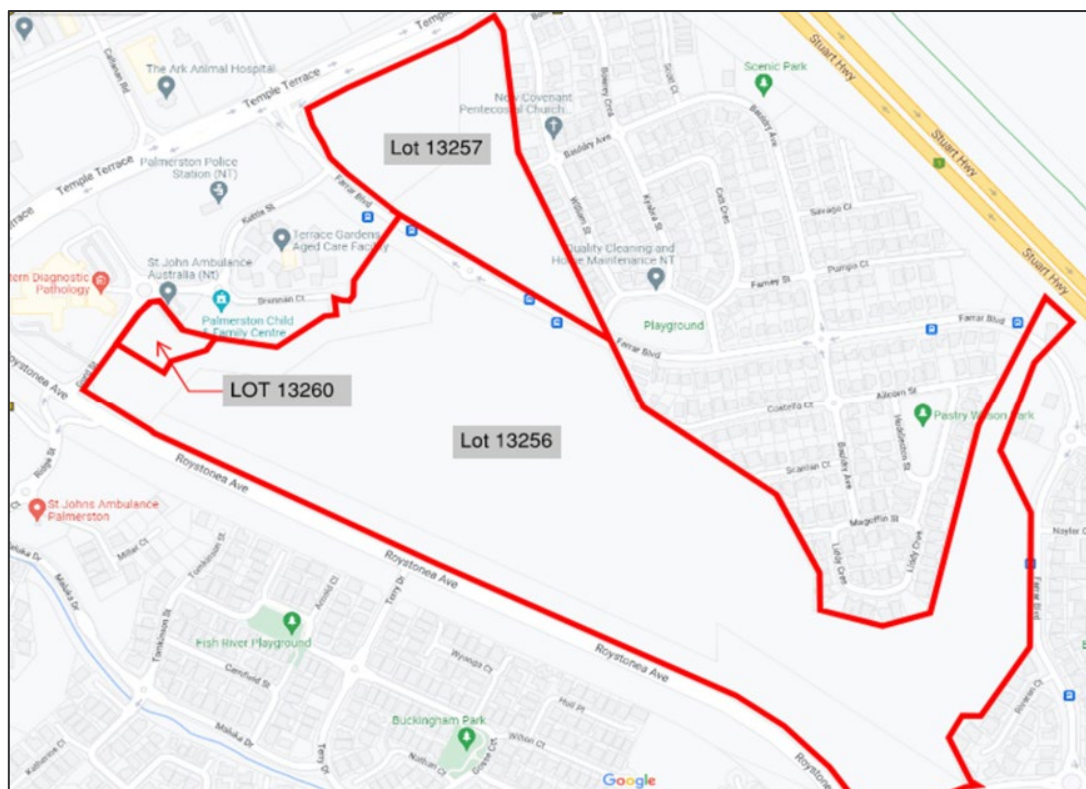


Figure 3: Locality Map (Google Maps, 2021)

2.2 Existing Development and Interface

The Farrar West development is constrained by existing developed areas on all sides, including:

- Roystonea Avenue on the south (Primary Arterial Road)
- Farrar residential development on the northeast, east and southeast
- Yarrawonga Industrial Development and Palmerston Health Precinct on the west and north.
- Temple Terrace to the north (primary arterial road)

It is proposed that the Farrar West development shall connect to the following infrastructure:

- Farrar Boulevard via a new access road from the existing roundabout
- Roystonea Avenue via a new signalised intersection at the current location of Terry Drive
- Additional road connections likely at Brennan Court and a left-in, left-out intersection onto Roystonea Ave south of the signalised intersection.
- Reticulation sewer on Farrar Boulevard at multiple locations
- Trunk sewer on the south-eastern side of Lot 13256
- Reticulation water on Gurd Street, Brennan Court and Farrar Boulevard
- Trunk water on Inverway Circuit
- Stormwater culverts on Temple Terrace, Farrar Boulevard, Roystonea Avenue and Inverway Circuit
- Stormwater pipes on Farrar Boulevard and Gurd Street

2.3 Geotechnical

Site investigation and geotechnical testing was undertaken by CMW Geosciences group in July 2026. This report is included in Appendix Two for information.

4x6.0m boreholes and 42x3.0m test pits were investigated throughout the site as shown in Figure 2 below.

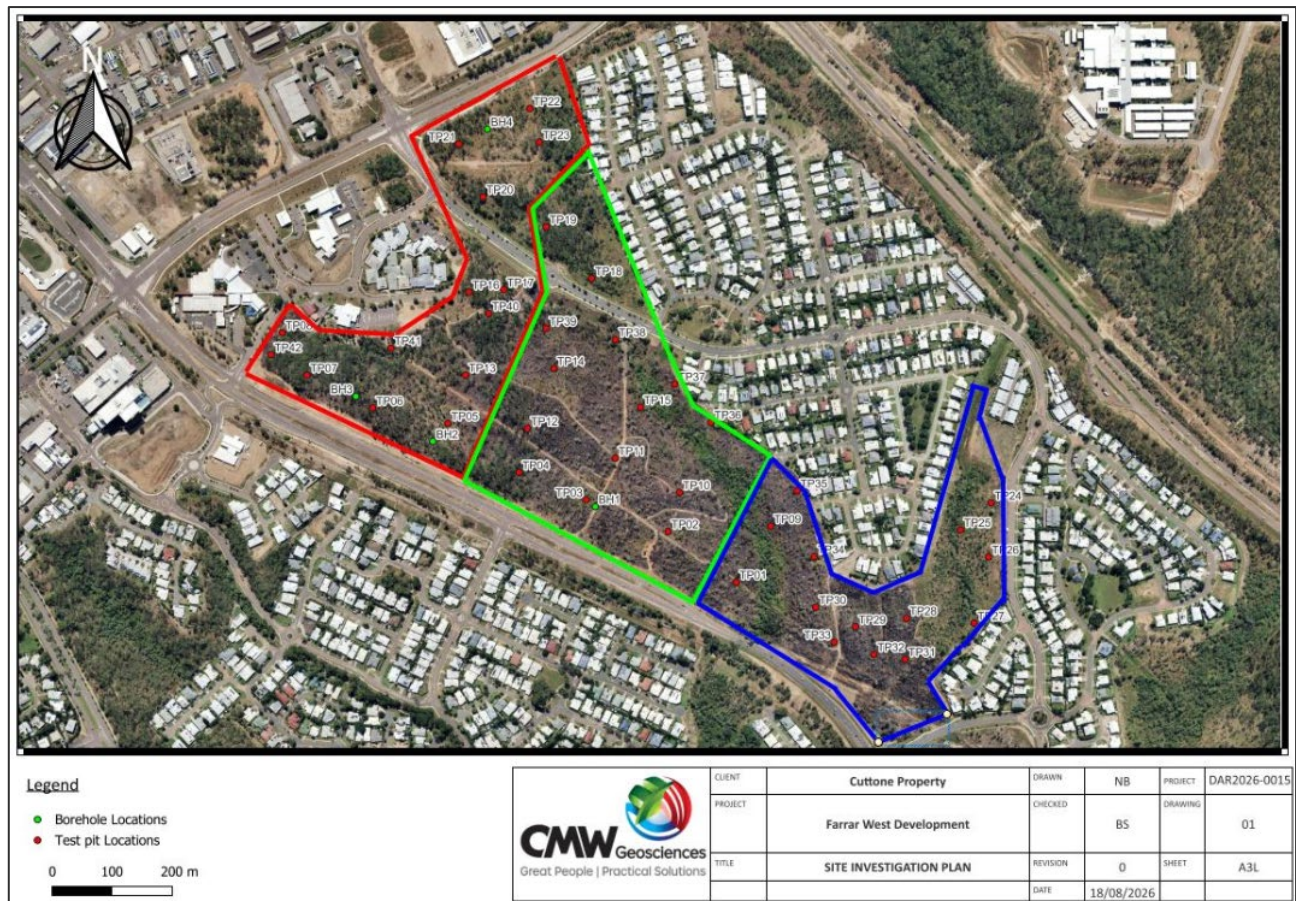


Figure 4: Geotechnical Testing

The site can be split into 3 sections, with the higher elevation red section of the site typically hitting shallow rock refusal within 1.0m below ground level, the low-lying blue section of the site consisting of predominantly deeper excavations with finer grained soil and presence of underlying clay in areas, and the middle section in green featuring a transitional area with highly variable subsurface conditions.

As noted in the Geotechnical Assessment, the site is considered suitable for the proposed purpose of residential development, provided earthworks and site preparation are completed in accordance with recommendations of the Geotechnical report, along with other relevant guidelines. Provided this is undertaken, a site classification of S in accordance with AS2870 is achievable. Typical excavated granular materials may be suitable for re-use as general fill. Topsoil or silt materials from the site may be suitable for landscape purposes. It is anticipated that level 1 geotechnical inspection and sign off will be implemented as part of earthworks development clearance.

2.4 Environmental and Heritage

Reference shall be made to the broader DA submission documents with respect to Environmental and Heritage aspects.

It is noted that Ecoz Environmental Consultants have been engaged to undertake relevant environmental assessment for the site, with associated documents provided with the DA submission package. A Typhonium survey has been undertaken along with self-assessment in accordance with the Northern Territory Environmental Protection guidelines.

A sacred sites survey has been previously undertaken, with An Aboriginal Areas Protection Authority (AAPA) certificate obtained for the site.

Any unexpected archaeological finds that may arise on site would need to be managed with the appropriate Construction and Environmental Management Plan and in accordance with relevant guidelines.

2.5 Proposed Development Form

The current development master plan consists of 241 lots of various sizes delivered over 7 stages.

Allotment Type	Typical Allotment Frontage (all lots typically 30m deep)	Lots	Lot %
375m ²	12.5m	18	7.5%
420 m ²	14m	35	14.5%
450 m ²	15m	65	27.0%
480 m ²	16m	73	30.3%
540 m ²	18m	26	10.8%
600 m ²	20m	17	7.1%
Irregular Lots	Varies	7	2.9%
		241	100%

In addition there are 11 medium density grouped housing sites, a community purpose site and a Commercial area in order to respond to requirements of the Area Plan. These sites constitute an additional area of approximately 5.25ha.

MD Site	Site Area m ²	Estimated Dwellings (Low)	Estimated Dwellings (High)
1	5867	33	46
2	4611	12	23
3	5458	31	42
4	3869	11	22
5	3042	8	15
6	2864	16	22
7	3053	17	24
8	3829	22	30
9	3446	20	27
10	2580	6	13
11	2277	6	11
Total		181	275

2.6 Earthworks Strategy

Bulk earthworks shall be necessary to shape the allotments within the development and the road reserves. A preliminary earthworks model has been completed for this engineering phase, that would need to be refined during subsequent design.

In general, and in accordance with City of Palmerston and NTG subdivisional guideline requirements, earthworks for proposed development lots will be based on the following characteristics:

Allotments:

- Allotments shall be generally graded between 1%-2% towards the Road Reserve.
- Any level differences between lots shall be aimed to be minimised wherever possible, however, where necessary, batters may be implemented with a grade of 1V:2H up to a maximum level difference of 1.5m
- Verge areas are noted to have a maximum grade of 6%, with driveway grades up to a maximum grade of 1:6.
- Any future treatment, such as landscaping or retaining wall substitution shall be the responsibility of the lot owner.

Public open space:

- Public open spaces shall typically be designed with batter slopes no steeper than 1V:6H
- Roadside verges shall have typical slopes of up to 6%

Earthworks is designed with the intent to achieve as best a cut and fill balance as possible, and staging completed in a way that minimises stockpiling of exposed fill materials onsite and excessive import/export is not required. This is to be refined during detailed design. Preliminary Earthworks modelling has been undertaken, where cut and fill depth plots are shown on the overall Earthworks plan, 17-182-DA-C1-EW-01 as included in Appendix Three, where a total cut of approximately 188,000m³ and fill of 185,000m³ has been developed. From this and accounting for compaction factors and potential unsuitable material, rock and the like, some allowance for imported fill may be required, however, is intended to be refined with more detailed design.

Preliminary earthworks design has been completed to gain an overarching understanding of approximate earthworks levles, grading and cut and fill quantities to achieve efficient and compliant design. this has been achieved by tiangualiting across multiple development lots and grading towards roadways at approximately 1%. The site, particularly in the western section has higher road grades of approximately 3% and up to 4%, given the natural fall of the land, which results in crossfall across lots at this stage in some parts greater than 2%. During detailed design, batters between lots in accordance with City of Palmerston and NTG requirements will be introduced in order to ensure a maximum grade of 2% across lots is achieved

2.7 Development Staging

A lot staging plan has been developed by the client, and included within the Town Planning documents, with excerpt as below.



Figure 5: Staging Plan

The project is proposed to be delivered in 7 stages of approximately equal number of allotments, generally progressing from west to east. It is intended that civil infrastructure staging will follow this intent, whereby roads and services would follow the lot boundaries. However, in order to maximise efficiency, and make use of dry season conditions, earthworks are intended to be completed in advanced and for grouped stages over a wider area. As further described below, earthworks are anticipated to be completed in approximately two to three stages in advance of successive subdivision works stages.

As included in Appendix Three, staging plans have been developed for both civil works and earthworks to facilitate the anticipated development stages. For proposed civil works staging plans, refer to the project drawings, 17182-DA-C6-MP-02 to MP-06

Where appropriate, each civil works stage is further broken down into substages, where it is proposed to separate standard residential lot areas to P.O.S areas as well as Grouped Housing sites. This is largely driven by the each of these areas having altering delivery timeframes, market demands, and in many cases, it may not be sensible to condition development lot titles upon completion of POS areas, since these areas then are further damaged by ongoing works and building activity. A breakdown of the subdivisional works staging is shown below in Table 1.

Table 1: Staging Plan and Number of Proposed Lots

Stage	Number of Lots	Proposed substages		
1	34 + MR	1A: lots	1B: Grouped Housing	1C: P.O.S
2	42 + MR/LMR	2A: Grouped housing	2B: lots	2C: P.O.S
3	54	3A: lots	3B: P.O.S	
4	43			
5	32	5A: lots	5B: P.O.S	
6	23 + LMR	6A: lots	6B: P.O.S	
7	13 + C/MR/LMR	7A: lots	7B: P.O.S	

2.7.1 Earthworks Staging

As noted above the project has been divided to 7 similar sized civil works stages. For full proposed staging works, refer to the project drawings, 17182-DA-C6-MP-02 to MP-06 in Appendix Three.

Earthworks staging plans have also been developed, being drawings 17182-DA-C1-EW-02 to EW-04, where three stages have been proposed. The extent and strategy of each stage may differ moving forward into more detailed design.

Stage 1:

For stage 1 Earthworks extent, refer to drawing 17182-DA-C1-EW-02. As indicated and described on the plan, the initial stage of earthworks is proposed for the north/west portion of the site and is based on lowering levels in this area, which are currently proud of the surrounding areas. The intent is to lower this area and fill the immediate surrounding area, which is expected to cover the extent of the stage 1 and 2 civil works as well as part of 3.

Following initial earthworks, civil subdivisional works for stages 1 and 2 are then proposed to be implemented sequentially. Whether these works occur in the same dry season or not would be determined at the time and be guided by LDC.

Stage 2

Following completion of stage 1 and 2 subdivisional stages and associated POS, the next stage of earthworks will be required in order to prepare subsequent development stages. Indicative stage 3 earthworks extent is shown on drawing 17182-DA-C1-EW-03.

A key component of the site is stormwater management and design, with a significant open drain required to carry existing flows through the site to the downstream connection points. In order to facilitate the proposed layout, significant drainage realignment works are required along Farrar Boulevard. These works are being discussed with the NTG, where it is intended that drainage reconfiguration forms part of the headworks to be delivered to the site by NTG. It is intended that these works occur during stage 3, such that the main POS park can be established. The completion of these drainage works will then require installation of the broader open drain on the eastern side of Lot 13256 and end of line basin, and therefore open the majority of the site. Fill material from the drainage channel and basin would be used to fill stage 3, however, may not be sufficient to extend beyond the stage 3 boundary and for stage 4. As a result it is anticipated that additional fill material from the north side of Farrar Blvd (stage 7) would be sourced to fill stage 4.

It is expected that since earthworks fill from north of Farrar Boulevard will require traffic management and transport across Farrar Boulevard to the south, it would be best to complete this in one mobilisation in order to reduce overall disruption and traffic management along Farrar, which would therefore fill the majority of the remainder of the site within stage 4, and 5. Should this not be preferred during detailed design or in discussion with the City of Palmerston, or timing for headworks is not congruent with this strategy, then modifications to the proposed stage 2 and earthworks extents would likely be necessary.

To manage temporary stormwater and sediment control, it will be necessary to provide temporary detention and sediment control basins, which has been shown indicatively on the staging plans. In addition, measures such as leaky weirs or temporary sedimentation traps within the open drain and main drainage basin will likely be necessary to control any risk to downstream environments. These details shall be coordinated and assessed during detailed design stages and completed in accordance with erosion and sediment control guidelines, with relevant plans being prepared.

Stage 3

Stage 3 earthworks is shown indicatively on drawing 17182-DA-C1-EW-04. This earthworks stage would essentially involve the decommissioning of any temporary drainage channels and sediment control basins constructed for stages 1 to 5 and complete the remaining earthworks fill associated with stages 5 and 6. Whether this is imported fill or stockpiled locally won material from site shall be determined during detailed design.

As noted above, there is potential for the extent of earthworks for stages 2 and 3 to be modified based mainly on the appetite to complete any works on the north side of Farrar Road. Should there be preference not to cut material on the north side of Farrar until later into the project, then stage 3 earthworks extent will increase considerably and stage 2 extents reduce.

Sedimentation control measures in the main drainage basin will likely need to remain in place until such time that all landscape treatments are finalised and drainage channels are vegetated and stabilised.

2.7.2 Overall construction sequencing:

In consideration of both the earthworks staging and civil works staging discussed above, the below table summarises the anticipated overall works staging for the Farrar West Development.

Stage	Anticipated construction year	Proposed substages		
Earthworks stage 1	2027			
Subdivision stage 1	2027	1A: lots	1B: Grouped Housing	1C: P.O.S
Subdivision stage 2	2027/2028	2A: Grouped housing	2B: lots	2C: P.O.S
Earthworks stage 2	2028			
Subdivision stage 3	2028	3A: lots	3B: P.O.S	
Subdivision stage 4	2029			
Subdivision stage 5	2029/2030	5A: lots	5B: P.O.S	
Earthworks stage 3	2030			
Subdivision stage 6	2030/2031	6A: lots	6B: P.O.S	
Subdivision stage 7	2031/2032	7A: lots	7B: P.O.S	

2.7.3 Roadworks Staging

2.7.3.1 Headworks

Ongoing discussions are being held with the Department of Lands Planning and Environment (DLPE) and the Department of Logistics and Infrastructure (DLI) with respect to the proposed headworks and scope delivered by NTG. At this point, the main headworks scope items being considered are the Access road connections onto Farrar Boulevard Roundabout, the signalised intersection on Roystonea Avenue with Terry Drive, drainage upgrades on Farrar Boulevard, the Left-in Left-out (LILO) on Roystonea Avenue between the intersection with Terry Drive and Inverway Circuit and a new roundabout at Kettle Street and Farrar Boulevard. A sketch for this is included in Appendix Four

The proposed staging and recommended timing for the road headworks are in the table below:

Proposed Works	Concurrent Stage	Proposed Timing
Farrar Boulevard Roundabout	Stage 1	2027
Farrar Boulevard Drainage Upgrade completion	Stage 2A	2028
Terry Drive Roystonea Avenue Signalised Intersection	Stage 2B	2028/2029
Roystonea Avenue Left in Left Out	Stage 3	2029/2030
Kettle Street Roundabout Upgrade	Stage 3	2029/2030

2.7.3.2 Access Roads

Access roads shall be completed for each stage to facilitate access to all lots of the specific stage. Where the roads interface with or extends through subsequent stages, a temporary road turnaround shall be included until roadworks for the next stage could commence and join the turnaround area.

For access road staging plans, refer to the project drawings in Appendix Three.

In order to facilitate access to stages 1 and 2 and considering that the Farrar Boulevard roundabout connection may not be completed as headworks in advance of the stage 1 and 2 developments, it is anticipated that construction access and temporary road access to the site may need to be developed at Brennan Court. This may be considered to remain as a permanent road connection, however, would require further assessment, traffic input and discussion with the City of Palmerston.

2.7.4 Services Staging

Reference can be made relevant sections in Chapters 3, 4 and 5 for respective stormwater, sewer and water staged development.

3 Civil Design

3.1 Stormwater Management

The detailed Part 1 Stormwater Management Plan has been included in a separate report, 17-182-RPT-Stormwater Management Plan.

A summary of the management strategy, as well as the existing and proposed infrastructure has been included herein.

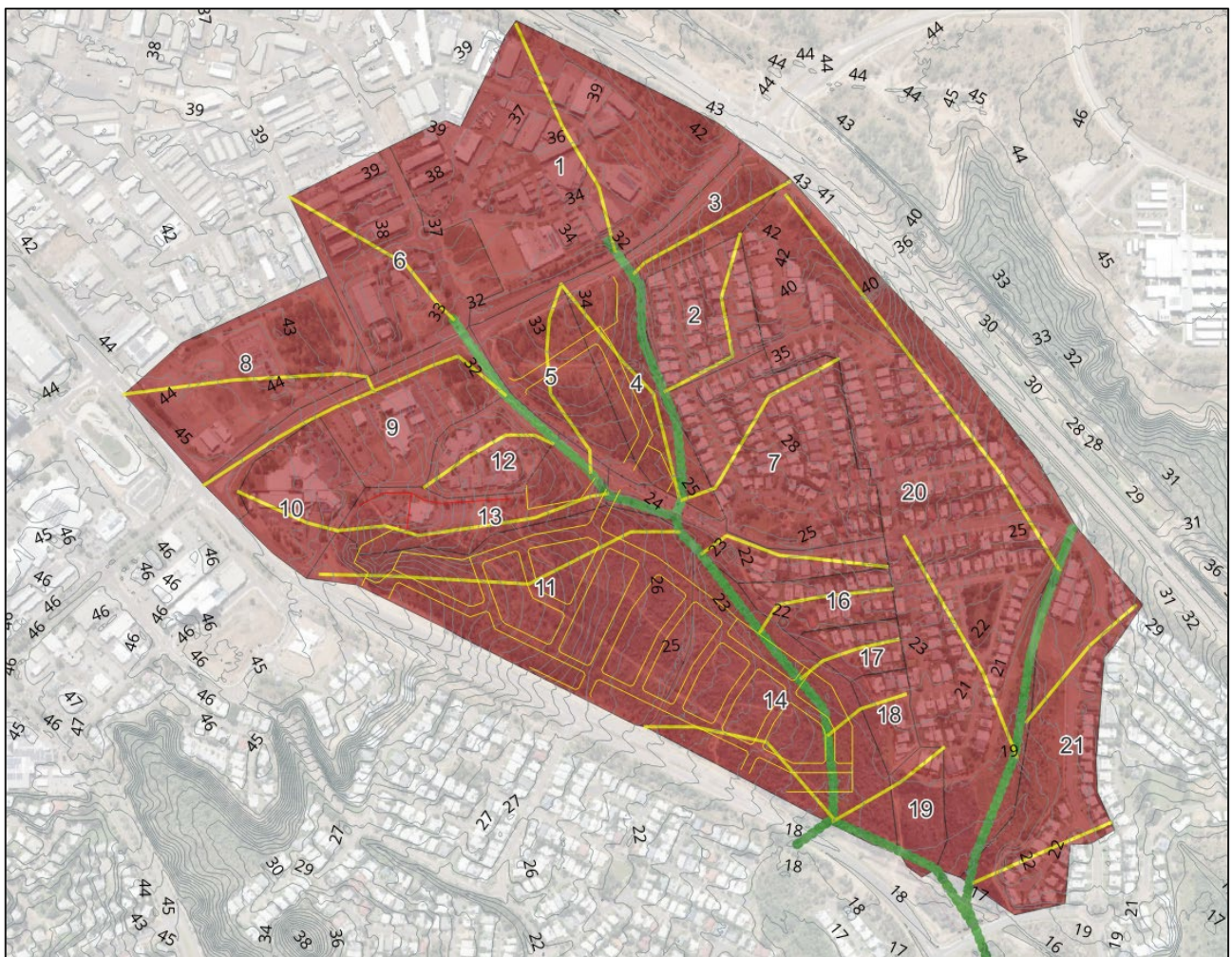


Figure 6: Existing Catchments

3.1.1 Existing Catchments

The Farrar West site forms a part of the larger catchment that drains south towards Mitchell Creek. Runoff originates from surrounding residential development, the Yarrowonga Industrial Precinct and the Palmerston Health Precinct areas before passing through a series of culverts at Temple Terrace, Farrar Boulevard, Roystonea Avenue and Inverway Circuit. Existing assessments identified that the Roystonea Avenue culvert is capacity constrained, while the remaining major culverts generally have adequate capacity.

3.1.2 Existing Infrastructure

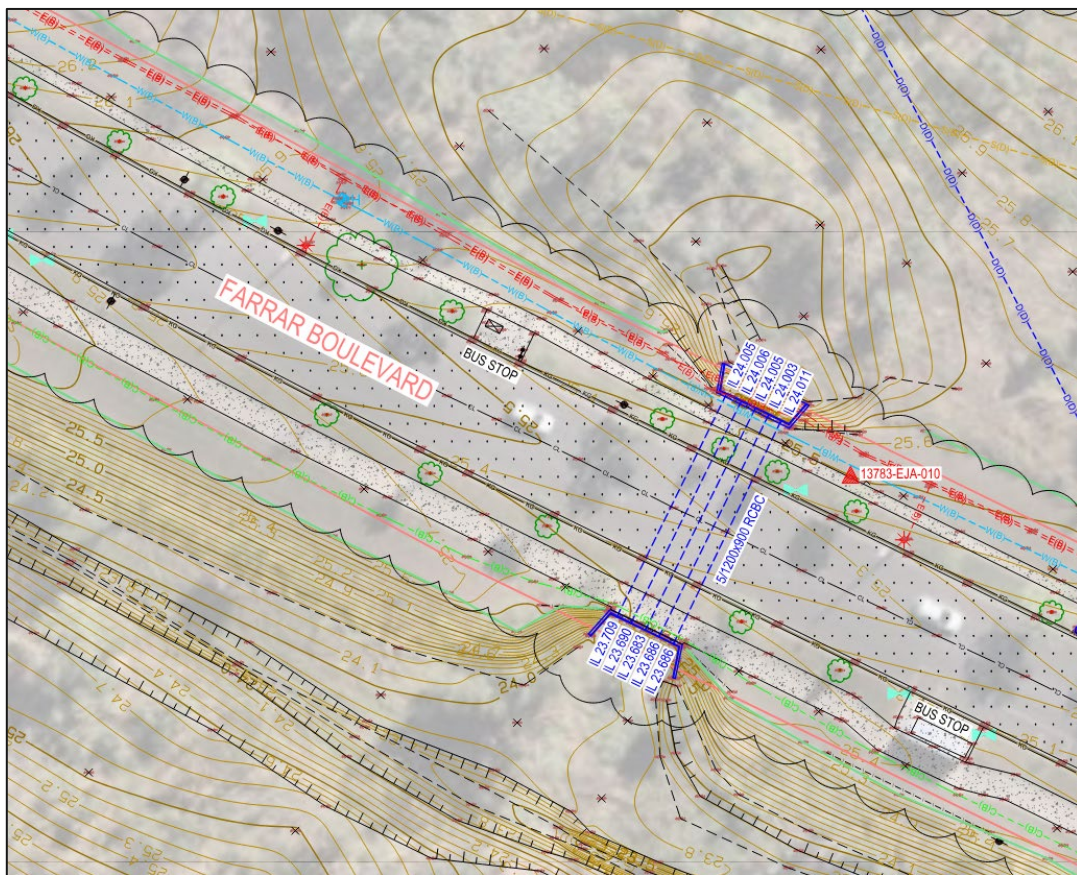


Figure 7: Existing Farrar Boulevard Culverts

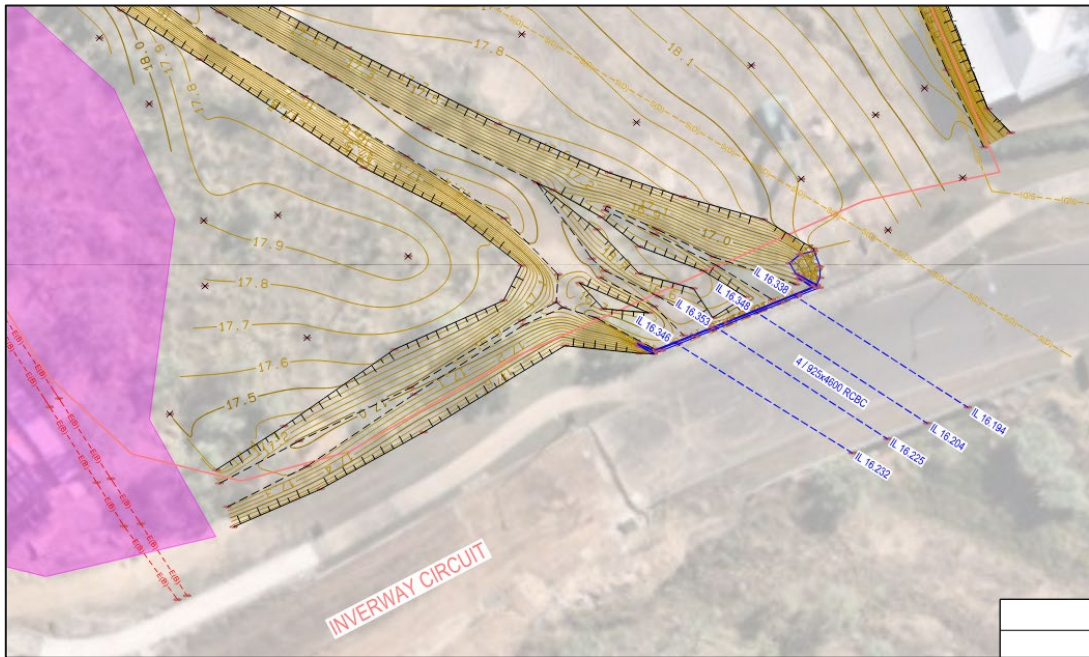


Figure 8: Inverway Circuit Existing Culverts

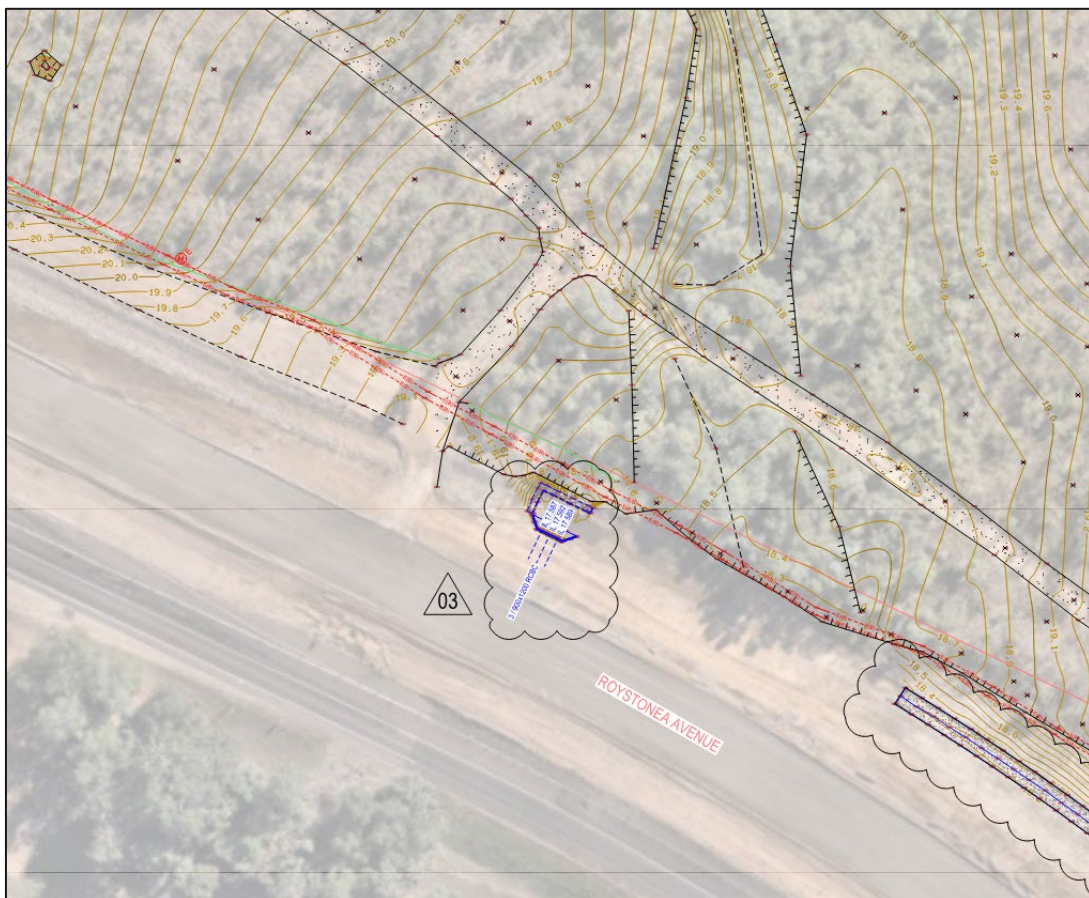


Figure 9: Roystonea Avenue Existing Culverts

The existing site discharges into a culvert at Roystonea Avenue and Inverway Circuit. The Roystonea Avenue culvert has a capacity of approximately 10m³/s, and the Inverway Circuit culvert has a capacity of around 40m³/s. Where the Roystonea Avenue culvert has insufficient capacity to deal with major flows, this surcharge will spill towards Inverway Circuit without overtopping the roadway.

For the 1% AEP major flows, existing flows towards the Roystonea Avenue culverts are approximately 25m³/s from the Farrar West lots and upstream catchments. The flows towards the open drain heading towards the Inverway Circuit culverts are approximately 22m³/s from the existing Farrar subdivision and upstream catchments. As such, total predevelopment flows for the major event that need to be considered are in the order of 47m³/s.

3.1.3 Management Strategy

The stormwater strategy manages increased runoff from the residential development of underground drainage pipe and pits, swales, culverts and a detention basin. Minor storm events are captured by the pit and pipe network, while major storm events are conveyed via overland flow paths and swales. A downstream detention basin is proposed to attenuate post-development peak flows and ensure discharge rates to Roystonea Avenue and Inverway Circuit do not exceed existing conditions, protecting downstream infrastructure from increased flooding risk. The Detailed design will further consider nutrient and sediment control, which will likely include gross pollutant traps at pipe discharges, and potential drop structures or check weirs within the open channels to reduce velocities. Currently, as supported by flood and hydrology outputs, results indicate manageable flow rates in the post development conditions.

The flows from the existing Farrar residential areas to the east of the development area previously discharged directly into the Inverway Circuit. The downstream area on the northwest of the Inverway Circuit will be expanded into a detention basin to attenuate this discharge. The detention basin will extend to connect with the western flow path coming from Farrar and Temple Terrace flow path, with a small ridge within the basin to divide the flow paths to their respective outlets under low rainfall conditions. The connection between the channels allow the western basin to overflow into the larger eastern basin, and limit discharge into the Roystonea Avenue culverts to match pre-development levels. The outlet in the eastern section of the basin towards the Inverway culverts is intended to be controlled through low flow culverts and a large high flow spillway. Details for these elements will need to be determined during subsequent design and development.

3.1.4 Design Stormwater Assets and Network

The proposed drainage network comprises pits, reinforced concrete pipes, drainage swales, culvert crossings and outlet scour protection. Existing culverts are generally retained, with the Farrar Boulevard culvert proposed for realignment and upgrade. The combined detention basin has a volume of approximately 24,500 m³ to the spillway level of 19.0 mAHD, with controlled outlets regulating discharge to the existing receiving network. Hydraulic modelling indicates the underground and overland system can safely convey respective adopted minor and major storm events while maintaining compliance with design criteria and limiting downstream impacts.

3.1.5 Stormwater Staging

Stages 1 and 2 of the project discharge the local drainage outflows into the existing open channels on the northeastern side of the project site. The initial 2 stages are located on a relatively high elevation, with no additional upstream catchments traversing through the developed areas. Temporary sedimentation control basins are anticipated upstream of discharge into existing drainage lines, in accordance with any Erosion and Sediment Control plans to be developed.

The underground network has been designed with alignments and levels to suit the ultimate development and minimise project rework. A temporary overland discharge point will be provided for stages 1 and 2, with the permanent connection for these two stages to be completed in conjunction with the detention basin and channel works during stage 3.

Stormwater infrastructure for the subsequent stages will be developed to suit the individual stages with outlets at either its final location along the major open channel, or to a temporary point downstream to form a connection to the piped network of subsequent development stages. Infrastructure and indicative stormwater staging is shown on civil works staging plans as included in Appendix Three.

Temporary discharge outlets and sediment basins have been included on the development application staging drawings. As noted in the earthworks section above, sediment control within the open channel as constructed during stage 3 will require further consideration and assessment, with any required temporary or permanent check weirs or drop structures to be detailed during detailed design.

3.2 Mobility Networks

3.2.1 Traffic Engineering

A Traffic Engineering Report has been prepared for the development by Colliers. The full assessment is contained within:

- Traffic Engineering – Proposed Subdivision Development 231 Roystonea Avenue, Farrar, NT, Traffic Impact Assessment, 26MET0233R01A 2026

The following summary has been extracted from the Traffic Engineering Report:

- The internal road network is consistent with the Northern Territory Subdivision Development Guidelines.
- A central Secondary Collector Road is proposed through the southern precinct, providing the primary connection between Roystonea Avenue and Farrar Boulevard and accommodating the highest internal traffic volumes, forecast at 1,960 vehicles per day.
- The broader internal street network comprise Access Streets and Minor Streets/Cul-de-sacs, ensuring traffic is dispersed appropriately and local streets remain low-speed residential environments.
- The hierarchy concentrates through-movements onto higher order roads, reducing unnecessary traffic on local residential streets and improving amenity outcomes.
- Multiple access points to Roystonea Avenue and Farrar Boulevard provide network resilience, route choice and balanced distribution of development traffic.
- The road network supports future pedestrian and cycling connections identified in the Palmerston Eastern Suburbs Planning Framework, improving active transport accessibility.
- Intersection traffic modelling confirms the surrounding arterial and collector road network can accommodate the additional development traffic, with acceptable intersection performance maintained in the 10-year post-development scenario.

Based on the above, Colliers considers the proposed subdivision appropriate from a traffic perspective.

Subsequent design will further consider the nature of intersections with the external network and seek design endorsement with respective authorities. In conjunction with this, elements of these road connections that may be delivered and procured by NTG will be further discussed and confirmed.

Road layout and typical road cross sections are included within the drawing set in Appendix Three, being drawings 17182-DA-C5-RL-01 and 17182-DA-C5-RX-01. The road cross sections are in accordance with NT subdivision guidelines being access streets, and secondary collectors. The layout also proposes some shared one-sided driveways to service up to three lots at the end of some roadways. These are intended to be 4m wide access driveways within a 13m Road Reserve.

3.3 Existing Road Infrastructure

A number of existing road reserve interfaces exist with the proposed development, these include:

1. Roystonea Avenue (Primary Arterial Road)
2. Temple Terrace (Primary Arterial Road)
3. Farrar Boulevard (26.0m Road Reserve)
4. Inverway Circuit (30.0m Road Reserve)
5. Gurd Street, Brennan Court and Kettle Street (17.0m Road Reserve)
6. Baldry Avenue (17.0m Road Reserve)
7. Brennan Court (17.0m Road Reserve)

Roystonea Avenue and Temple Terrace are owned and operated by the Department of Logistics and Infrastructure. The other roads are administered by the City of Palmerston.

3.4 Proposed Road Infrastructure

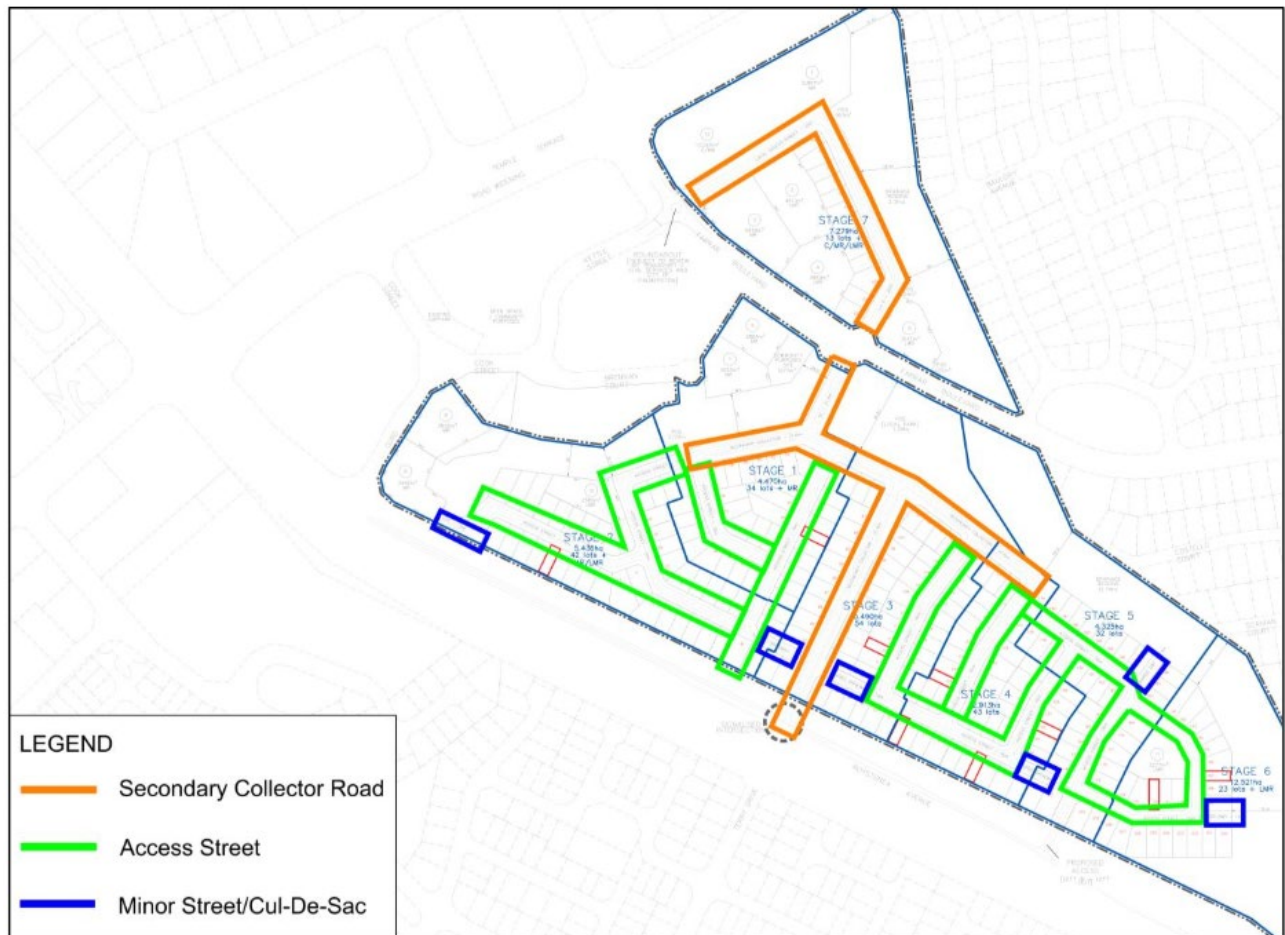


Figure 10: Street Type Allocation

With reference to the traffic engineering report, Internal local roads are proposed for the Farrar West subdivision as shown in Figure 10. A road layout plan and typical cross sections are also provided in the civil layout drawings, 17182-DA-C5-RL-01 and RX-01 respectively. The internal roads proposed are generally in accordance with the NT Subdivision Guidelines, being Access Street within a 16m Road Reserve allocation, and Secondary Collector roads with a 21.6m Road Reserve, in addition, and based on nearby developments, there are some shared driveways proposed, nominating a 4m wide pavement with mountable kerbs within a 13m reservation, which service up to 3 lots to one side of the shared driveway. These reserves will also have footpaths and services.

The secondary collector joining with Roystonea and aligning with Terry Dr, proposed as a signalised intersection is proposed as the primary access point to the Development, and will provide tree planting and pathways on each side to provide the Landscape Boulevard Treatment as required in the Area Plan.

Road cross sections are provided in accordance with NT SDG and standard drawings SS1000 and SS1001, with service alignments, carparking were relevant and tree planting in accordance with these standards. Due to the sloping nature of the site, it is proposed that roadways are generally constructed with one way crossfall in order to avoid any undesirable height discrepancies to lot levels, excessively steep driveway slopes and reduce the need for retaining wall implementation.

3.4.1 Pedestrian Movement Network

Proposed footpaths and shared paths have been incorporated into the masterplan to connect the subdivision with adjacent infrastructure, including the health precinct, the Palmerston CBD and open spaces. The subdivision's internal networks are intended to join the existing network at key interface points on Farrar Boulevard, Roystonea Avenue, Brennan Court and Gurd Street. An excerpt of the movement plan from the planners and landscape layout is shown below in Figure 11. Further discussion is included in the Landscape Masterplan documentation.

The proposed signalised intersection on Roystonea Avenue will provide a controlled crossing location for pedestrians and cyclists to join the wider Palmerston active transport network on the south side of Roystonea Ave the proposed layout and footpath network result in all lots being within approximately 500m of the main Public Open Space and Bus stops on Farrar Boulevard.

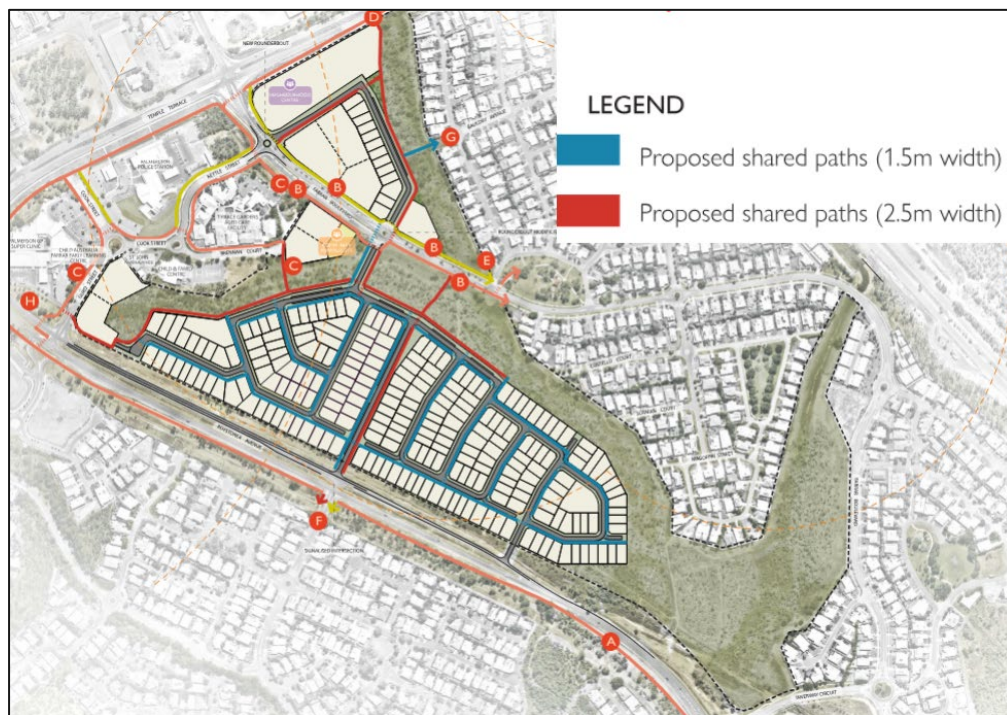


Figure 11: Pedestrian Movement Network

3.1 Public Transport

Figure 12 below summarises the public transport routes and stops proximate to the site.

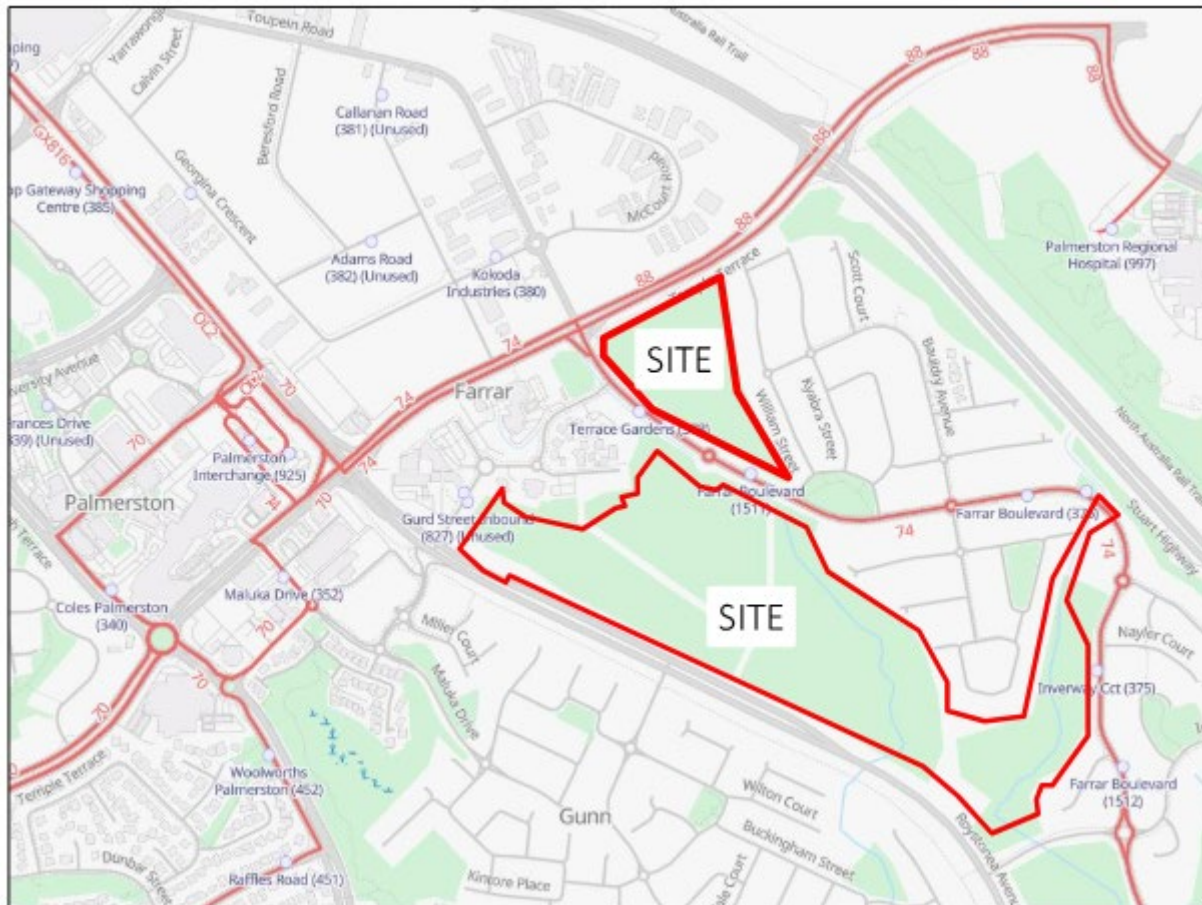


Figure 12: Public Transport Network (OpenStreetMap, 2026)

The Farrar Boulevard / Kettle Street bus stop is located along the site frontage, providing bus route options within close walking distance to the site. Additional bus routes pass through the Palmerston Interchange.

No modifications to the bus routes or additional bus routes have been proposed as a part of the development. There may be some modifications required to existing bus stops, the exact locations and details will be worked through with the relevant service authority at the detailed design stage.

4 Sewer Infrastructure

Colliers has been engaging with Power and Water Corporation (PWC) for the development of the Sewer Network Master Plan and relevant development approvals. This will be further detailed in the services design report.

4.1 Existing infrastructure

The sewerage network around the site is well developed. The existing catchment consists of the Yarrawonga industrial precinct, the Health and Police Precinct and travels downstream through the residential area and discharges over Roystonea Avenue via a 600mm diameter main located on the south-eastern portion of Lot 13256.

The existing Farrar sewer network has limited excess capacity, although PWC has indicated that the proposed future development should not overload the current gravity sewer system.

4.2 Preliminary Design

Design of the sewer network for the proposed subdivision will include a new reticulation system, a “spine” to connect to the existing DN600 sewer main on the southern side of Lot 13256.

The design will intercept and divert the existing sewer main on the norther side of Farrar Boulevard and redirect into the new “spine” of the sewer system. The existing sewer main coming from Brennan Court will also join to this new “spine” main.

The existing section of sewer main on the north-eastern side of Farrar Boulevard will be abandoned and rehabilitated on the eastern side of the existing roundabout. All discharge from the development site will converge into the DN600 main on the southern side of Lot 13256. Sewer infrastructure shall be designed and constructed in accordance with Power and Water Corporation standards and requirements.



Figure 13: Preliminary Sewer Layout

4.3 Design Flow

Preliminary feedback from PWC identified an additional 1,515EPs of capacity had been allowed for in the model for the proposed development.

Total discharge from the site has been estimated at 1,500EPs for the concept design, with an additional ~700EPs of existing demand passing through the new “spine” pipe from the upstream Yarrowonga and Health Precinct networks, which shall be considered in any pipe design for the subdivision.

Sewer design data plans are included within Appendix Three, 17182-DA-C2-SD-01 and SD-02, which provide an overview of proposed sewer catchment and contributing EP's for consideration.

4.4 Development Staging

It is proposed to construct and provide a temporary sewer connection for stages 1 and 2 to the existing DN150 sewer connection from Brennan Court to Farrar Boulevard. This connection will be subsequently abandoned and join the 'spine' sewer as it is constructed during stage 3. Further reference can be made to the civil works staging plans as included in Appendix Three to gain description regarding proposed interim vs ultimate sewer routing.

It is proposed to abandon the existing Farrar Boulevard connection during stage 3 to join in the newly constructed sewer 'spine' which connects it into the discharge manhole at the south-east part of the site near Roystonea Avenue, at or near manhole 41/1. This will be confirmed with Power and Water during the application stage to check for adequate hydraulic capacity within the existing sewer and self-cleansing flow volumes prior to fully developed conditions.

Subsequent stages 4 to 7 shall consist of stage specific reticulation sewer pipes only, to join into the constructed 'spine' from stage 3. All sewer reticulation is proposed to be installed on standard alignments and to the details and requirements of Power and Water Corporation.

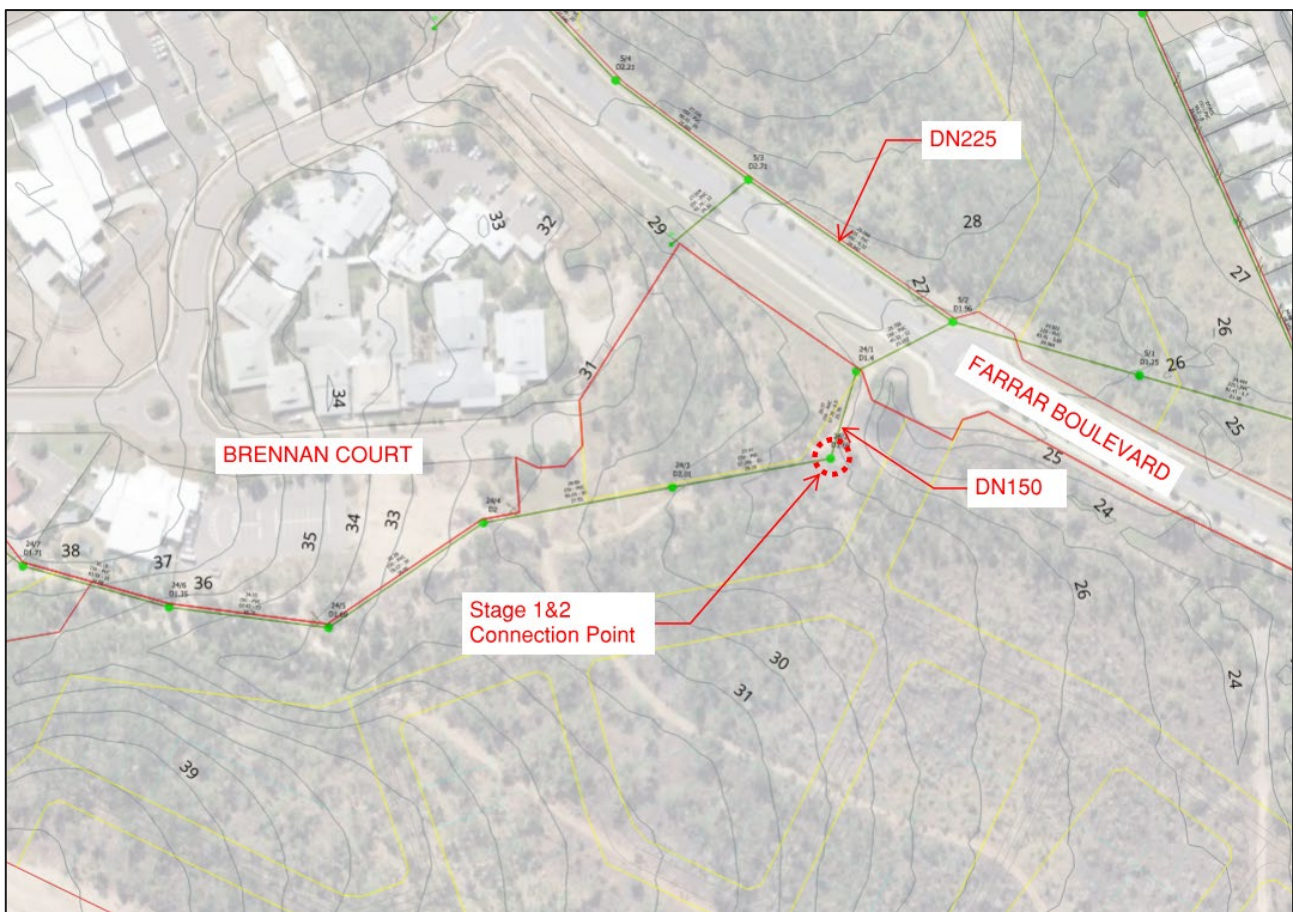


Figure 14: Proposed Connection Point Stages 1&2

Refer to project staging drawings for full proposed staged sewer works.



Figure 15: Proposed Ultimate Connection Point

5 Water Infrastructure

Colliers has been engaging with Power and Water Corporation (PWC) for the development of the Water Network Master Plan and relevant development approvals. This will be further detailed in the subsequent water and sewer specific design report.

5.1 Existing infrastructure

There are existing water mains on Farrar Boulevard, Brennan Court and Inverway Circuit.

- A DN225 PVC main on the northern side of Farrar Boulevard
- A DN150 PVC main on Brennan Court
- A DN375 DICL main on the northern side of Inverway Circuit

5.2 Preliminary Design

Design of the water reticulation network will be completed in subsequent design stages to contemporary PWC Standards, requirements and specifications.

The proposed development shall provide an interconnection between Brennan Court and Inverway Circuit. This connection has been nominally specified as DN225, with final sizing and configuration to be confirmed with lot layouts during detailed design. At this stage, it is also considered likely that an additional connection will be made to the 150mm stub at the Farrar Boulevard Roundabout in order to provide a suitable ring supply and improved pressures for earlier stages.

An extension of the Brennan Street water main will be required to service the lots adjoining Gurd Street.

Water demand including diurnal curves and modelling will be completed during detailed design for review and approval by Power and Water Corporation.

Upon the completion of the defect maintenance period, the assets will be handed over to PWC.

5.3 Development Staging

It is proposed to construct and provide a temporary water connection for Stages 1 and 2 to the existing water network on Brennan Court. It may be necessary at this stage to extent and provide a looping interconnection to the 150mm stub at Farrar Boulevard or potentially extend to the DN225 main on the north side of Farrar Boulevard. Final configuration to be confirmed with hydraulic modelling for PWC approval.

The connection shall form a part of the final water connection between Inverway Circuit and Brennan Court. As the development stages progress towards the east, each stage shall connect into the already completed looping main from the previous stage. The ultimate development shall consist of a larger water main from Brennan Court DN150mm pipe to the Inverway Circuit DN375mm trunk main, to be installed either in the services corridor at the top of the shoulder from the drainage corridor or within the roadway. This is anticipated to be extended at each stage until stage 5 where the pipe will form an interconnection to the trunk main on Inverway Circuit where service pressures remain compliant, subject to PWC review and approval.

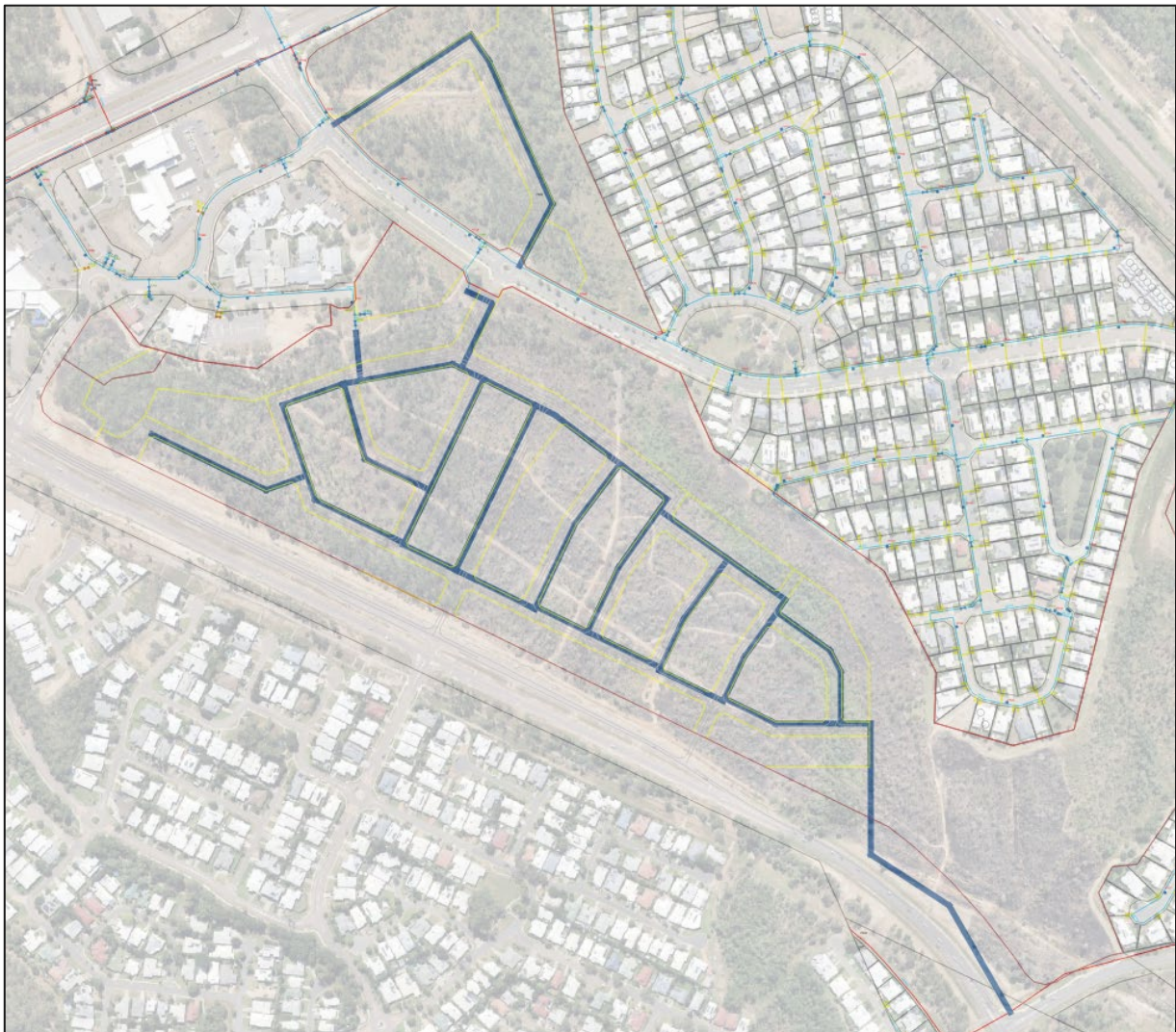


Figure 16: Concept Water Main Layout

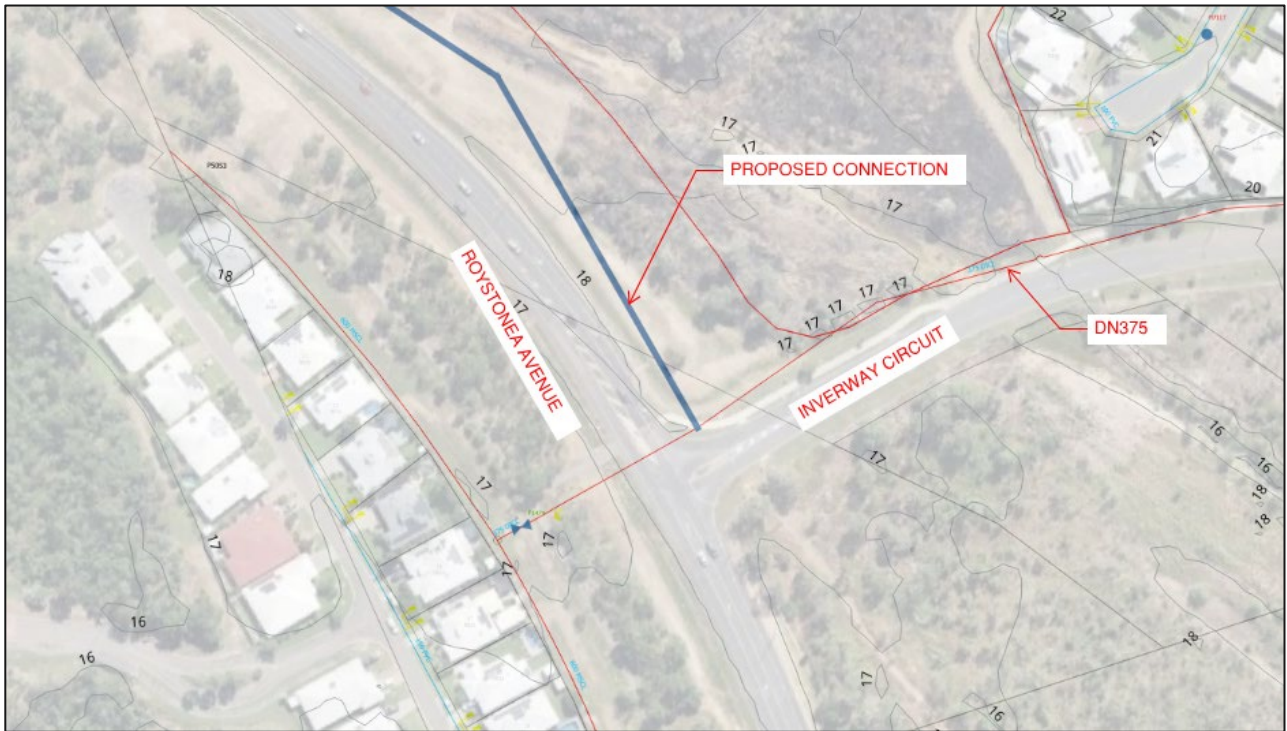


Figure 17: Connection Point Inverway Circuit

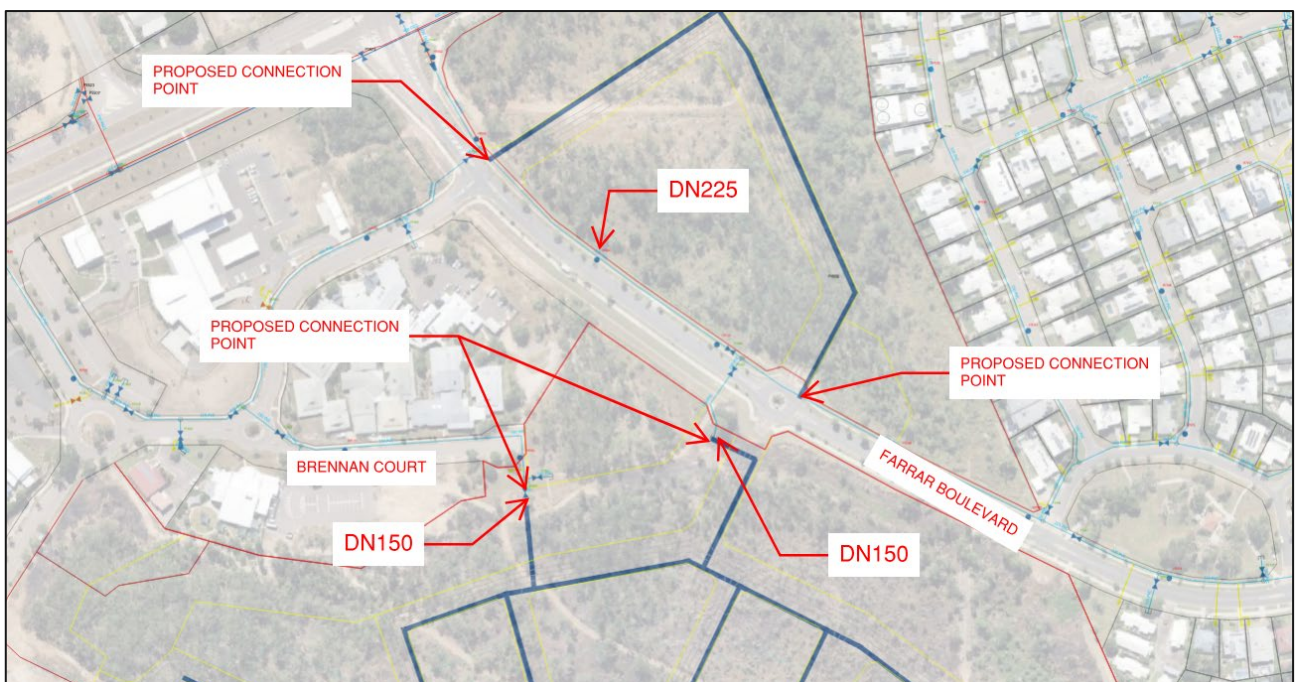


Figure 18: Connection Point Brennan Court and Farrar Boulevard

Refer to project staging drawings for full proposed staged water works.

6 Electrical and communications:

Electrical and Communications assessment and preliminary Design has been carried out by Promant Electrical, in consultation with Power and Water Corporation. A technical memorandum is included in Appendix One for reference, along with associated sketches.

From this assessment it is noted that the Maximum diversified electrical demand for the site is 2.875MVA, where it is understood that there is 2.257MVA spare capacity in the Gunn HV feeder. Interconnection with the Farrar HV feeder is expected to provide the additional 0.618MVA capacity required.

The proposed preliminary design involves new RMU's connected on the existing HV line along Roystonea Avenue, along with new RMU's at Farrar Boulevard and upgrade of existing. The internal supply for the site would be via HV rings and respective substations to feed local LV networks. It is intended to stage the substations according to subdivision staging, in order to limit supply from a spur HV main and substation to the maximum number of lots as required by PWC. Power connection pillars are proposed throughout the development, which are included on the combined services plan, 17182-DA-C6-MP-01 and respective staging plans for reference. Street lighting shall be installed along all streets and pathways on standard alignments in order to light to the appropriate category in accordance with AS/NZS 1158.

Further services coordination will be necessary during subsequent design along with consideration of lot connections amongst services and positioning of driveways.

Communications supply will be via conventional pit and pipe reticulation, providing a site ready for NBN connection.

Appendices

Appendices

Appendix One: Electrical and Communications Assessment

Appendix Two: Geotechnical Investigation

Appendix Three: Preliminary Civil Design Drawings

Appendix Four: Headworks Sketch.

Appendix One:

Electrical and Communications Assessment

PROMANT

FARRAR WEST SUBDIVISION

Electrical and Communications Servicing Report

Document Name:	Servicing Report	Document No:	P26-15-SR-001
Revision:	A	Revision Date:	21/09/2026
Client:	PCG & Colliers	Contact:	Phil Cuttone & Fabio Otranto

Revision History

Issue	Date	Pages	Issue Description	By	Check	Approved
A	21/09/2026	4	First Draft	KF	KF	

Introduction

Larrakia Development Corporation, through Cuttone Property Group have engaged PROMANT Pty Ltd to undertake the electrical infrastructure (high voltage and low voltage), communications infrastructure and streetlighting design and documentation for the proposed Farrar west Subdivision. PROMANT has engaged AGA Consulting Engineers Pty Ltd as a sub-consultant to provide additional resources. PROMANT will work cohesively with Colliers, the clients civil and stormwater engineers during the design phase.

Electrical

The proposed subdivision has six [6] distinct stages. Preliminary calculations indicate a diversified high voltage load of 2.875MVA for all stages. Based on PWC advice provided to AGA Consulting Engineers Pty Ltd in 2021, there is approximately 2.257MVA spare capacity in the Gunn HV feeder. Interconnection with the Farrar HV feeder should provide the additional 0.618MVA capacity required. The majority of load will be on the Gunn HV feeder. To service the Development, several RMU's will be required in various locations along Farrar Boulevard and Roystonea Avenue. Within the urban development, a numerous package substations interconnected with underground HV cables and numerous distribution pillars interconnected with underground LV distribution cable will be provided.

Stage 1

A new ring main unit (RMU) will be required on Farrar Boulevard to service stage 1. The new RMU shall be connected to an existing RMU located on the opposite side of the road. A new Mk3 package substation (SUB-1) will be installed within the Stage 1 boundary and be connected to the new RMU via a radial feeder. SUB-1 shall service the single residence lots and a community purposes site. A second substation (SUB-2) shall be installed to service two medium density residential lots, this SUB shall be connected to existing HV infrastructure along Brennan Court. Low Voltage (LV) distribution from the substations shall be design in accordance with PowerWater Corporation (PWC) specifications.

Stage 2

A new RMU shall be installed along Roystonea Avenue and be connected to existing HV feeder cables. A new substation (SUB-3) shall be installed within the Stage 2 boundary and be connected to the new RMU. HV cabling shall be installed to interconnect the SUB-1 and SUB-3 between the two new RMU's to create a 'ring arrangement'. This substation shall service the single residence lots. A second substation (SUB-4) shall be installed to service two medium density residential lots, SUB-4 shall be connected to existing HV infrastructure along Gurd Street. Low Voltage (LV) distribution from the substations shall be design in accordance with PowerWater Corporation (PWC) specifications.

Stage 3

A new substation (SUB-5) shall be installed within the Stage 3 boundary. SUB-5 shall service all single residences lots in this stage. SUB-5 shall be connected to SUB-1 via a radial feeder. Low Voltage (LV) distribution from the substations shall be design in accordance with PowerWater Corporation (PWC) specifications.

Stage 4

A new substation (SUB-6) shall be installed within the Stage 4 boundary. SUB-6 shall service all single residences lots in this stage. SUB-6 shall be connected to SUB-3, which will put SUB-5 and SUB-6 on a ring arrangement. Low Voltage (LV) distribution from the substations shall be design in accordance with PowerWater Corporation (PWC) specifications.

Stage 5

A new RMU shall be installed along Roystonea Avenue and be connected to existing HV feeder cables. A new substation (SUB-7) shall be installed within the Stage 5 boundary. SUB-7 shall service all single residences lots in this stage and a low density residential lot. SUB-7 shall be connected to the new RMU and to SUB-6 to create a ring arrangement. Low Voltage (LV) distribution from the substations shall be design in accordance with PowerWater Corporation (PWC) specifications.

Stage 6

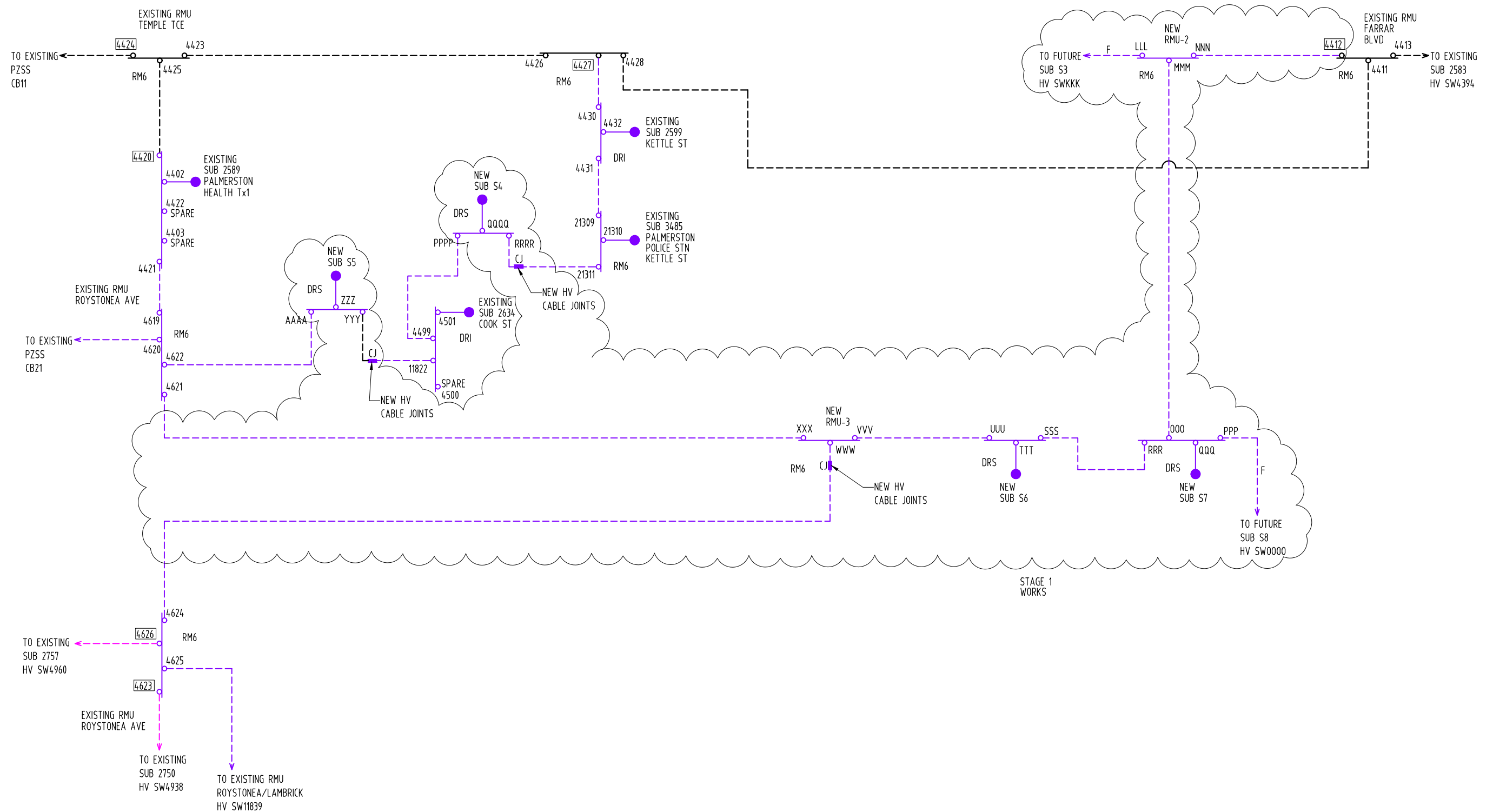
Stage 6 comprises 4 package substations to service potential commercial and multi residential lots. The substations will be installed in a 'ring configuration' between two existing RMU's located along Farrar Boulevard. One of the existing RMU's may need to be upgraded from a 3-way to a 4-way. Low Voltage (LV) distribution from the substations shall be design in accordance with PowerWater Corporation (PWC) specifications.

Communications

All stages of the development shall be provided with communications pit and pipe networks designed in accordance with NBN Co. rules and requirements. Several pit and pipe extensions along Farrar Boulevard, Roystonea Avenue, Gurd Street and Brennan Court. P100 pipes and conduits will then be extended into the Farrar West urban area. The Developer is required to enter into a Master Developers Agreement with NBN Co. and install appropriate infrastructure to ensure the development of Farrar West is 'fibre ready'.

Street Lighting

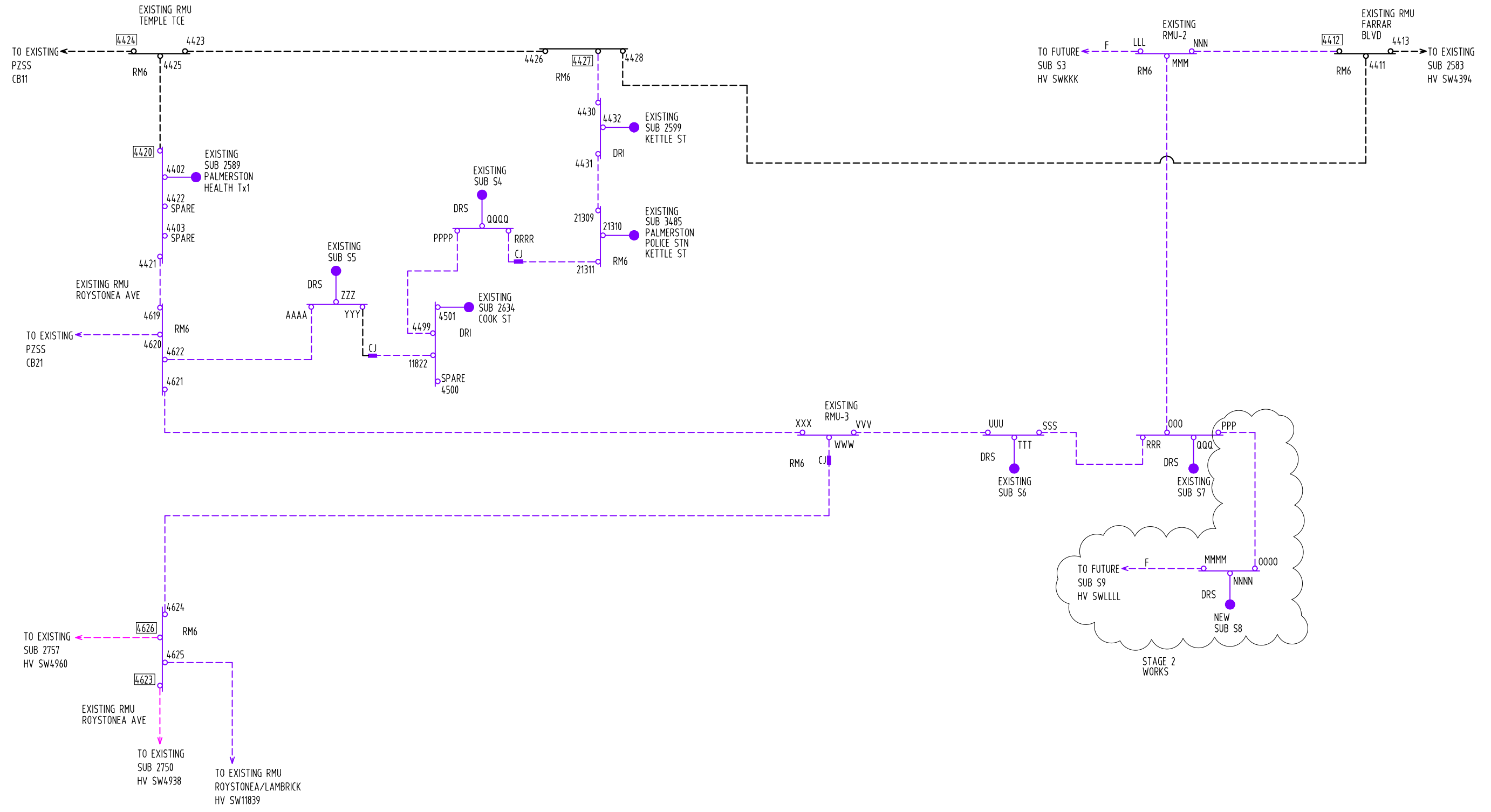
Street lighting and pedestrian pathway lighting shall be provided in all stages. The lighting systems shall be designed to comply with Australian Standard AS/NZS 1158 for each relevant category (V-Vehicular and P-Pedestrian). The lighting controls and luminaire selections shall comply with Palmerston Council policies and standards.



HV SCHEAMTIC (11PA04 BAKEWELL/11PA11 FARRAR/11PA21 GUNN) (N.T.S.)

PRELIMINARY

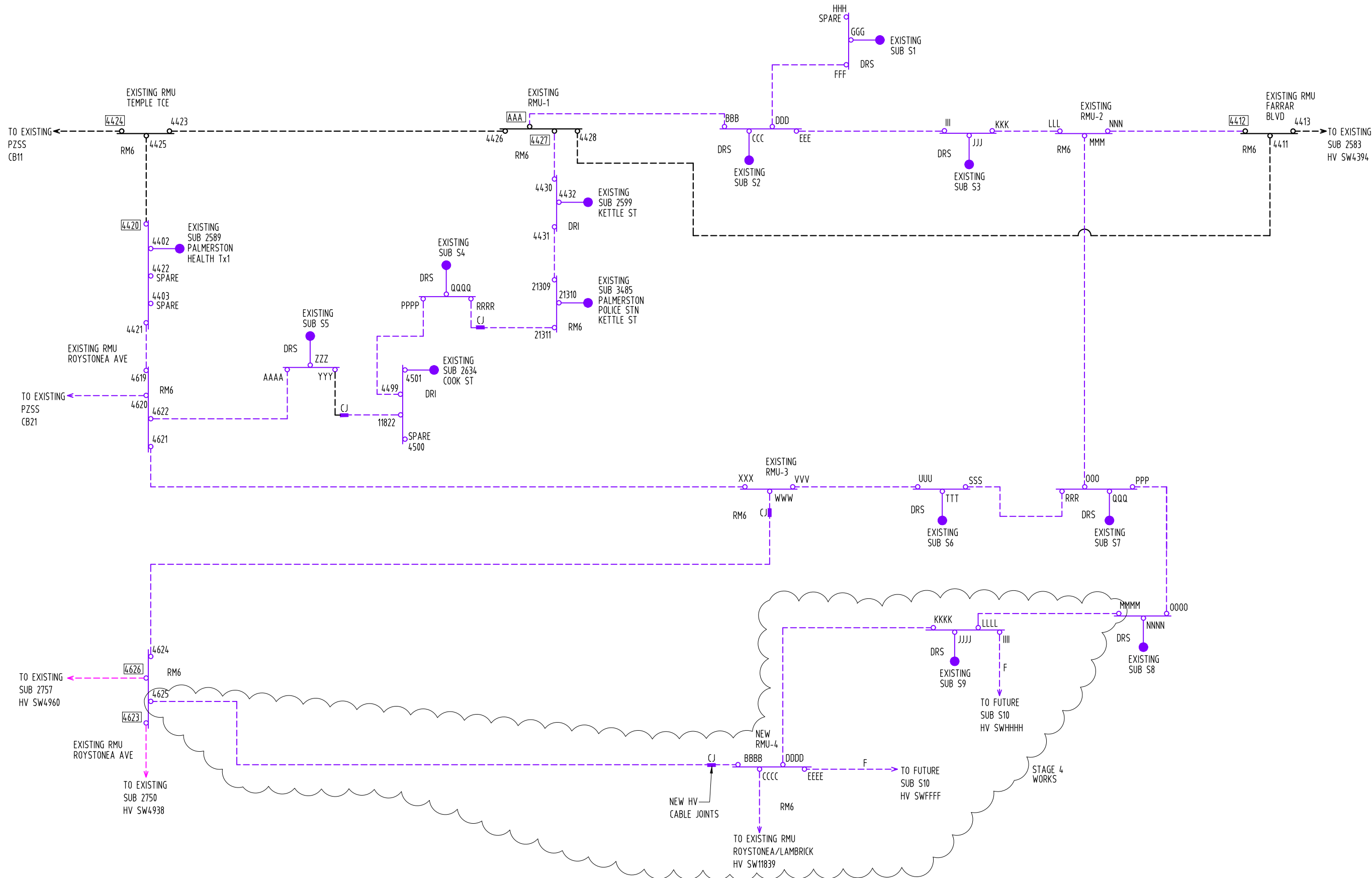
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HV SCHEAMTIC (11PA04 BAKEWELL/11PA11 FARRAR/11PA21 GUNN) (N.T.S.)

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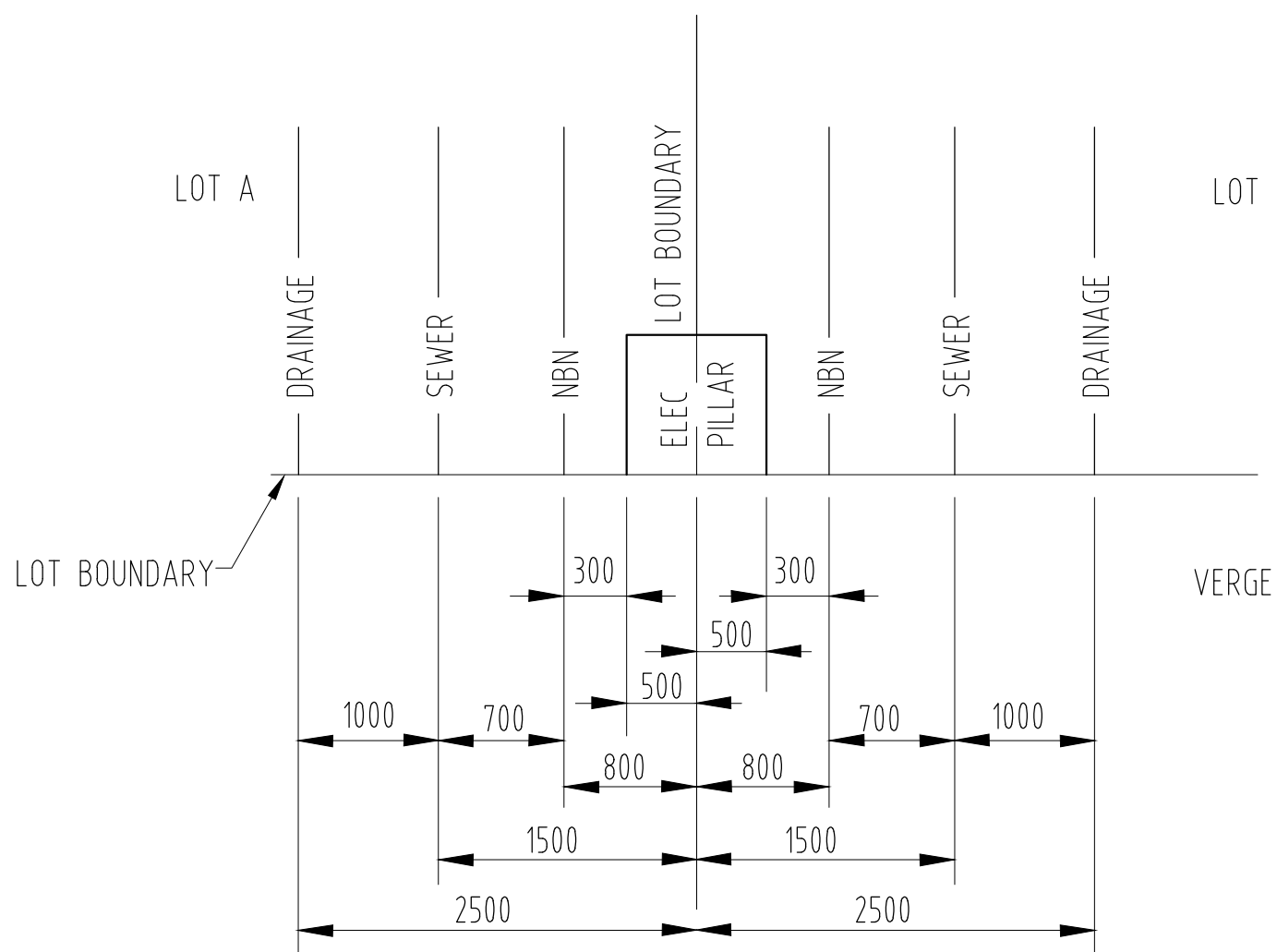
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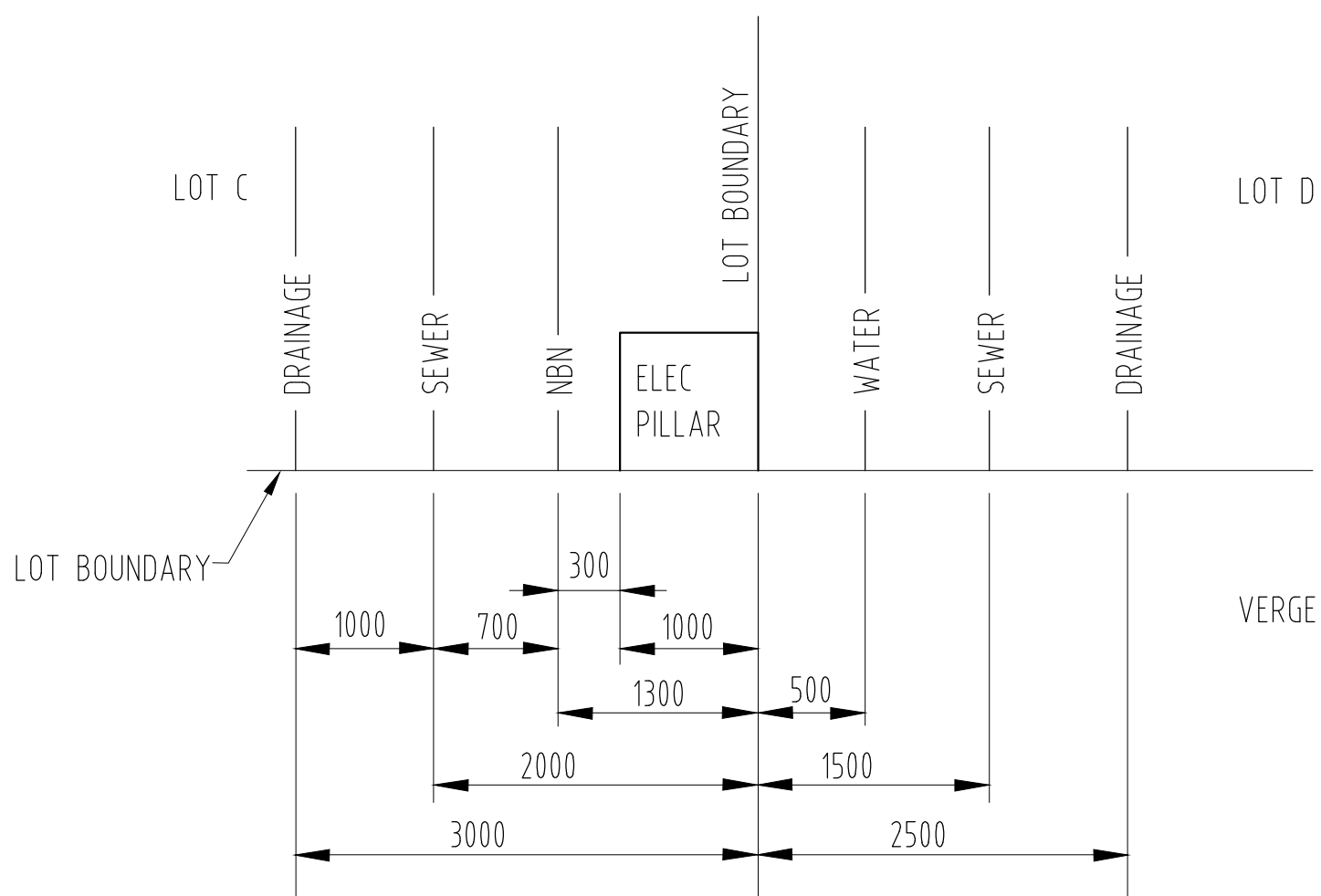
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DETAIL F - TYPICAL OFFSETS FOR ELEC/NBN/SEWER/DRAINAGE/WATER
LOT CONNECTIONS - ELEC PILLAR IN 2 LOTS (N.T.S.)



DETAIL G - TYPICAL OFFSETS FOR ELEC/NBN/SEWER/DRAINAGE/WATER
LOT CONNECTIONS - ELEC PILLAR IN 1 LOT (N.T.S.)

Appendix Two: Geotechnical Investigation

28 August 2026

Proposed Subdivision

West Farrar

GEOTECHNICAL INVESTIGATION REPORT

Cuttone Property Group

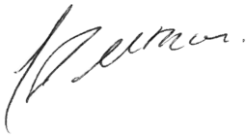
Job No. DAR2026-0015AB | Version 0



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Version Control

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Review and Update History

Revision	Date	Comments
0	28 August 2026	Initial revision for client review



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Appendices

APPENDIX A	Site Investigation Plan
APPENDIX B	Results of Site Investigation
APPENDIX C	Laboratory Test Certificates

1.0 INTRODUCTION

CMW Geosciences (CMW) was engaged by Cuttone Property Group to carry out a geotechnical investigation of a site located at West Farrar, which is being considered for the development of the new residential and commercial development.

The scope of work and associated terms and conditions of our engagement were detailed in our services proposal letter referenced DAR2026-0015AA Rev 1 dated 9 June 2026.

Farrar West Development comprises the development of the first five stages of the new Farrar subdivision, which is understood to contain 222 lots. It is understood that the development area is currently uncleared and construction will involve cut and fill earthworks (balanced over all stages) to bring the site to the required level.

After consultation, the client has also requested additional investigation for the proposed stormwater reserve and associated stormwater infrastructure (pits, pipes and swales).

Figure 1: West Farrar Site Plan



2.0 SITE DESCRIPTION

The proposed subdivision is located approximately 17 km Southeast of the Darwin CBD and approximately 1.0 km northeast of the Palmerston CBD. Historical satellite imagery indicated that the majority of the site had been undeveloped for the past 20 years and is considered a “greenfield site”.

During the time of investigation on 6/07/2026 and 15/07/2026, the overall site was identified to slope downwards toward the east and the southeast, with the highest elevation being 41.0m AHD, and the lowest being ~18.0m AHD. The area appeared to be moderately vegetated with trees reaching heights of approximately 15m, with dense, burned regrowth and savannah. Elevated areas towards the western side of the site seemed to have shorter and dryer grass and more spread-out taller trees, compared to lower lying areas toward the east, which had thicker green grass and the trees were shorter, but closer together.

A number of unsealed tracks were present in the area with evidence of recent vehicle use. **Figure 2** shows the typical site condition that was encountered during the time of visit.

Figure 2: Overview of site condition during investigation



3.0 FIELD INVESTIGATION

3.1 Objectives

The site visit was required to understand the following elements:

- Investigate the lot and access road areas’ sub-surface conditions for preliminary lot classification and geotechnical parameters
- Advice for earthwork activities including batter and trench stability; trafficability; site won material for re-use
- Investigate the stormwater reserve areas for deeper sub surface conditions for stormwater infrastructure foundations

3.2 Fieldwork

Fieldwork for this investigation was carried out on the 6th to 15th of July 2026 consisting of the following:

- 4 no. Boreholes up to 6.0 m depth using a trailer mounted drilling rig.

- 42 no. test pits up to 3.0 m depth using 5.5 Tonne excavator with 450 mm wide rock toothed bucket
- All test locations were completed with Dynamic Cone Penetrometer to 2.0 m for earlier refusal
- The approximate locations of the site locations are presented on the attached Site Plan located in Appendix A. The test locations were measured using handheld GPS to an accuracy of 5m.
- All fieldwork was carried out by a geotechnical engineer from CMW Geosciences in accordance with AS1726-2017. Engineering logs and photographs of the test pits are presented in Appendix B.

Table 1: Summary of Test Locations

Test ID	Depth (m)	Comments
BH01	6.0	Target depth reached.
BH02	0.45	Shallow refusal on high strength rock.
BH03	6.0	Target depth reached.
BH04	3.2	Borehole terminated due to hole collapse.
TP01	2.0	Loose sand from 0.2 – 0.6 m, target depth reached. Groundwater at 1.8 m.
TP02	0.5	Shallow refusal on medium to high strength rock.
TP03	2.0	Target depth reached.
TP04	2.0	Target depth reached.
TP05	0.3	Shallow refusal on medium to high strength rock.
TP06	0.6	Shallow refusal on medium to high strength rock.
TP07	0.2	Shallow refusal on medium to high strength rock.
TP08	1.0	Refusal on medium to high strength rock.
TP09	1.0	Soft clay to 0.4 m. Groundwater at 0.7 m.
TP10	1.1	Refusal on low to medium strength rock.
TP11	0.7	Shallow refusal on medium to high strength rock.
TP12	0.9	Shallow refusal on medium to high strength rock.
TP13	0.4	Shallow refusal on medium to high strength rock.
TP14	2.0	Target depth reached.
TP15	2.0	Target depth reached.
TP16	0.4	Shallow refusal on medium to high strength rock.
TP17	0.6	Shallow refusal on medium to high strength rock.
TP18	1.8	Target depth reached.
TP19	1.6	Practical refusal.
TP20	0.6	Shallow refusal on medium to high strength rock.
TP21	0.5	Shallow refusal on medium to high strength rock.
TP22	0.4	Shallow refusal on medium to high strength rock.
TP23	0.3	Shallow refusal on medium to high strength rock.
TP24	3.0	Target depth reached. Firm to stiff clay from 1.0 m – 1.6 m.

Test ID	Depth (m)	Comments
TP25	1.0	Refusal on low to medium strength rock.
TP26	1.3	Refusal on low to medium strength rock.
TP27	2.5	Practical refusal.
TP28	1.8	Difficult to advance test pit due to rock capping at surface. Stiff clay from 1.0 m – 1.8 m.
TP29	3.0	Target depth reached. Stiff to hard clay from 0.7 m – 3.0 m
TP30	3.0	Target depth reached. Firm clay from 1.0 m – 1.5 m. Stiff to very stiff clay from 1.5 m – 3.0 m
TP31	1.4	Refusal on low to medium strength rock.
TP32	3.0	Target depth reached. Firm to stiff clay from 0.6 m – 1.7 m.
TP33	3.0	Target Depth Reached. Presence of fill from 0.0 m – 1.6 m.
TP34	1.4	Refusal on medium to high strength rock.
TP35	2.0	Refusal on low to medium strength rock.
TP36	0.7	Shallow refusal on medium strength rock. Groundwater at 0.65 m.
TP37	1.0	Shallow refusal on low to medium strength rock.
TP38	1.2	Refusal on medium to high strength rock.
TP39	3.0	Target depth reached. Stiff to very stiff clay from 0.6 m – 3.0 m.
TP40	1.8	Refusal on low to medium strength rock. Soft to firm clay from 0.0 m – 0.6 m
TP41	1.1	Refusal on medium to high strength rock.
TP42	0.8	Shallow refusal on high strength rock.

3.3 Laboratory Testing

Testing was completed by Construction Sciences a NATA approved laboratory and the relevant Australian standard.

- 18 no. Particle size distributions (PSD)
- 18 no. one-point Atterberg limits and Linear Shrinkage
- 5 no. California Bearing Ratio (CBR) compacted to 95% maximum dry density (MDD)

Laboratory Test Certificates are presented in Appendix C.

4.0 GROUND MODEL

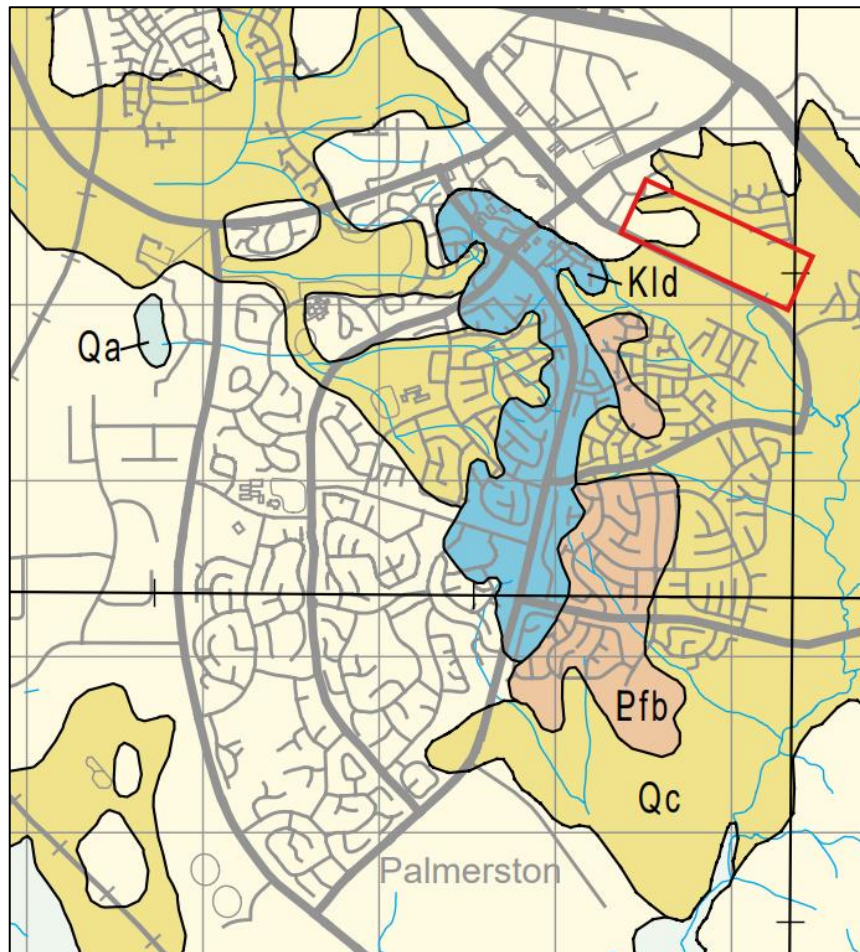
4.1 Regional Geology

Referencing was made to the Extractive Geology of the Northern Territory 1:100,000 geology map (Figure 3) which indicates that the area is underlain by the following geology:

- Qc – Slope Wash, sandy flood plains, gravel, sand, silt, colluvium
- L – Laterite Gravel (pisolitic and modular) duricrust/ ferricrete
- KId – Darwin Formation – claystone, sandstone and clayey sand

- Pfb – Burrell Creek formation – Siltstone, shale, phyllite, sandstone

Figure 3: Extract from Extractive Geology of the Northern Territory 1:100,000 Geological map (site area in red)



4.2 Subsurface Conditions

The ground conditions encountered and inferred from the investigation were considered to be generally consistent with the published geology for the area. These conditions can be generalised according to the following subsurface sequence:

TOPSOIL:	Predominantly brown and dark brown, Sandy Gravel, Clayey Sand, Silty Sand, Gravelly Sand, Sandy Clay
UNCONTROLLED FILL:	Pale orange-brown, typically Clayey Sandy Gravel encountered in TP33 only.
ALLUVIUM:	Brown, grey-brown, pale brown, orange-brown, Clay, Silty Clay, Sandy Gravel. Typically, encountered in lower lying areas (TP09, TP24, TP26, TP27, TP30, TP31 and TP40)
RESIDUAL SOILS:	Orange-brown, red brown, brown, pale brown, gravel, sandy gravel, clayey gravel, clay encountered in most test pits and boreholes. Pale yellow brown, pale brown, orange-brown, white-brown, typically Gravel-clay mixtures. Typically encountered in higher elevated areas (BH01,

EXTREMELY WEATHERED MATERIAL: TP01, TP08, TP09, TP14, TP15, TP18, TP19, TP24, TP27-TP30, TP32, TP33 and TP39)

LATERISED SILTSTONE / PORCELLANITE / PHYLLITE: Orange-brown, brown, red brown low to high strength rock encountered in most Boreholes and Test Pits.

The subsurface profile at each of the borehole and test pit locations is shown in Table 2.

Table 2: Summary of encountered subsurface conditions

Unit	Depth to base of unit (m)					
	TOPSOIL	FILL	RESIDUAL/ALLUVIUM	EXTREMELY WEATHERED MATERIAL	PORCELLANITE	LATERISED SILTSTONE/PHYLLITE
BH01	0 - 0.2	-	0.2 – 1.5	1.5 – 6.0	-	-
BH02	-	-	0 – 0.45	-	-	-
BH03	-	-	0 – 0.7	-	0.7 – 6.0	-
BH04	-	-	0 – 0.2	-	0.2 – 3.2	-
TP01	0 – 0.1	-	0.1 – 1.7	1.7 – 2.0	-	-
TP02	0 – 0.2	-	0.2 – 0.4	-	-	0.4 – 0.5
TP03	0 – 0.2	-	0.2 – 2.0	-	-	-
TP04	0 – 0.2	-	0.2 – 1.4	-	-	-
TP05	-	-	0.0 – 0.2	-	0.2 – 0.3	-
TP06	0 – 0.1	-	-	-	-	0.1 – 0.6
TP07	0 – 0.1	-	-	-	-	0.1 – 0.2
TP08	0 – 0.2	-	-	0.2 – 0.8	0.8 – 1.0	-
TP09	0 – 0.2	-	0.2 – 0.5	0.5 – 0.9	-	0.9 – 1.0
TP10	0 – 0.2	-	0.2 – 0.8	-	-	0.8 – 1.1
TP11	0 – 0.2	-	-	-	-	0.2 – 0.7
TP12	0 – 0.1	-	0.1 – 0.4	-	0.4 – 0.9	-
TP13	0 – 0.1	-	0.1 – 0.3	-	0.3 – 0.4	-
TP14	0 – 0.1	-	0.1 – 0.4	0.4 – 2.0	-	-
TP15	0 – 0.2	-	0.2 – 0.7	0.7 – 2.0	-	-
TP16	0 – 0.2	-	-	-	0.2 – 0.4	-
TP17	-	-	0 – 0.2	-	0.2 – 0.6	-
TP18	0 – 0.2	-	0.2 – 0.4	0.4 – 1.8	-	-
TP19	0 – 0.2	-	-	0.2 – 1.6	-	-
TP20	0 – 0.2	-	0.2 – 0.5	-	0.5 – 0.6	-
TP21	0 – 0.25	-	-	-	0.25 – 0.5	-
TP22	0 – 0.1	-	0.1 – 0.4	-	0.4 – 0.5	-

TP23	0 – 0.1	-	-	-	0.1 – 0.3	-
TP24	0 – 0.1	-	0.1 – 0.7	0.7 – 3.0	-	-
TP25	0 – 0.2	-	-	-	-	0.9 – 1.0
TP26	0 – 0.2	-	0.2 – 1.2	-	-	1.2 – 1.3
TP27	0 – 0.2	-	0.2 – 0.6	0.6 – 2.5	-	-
TP28	0 – 0.2	-	0.6 – 1.0	1.0 – 1.8	-	0.2 – 0.6
TP29	0 – 0.2	-	0.5 – 1.2	1.2 – 3.0	-	0.2 – 0.5
		-				
TP30	0 – 0.2	-	0.2 – 0.6/1.0 – 2.6	2.6 – 3.0	-	0.6 – 1.0
		-				
TP31	0 – 0.2	-	0.2 – 1.3	-	-	1.3 – 1.4
		-				
TP32	0 – 0.2	-	0.6-1.7	1.7 – 3.0	-	0.2 – 0.6
		-				
TP33	-	0 – 1.6	-	1.6 – 3.0	-	-
		-				
TP34	0 – 0.2	-	0.2 – 0.7	-	-	0.7 – 1.4
TP35	0 – 0.2	-	-	-	0.7 – 1.9	0.2 – 0.7/1.9 – 2.0
TP36	0 – 0.2	-	0.2 – 0.6	-	-	0.6 – 0.7
TP37	0 – 0.1	-	0.1 – 0.8	-	-	0.8 – 1.0
TP38	0 – 0.2	-	-	-	1.1 – 1.2	0.2 – 1.1
TP39	0 – 0.1	-	-	0.6 – 3.0	-	0.1 – 0.6
TP40	0 – 0.2	-	0.2 – 0.6	-	-	0.6 – 1.8
TP41	0 – 0.2	-	0.2 – 0.7	-	-	0.7 – 1.1
TP42	0 – 0.2	-	0.2 – 0.7	-	0.7 – 0.8	-
Note: * – Termination depth of investigation; ‘-’ not encountered						

After review, the site has been broadly split into three sections as shown in Figure 4.

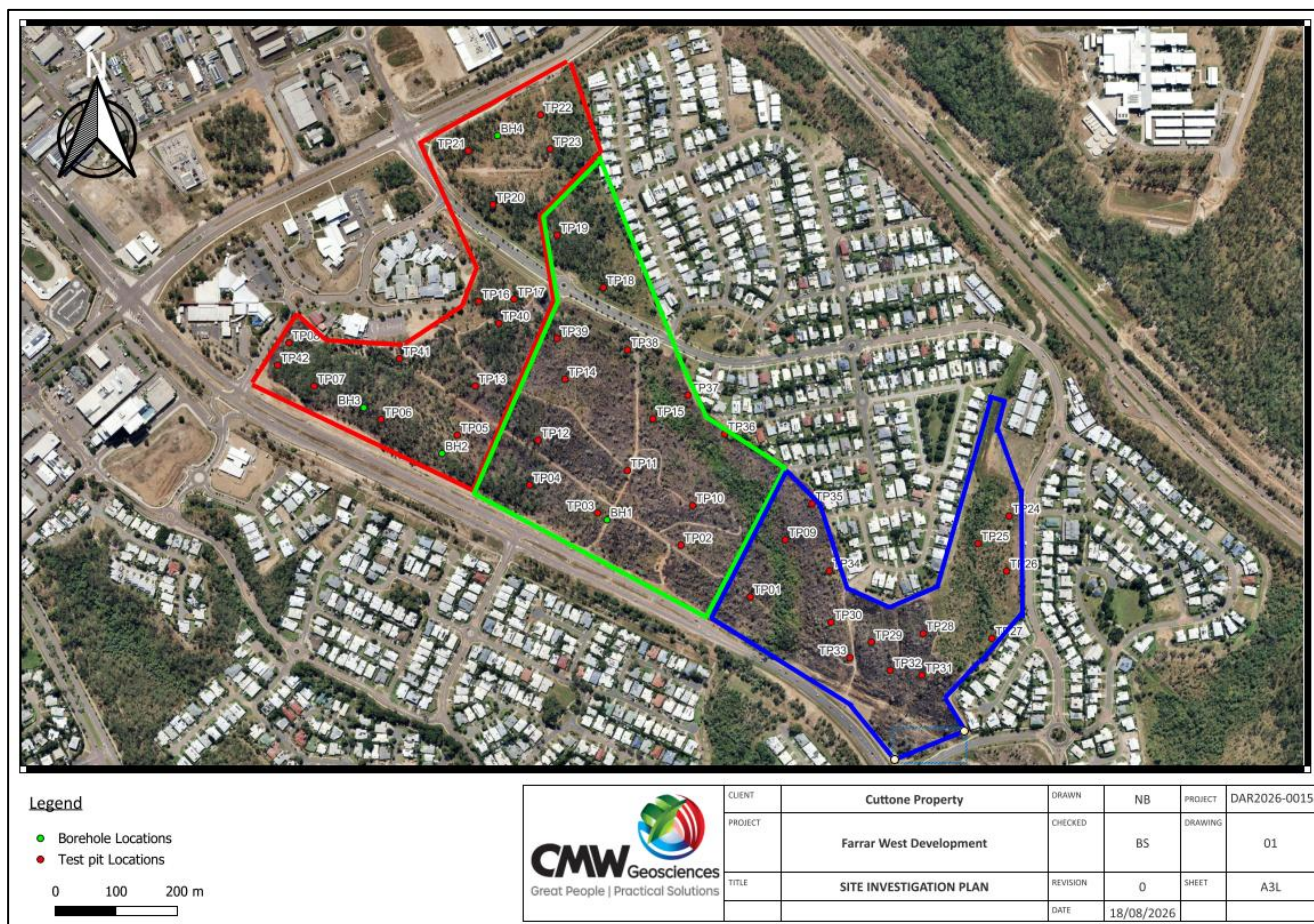
The western section of the site (outlined in red) typically encountered shallow rock refusal within 1.0 m below ground level. This area of the site tends to have a higher elevation compared to the rest of the site.

Test pits within the low-lying western section (outlined in blue) encountered predominantly deeper excavations with finer grained soil, which correlate with the lower lying areas of the site and increased vegetation.

Finally, the central section (outlined in green) features a transitional area with highly variable subsurface conditions of deep soils and shallow rock.

These zones generally correspond with the boundary of geological units within published geology maps between the Slope Wash deposits (Qc) and Lateritic deposits. Typically, higher elevations increase the likelihood of shallow rock.

Figure 4: Site Geological Areas



4.3 Groundwater

Groundwater was encountered at 1.8 m in TP01, 0.7 m in TP09 and 0.65 m in TP36 near or within the existing drainage channel running through the site.

Groundwater levels can be influenced by many factors including regional groundwater level, local and regional drainage, geology, rainfall, presence, or removal of vegetation notably medium to large trees, changes in land use and groundwater extraction. Consideration should be given to the likely conditions in the wet season, and that this may impact the geotechnical conditions of the site.

4.4 Laboratory Testing Results

Our laboratory test results are summarised Table 3 to Table 6. The associated laboratory testing certificates are presented in Appendix C.

Table 3: Summary of Geotechnical Classification test results.

ID	Depth (m)	Classification Testing					
		LS (%)	LL (%)	PI (%)	Fines (%)	Sand (%)	Gravel (%)
TP01	1.1 – 1.2	10.0	32	19	36	26	38
TP03	1.2 – 1.3	10.5	22	23	32	34	34

TP08	0.3 – 0.4	5.5	32	11	39	26	35
TP10	0.4 – 0.6	7.5	26	14	12	28	60
TP13	0.1 – 0.3	3.0	20	4	8	38	54
TP14	1.6 – 1.7	11.0	48	27	19	25	56
TP15	1.5 – 1.6	11.5	43	21	41	28	31
TP18	0.2 – 0.4	5.0	26	8	22	34	44
TP20	0.3 – 0.4	3.0	20	6	18	42	40
TP22	0.2 – 0.4	6.5	28	12	9	40	51
TP24	2.6 – 2.8	7.5	39	17	31	30	39
TP26	1.1 – 1.2	14.0	60	36	31	19	50
TP31	1.2 – 1.3	7.0	25	11	17	32	51
TP32	2.4 – 2.5	12.5	47	30	33	22	35
TP33	0.9 – 1.0	1.0	34	20	28	32	40
TP35	0.9 – 1.0	8.0	36	17	23	35	42
TP37	0.4 – 0.5	6.0	23	9	22	29	49
TP40	0.4 – 0.5	8.5	38	14	36	45	19

Note: LS = Linear Shrinkage, LL = Liquid Limit, PI = Plasticity Index, Gravel/Sand/Fines percentages are by weight

Table 4: Summary of 4-Day Soaked CBR test results

ID	Depth (m)	FMC (%)	OMC (%)	MDD (t/m ³)	Soaked CBR (%)	Swell (%)
TP08	0.3 – 0.4	13.6	17.5	1.78	14	0.5
TP09	0.7 – 0.9	11.8	12.0	2.15	12	0.5
TP13	0.1 – 0.3	6.6	10.0	2.12	35	0.0
TP18	0.2 – 0.4	11.3	13.0	1.98	20	0.5
TP22	0.2 – 0.4	8.9	12.0	2.03	35	0.0

Note: FMC – Field Moisture Content, OMC – Optimum Moisture Content, SMDD – Standard Maximum Dry Density, CBR – California Bearing Ratio

5.0 GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS

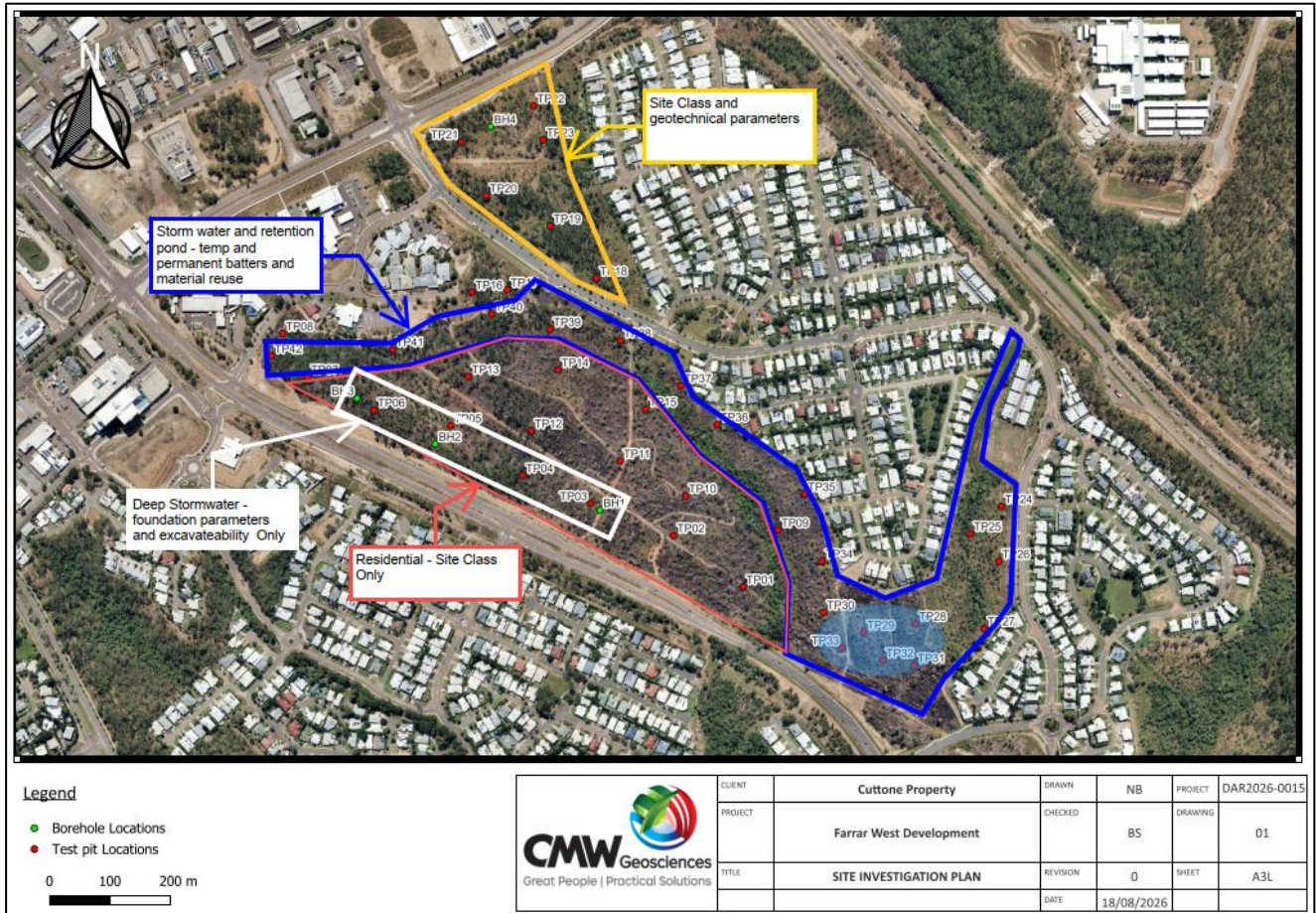
5.1 Assessment Areas

The site has been segregated into four assessment areas relevant to the entire site to aid with the geotechnical assessment as outlined below:

- Industrial/Commercial – Site classification and parameters
- Residential Subdivision Area – Site classification and material re-use
- Stormwater Reserve and Retention Pond – Batter slope stability
- Deep Stormwater Infrastructure – Foundation parameters and excavatability

Figure 5 illustrates the four assessment areas.

Figure 5: Assessment Areas



5.2 Geotechnical Model – Industrial/Commercial Area

Based on the subsurface conditions encountered and results of in-situ and field testing we have provided a geotechnical model for the industrial zoned, northwest corner of the site. CMW used the data from BH4 and TPs 18-23 for this assessment. Our geotechnical model is provided in Table 5.

Table 5: Proposed Geotechnical Model – Industrial area only

Unit	Depth Range (mbgl)	γ (kN/m ³)	ϕ (°)	Cu (kPa)	c' (kPa)	E' (MPa)
Topsoil	0.0 - 0.1	-	-	-	-	-
Residual (Granular)	0.1 – 0.5	18	34	-	-	15
Extremely Weathered Material (Granular)	0.5 – 1.5	18	36	-	-	25
Rock Strength Material	1.5 < *	22	45	-	10	150

Notes: ϕ – internal angle of friction, c' – drained cohesion, Cu – undrained shear strength, γ – unit weight, E' – drained Young Modulus

*Depth to porcellanite is high variable.

5.3 Site Classification – Industrial/Commercial and Residential Areas

Based upon the design suction soil profile and recommendations in AS2870-2011 “*Residential Slabs and Footings*” a characteristic surface movement (y_s) has been assessed for the soil profile encountered in the borehole at the current surface level. The depth of design suction change (H_s) adopted in this assessment is 1.8 m, with a design suction change at ground surface of 1.2pF and crack depth of 0.75 H_s . Instability indices have been assessed based on visual tactile assessment and laboratory testing of the encountered soils.

The site is assessed as a slightly reactive site (**Class S**) with low ground movement (less than 20 mm) in accordance with AS2870-2011, provided all footings are founded in natural soils.

Larger y_s values may occur when the future moisture content change in the soil exceeds design moisture content change as determined from AS2870. Such changes may occur, for example, adjacent to leaking water services or where the soils are desiccated by the roots of trees. Should site levels vary by more than 0.5m, it is recommended that the site classification be re-assessed.

5.4 Foundations – Industrial/Commercial and Residential Areas

5.4.1 General

Foundation systems for the structure foundations and stormwater infrastructure are expected to be founded on shallow pad or strip footings.

5.4.2 Shallow Foundations

The shallow foundations at the site are anticipated to be founded in medium dense or stronger soils with a minimum embedment of 0.3 m. The allowable bearing pressures for potential foundation strata will not only depend on the strength of the foundation stratum but will also depend on the foundation depth and the width and shape of the footing in plan.

If shallow foundations are proposed at the site, it is highly recommended that a geotechnical engineer familiar with the design and/or ground conditions assess the ground conditions prior to foundations being poured.

The shear strength and stiffness of the subsurface material, within 1.5 times the width below the base of the footing, generally govern the available bearing capacity. The friction angle, cohesion and Young’s modulus provided above can be used to estimate bearing capacity and modulus of subgrade reaction for shallow footings.

CMW have assessed that an allowable bearing capacity of 100kPa is reasonable providing that an embedment depth of 0.3m is achieved within natural granular soils.

The allowable bearing pressures should be taken as a guide only, and they do not include explicit consideration of settlement limits under working loads. Settlements of shallow footings under load may be estimated using the geotechnical model given above.

It is expected that footings designed for the recommended allowable bearing pressures and other geotechnical design parameter values given in this report will have acceptably low settlements under working loads (less than 20mm).

5.4.3 Deep Stormwater Infrastructure Foundations

Based on the ground conditions encountered, within BH01, BH02 and BH03 it is anticipated that the foundations for the stormwater infrastructure are likely to comprise either stiff to very stiff extremely weathered material (clay) or medium to high strength porcellanite within this area.

Within the shallow soil strength materials (residual/alluvial soils and extremely weathered material), CMW have assessed that an allowable bearing capacity of 100kPa is reasonable is achieved. It is expected that footings designed for this recommended allowable bearing pressures and other geotechnical design parameter values given in this report will have acceptably low settlements under working loads (less than 20mm).

Within the medium strength or better rock material (porcellanite/ siltstone/phyllite) an allowable bearing capacity of 200kPa is reasonable providing that an embedment depth of 0.3m is achieved. It is expected that footings designed for this recommended allowable bearing pressures and other geotechnical design parameter values given in this report will have acceptably low settlements under working loads (less than 20mm).

Any further assessment is outside the current scope of CMW geotechnical investigation work but can be carried out by CMW personnel as an extension to our scope of work if required.

5.5 Temporary Batter Stability – All Areas

The following maximum temporary batter slopes are recommended for short term excavation where no groundwater seepage is encountered for a batter height up to 3m:

- Uncontrolled Fill – 1V:2H
- Residual/Alluvial - 1V:2H
- Extremely Weathered Material - 1V:1H
- Low strength or stronger Laterised Siltstone/Porcellanite/Phyllite - 2V:1H

Flatter batter slopes would be required where groundwater seepage is encountered or where loading at the crest of the batter is to be performed.

For batters that exceed 3m in height, individual design consideration from a Geotechnical Engineer is required.

5.6 Permanent Batter Stability – Stormwater Reserve and Retention Pond only

The following permanent batter slopes are recommended for long term excavation where no groundwater seepage is encountered for a batter height up to 3m:

- Uncontrolled Fill - 1V:3.0H
- Residual/Alluvial - 1V:2.5H
- Extremely Weathered Material - 1V:2.5H
- Low strength or stronger Laterised Siltstone/Porcellanite/Phyllite - 1V:1.0H

Flatter batter slopes would be required where groundwater seepage is encountered or where loading at the crest of the batter is to be performed.

For batters that exceed 3m in height, individual design consideration from a Geotechnical Engineer is required.

5.7 Earthworks and Site Preparation - All areas

Earthworks construction should be undertaken in general accordance with AS3798-2007 '*Guidelines on Earthworks for Commercial and Residential Developments*'. The following general guidelines are recommended:

- Remove any topsoil, uncontrolled fill, rubbish, loose surface soils and vegetation.
- Moisture condition the exposed subgrade as necessary.
- Proof roll the exposed surface as per AS3798 under the guidance of a suitable trained person as per AS3798.
- Any wet, soft, loose or heaving materials identified during proof rolling should be removed as directed by the geotechnical engineer or Level 1 Geotechnical Inspection and Testing Authority (GITA).
- Fill, where required, should be placed in layers not exceeding 250mm loose thickness and be compacted to the required standard and level before placing the next layer. Thinner layers may be required for smaller compaction equipment. The recommended compaction levels would be at least 95% of maximum modified dry density.

5.8 Subgrade Design CBR - Industrial/Commercial and Residential Areas

The subgrade for proposed pavements would likely comprise residual soils/alluvial soils or shallow rock. Based on the results of laboratory testing and our experience in these soils a site wide design CBR of 8 % is assessed appropriate. The design CBR advice is subject to the following site preparation being carried out:

- The subgrade surface is proof rolled with a fully loaded water truck (minimum 10,000 litres) to identify any soft, wet or weak areas which may require remedial work (such as removal and replacement).
- Soft spots identified during proof rolling should be over excavated and replaced with engineered fill placed in maximum 250mm loose lifts and compacted to 95% of Modified Maximum Dry Density (MMDD) at $\pm 2\%$ of Optimum Moisture Content (OMC). If extensive soft spots are encountered, further geotechnical advice should be obtained.
- The pavement is adequately drained to prevent saturation of the pavement materials and underlying subgrade (including dewatering of subgrade soils where groundwater is present within 1m of finished pavement level); and
- Field testing is undertaken on subgrade and pavement materials during construction to ensure compliance with the above recommendations.
- Pavements should be placed as soon as practicable after preparation of the subgrade to avoid disturbance and softening of the subgrade soils.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Site Drainage - All Areas

Care should be taken during construction to prevent water from ponding in the base of any trench or footing excavation. The ponding of water could result in softening of the foundation soils and additional post construction settlement and/or heave. It would be desirable that a blinding layer of lean mix concrete, or appropriate moisture barrier, be placed in the base of trench footing excavations to reduce moisture content variations in the foundation soils during construction.

Surface drainage must be constructed to keep water off the foundation soil strata. The ground surface adjacent to any trenches should be graded to divert all water run-off away from the trench.

6.2 Excavatability – All areas

Based on the subsurface conditions encountered during the investigation, soil materials that included topsoils, residual/ alluvial soils and extremely weathered material was encountered up to a maximum depth of 6.0 m as shown in Table 2. Soil-strength material is anticipated to be excavatable using conventional earthmoving equipment however the depth to rock and refusal was highly variable across the site.

Shallow refusal encountered in the test pit locations is likely to correspond to depths at which a typical earthmoving equipment may encounter slower production rates or refusal. Where medium strength or stronger rock is encountered, it is anticipated that a large excavator (at least 20 t) fitted with rock hammer and, ripping attachments or rock saws may be required to excavate the material.

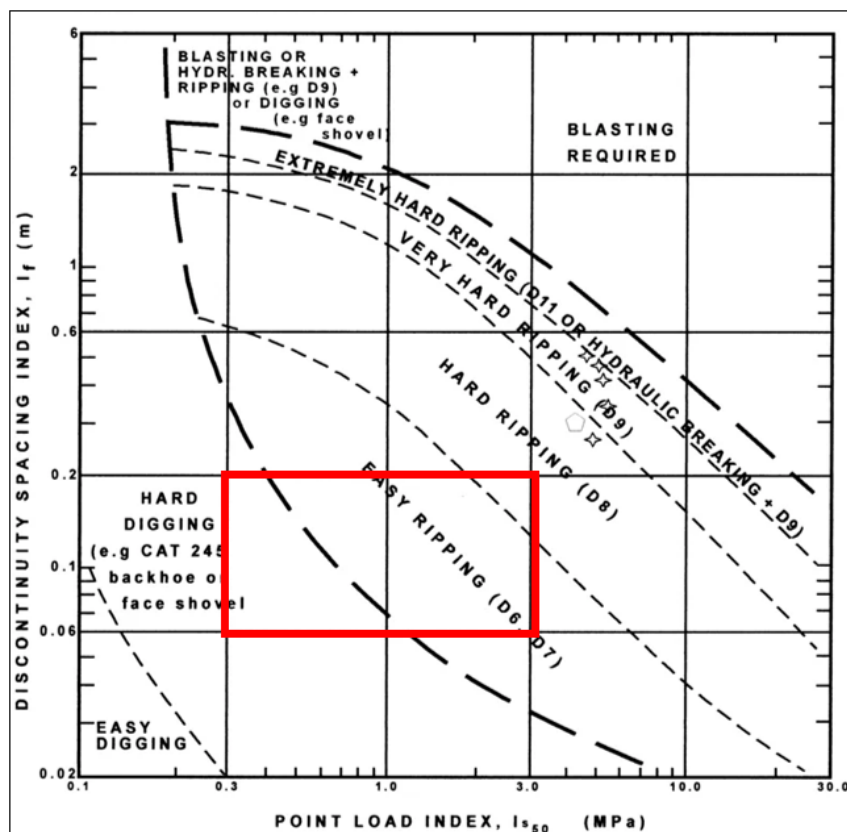
6.3 Excavatability – Deep stormwater Infrastructure

It is understood that excavation is required to a depth of up to approximately 6.0 m below ground for the deep stormwater infrastructure. CMW perform additional deep boreholes to investigate the rock encountered in this area.

Excavatability of rock is dependent not only on rock strength, but also on the presence, orientation and extent of discontinuities such as jointing, bedding and fracturing of the rock, the presence of favourable and adverse bedding planes, presence of groundwater and other factors. For example, low strength rock with few discontinuities may be more difficult to excavate than highly fractured, high strength rock.

Pettifer and Fookes (1986) outlines this correlation between point load strength vs defect spacing and provides suggested construction plant capable of progressing through these materials.

Figure 6: Excavatability Extract from Pettifer and Fookes (1986). Red Box - rock encountered in BH01 to BH03



From visual-tactile assessment of recovered rock as per AS1726, CMW encountered medium to high strength rock in the deep stormwater alignment. This assessment approximately correlates to a point load strength (I_{s50}) between 0.3 to 3.0 MPa (or 2 to 20 MPa UCS). From rock core logging, typical defect spacing ranged between 60-200 mm.

Based on the above, the encountered rock will likely require a CAT D7 (or similar) dozer with tipper tine attachment.

Contractors are responsible for selecting excavation equipment based on the proposed excavation depths and equipment capabilities, together with the anticipated conditions. It is suggested that potential earthworks contractors should be given the opportunity to review this report prior to being engaged.

6.4 Material Reusability - All Areas

We consider a potential for excavated granular material to be suitable for re-use as general fill. In general, material reused as structural or general fill should be free of topsoil, organics or other deleterious material and should have a maximum particle size of less than 75mm.

Topsoil, silt and material which breaks down to silt during compaction are unsuitable for reuse as engineered fill but may be suitable for landscaping purposes.

6.4.1 Retention Basin

Test pits that were excavated within the retention basin included test pits TP28 to TP33. Medium plasticity clay/gravelly clay material was encountered from approximately 1.0 m to 3.0 m in all test pits except TP31.

In general terms and with respect to geotechnical properties, this cohesive material may be considered for re-use as liner material for the retention basin structure at the site, provided that any deleterious materials (tree roots etc) are removed and geotechnical properties (e.g. plasticity and shrink-swell potential) are carefully considered.

6.5 Construction Observations - All Areas

Level 1 supervision is required for all earthworks to conform with NTG guidelines, CMW are experienced and happy to provide these services which are detailed in our original proposal.

CMW has extensive experience in the detailed design of pile foundations, pad and shallow footings and would be pleased to undertake this work to optimise the design solutions for the project. If required, CMW can assist in the detailed design, or the review of designs prepared by other parties.

It is strongly recommended that an experienced geotechnical engineer attend site to verify the validity of the assumptions made by the designer as to the subsurface conditions encountered. CMW are able to perform this task if required.

7.0 CLOSURE

This report has been prepared for use by Cuttone Property Group in relation to the West Farrar project in accordance with the scope, proposed uses and limitations described in the report. Should you have further questions relating to the use of your report please do not hesitate to contact us.

Where a party other than Cuttone Property Group seeks to rely upon or otherwise use this report, the consent of CMW should be sought prior to any such use. CMW can then advise whether the report and its contents are suitable for the intended use by the other party.

USING YOUR CMW GEOTECHNICAL REPORT

Geotechnical reporting relies on interpretation of facts and collected information using experience, professional judgement, and opinion. As such it generally has a level of uncertainty attached to it, which is often far less exact than other engineering design disciplines. The notes below provide general advice on what can be reasonably expected from your report and the inherent limitations of a geotechnical report.

Preparation of your report

Your geotechnical report has been written for your use on your project. The contents of your report may not meet the needs of others who may have different objectives or requirements. The report has been prepared using generally accepted Geotechnical Engineering and Engineering Geology practices and procedures. The opinions and conclusions reached in your report are made in accordance with these accepted principles. Specific items of geotechnical or geological importance are highlighted in the report.

In producing your report, we have relied on the information which is referenced or summarised in the report. If further information becomes available or the nature of your project changes, then the findings in this report may no longer be appropriate. In such cases the report must be reviewed, and any necessary changes must be made by us.

Your geotechnical report is based on your project's requirements

Your geotechnical report has been developed based on your specific project requirements and only applies to the site in this report. Project requirements could include the type of works being undertaken; project locality, size and configuration; the location of any structures on or around the site; the presence of underground utilities; proposed design methodology; the duration or design life of the works; and construction method and/or sequencing.

The information or advice in your geotechnical report should not be applied to any other project given the intrinsic differences between different projects and site locations. Similarly geotechnical information, data and conclusions from other sites and projects may not be relevant or appropriate for your project.

Interpretation of geotechnical data

Site investigations identify subsurface conditions at discrete locations. Additional geotechnical information (e.g. literature and external data source review, laboratory testing etc) are interpreted by Geologists or Engineers to provide an opinion about a site specific ground models, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist due to the variability of geological environments. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. Interpretation of factual data can be influenced by design and/or construction methods. Where these methods change review of the interpretation in the report may be required.

Subsurface conditions can change

Subsurface conditions are created by natural processes and then can be altered anthropically or over time. For example, groundwater levels can vary with time or activities adjacent to your site, fill may be placed on a site, or the consistency of near surface conditions might be susceptible to seasonal changes. The report is based on conditions which existed at the time of investigation. It is important to confirm whether conditions may have changed, particularly when large periods of time have elapsed since the investigations were performed.

Interpretation and use by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical report. To help avoid misinterpretations, it is important to retain the assistance of CMW to work with other project design professionals who are affected by the contents of your report. CMW staff can explain the report implications to design professionals and then review design plans and specifications to see that they have correctly incorporated the findings of this report.

Your report's recommendations require confirmation during construction

Your report is based on site conditions as revealed through selective point sampling. Engineering judgement is then applied to assess how indicative of actual conditions throughout an area the point sampling might be. Any assumptions made cannot be substantiated until construction is complete. For this reason, you should retain geotechnical services throughout the construction stage, to identify variances from previous assumption, conduct additional tests if required and recommend solutions to problems encountered on site. A Geotechnical Engineer, who is fully familiar with the site and the background information, can assess whether the report's recommendations remain valid and whether changes should be considered as the project develops. An unfamiliar party using this report increases the risk that the report will be misinterpreted.

Environmental matters are not covered

Unless specifically discussed in your report environmental matters are not covered by a CMW Geotechnical Report. Environmental matters might include the level of contaminants present of the site covered by this report, potential uses or treatment of contaminated materials or the disposal of contaminated materials. These matters can be complex and are often governed by specific legislation.

The personnel, equipment, and techniques used to perform an environmental study can differ significantly from those used in this report. For that reason, our report does not provide environmental recommendations. Unanticipated subsurface environmental problems can have large consequences for your site. If you have not obtained your own environmental information about the project site, ask your CMW contact about how to find environmental risk-management guidance.

APPENDIX A

Site Investigation Plan



Legend

- Borehole Locations
- Test pit Locations

0 100 200 m



CLIENT	Cuttone Property	DRAWN	NB	PROJECT	DAR2026-0015
PROJECT	Farrar West Development	CHECKED	BS	DRAWING	01
TITLE	SITE INVESTIGATION PLAN	REVISION	0	SHEET	A3L
		DATE	18/08/2026		

APPENDIX B

Results of Site Investigation

BOREHOLE LOG - BH1

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 14/07/2026



1:25 Sheet 1 of 2

Logged by: NB Position: E.1717919m N.2470931m Plant used: Trailer rig scout 1750
Checked by: Elevation: 24.9172 m (mAHD) Contractor: PRJ Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
		Depth	Type & Results							5	10	15	
				24.72			TOPSOIL : Silty SAND: fine to coarse grained, pale brown; silt, low plasticity, trace gravel, fine grained.	D					
		1.0-1.3	BH1SPT01 SPTLS SPT: (9,12,11) N=23 Rec.=300mm		1		GW: Sandy GRAVEL: fine to coarse grained, angular to sub-angular orange brown; sand, fine to coarse grained, with clay, low plasticity. (RESIDUAL)	D to M	MD				
		1.00		23.42			Cl: CLAY: medium plasticity, pale yellow brown with gravel, fine grained, angular to sub-angular. (EXTREMELY WEATHERED MATERIAL).						
		2.5-3.0	BH1SPT02 SPTLS SPT: (2,3,6) N=9 Rec.=450mm PP=210kPa	22.42			Cl: CLAY: medium plasticity, pale brown mottled white trace sand, fine grained, trace gravel, fine grained (EXTREMELY WEATHERED MATERIAL)						
		2.50			3								
		2.60											
		3.8-4.0	BH1_01 D										
		4.00	SPT: (4,8,9) N=17 Rec.=700mm PP=270kPa		4								
		4.20											
					5								

DCP/PSP Equipment Ref.: In Situ Vane Ref.: Pocket Penetrometer Equipment Ref.:
Termination Reason: Target Depth
Remarks:
This report must be read in conjunction with accompanying notes and abbreviations.

CMW Geosciences
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1:25 Sheet 2 of 2

Plant used: Trailer rig scout 1750
Contractor: PRJ Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
		Depth	Type & Results							5	10	15	
		5.50	SPT: (6,9,13) N=22 PP=320kPa	19.12			Cl: CLAY: medium plasticity, pale brown mottled white trace sand, fine grained, trace gravel, fine grained (EXTREMELY WEATHERED MATERIAL)						
		5.60			18.92		GC: Clayey GRAVEL: fine to coarse grained, angular to sub-angular yellow brown mottled white clay, medium plasticity, with sand, fine to coarse grained. (EXTREMELY WEATHERED MATERIAL) Borehole terminated at 6.00 m	M	D to VD				
					6								
					7								
					8								
					9								
					10								

	Pocket Penetrometer Equipment Ref.:	
--	-------------------------------------	--

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - BH1

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 14/07/2026

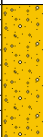


CMW Geosciences
Great People | Practical Solutions
1:25 Sheet 1 of

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 14/07/2026

1:25 Sheet 1 of 1

Logged by: NB	Position: E.1717644m N.2471060m	Hole Diameter: 125mm	Plant used: Trailer rig scout 1750
Checked by:	Elevation: 34.0612 m (mAHD)	Angle from horizontal: 0°	Contractor: PRJ Drilling

Well	Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
		Depth	Type & Results							5	10	15	
		0.45	SPT: (30/10mm) N=R Rec.=0mm	33.61			GW: Sandy GRAVEL: fine to coarse grained, angular to sub-angular pale brown ; sand, fine to coarse grained, trace clay, low plasticity. (RESIDUAL)	D	D to VD				0.40-0.45m: Auger refusal
							Borehole terminated at 0.45 m						
					1								
					2								
					3								
					4								
					5								

DCP/PSP Equipment Ref.:	
-------------------------	--

In Situ Vane Ref.:	
--------------------	--

	Pocket Penetrometer Equipment Ref.:
--	-------------------------------------

Termination Reason: Practical refusal

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - BH2

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 14/07/2026



BH2_11-57-16



BH2_12-12-53

BOREHOLE LOG - BH3

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 15/07/2026



1:25 Sheet 1 of 2

Logged by: NB				Position: E.1717515m N.2471145m				Plant: Trailer rig scout 1750													
Checked by:				Elevation: 39.9204 m (mAHD)				Angle from horizontal: 0° Contractor: PRJ Drilling													
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength						Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data	
			TCR	SCR	RQD							VL	L	M	H	VH	EH				
AD/V						39.9			GP: Sandy GRAVEL: fine to medium grained, angular to sub-angular brown; sand, fine to coarse grained, trace clay, low plasticity. (RESIDUAL)	MD to D											
						39.2		PORCELLENITE : fine, orange brown mottled white, Distinctly weathered, medium to high strength, dry													
NML C			100	113	0	1														0.70-0.90m:SZ, 0°, RO, SN	
																				0.90-0.97m:SS, UN, RO, SN	
																				1.00-1.04m:SS, 90°, UN, SN	
																				1.09-1.10m:JT, 10°, UN, RO, SN	
																				1.10-1.27m:SS, UN, RO, SN	
																				1.27-1.29m:SZ, RO, SN	
																				1.40-1.42m:JT, 30°, IR, RO, SN	
																					1.81-1.84m:SZ, RO, CN
																					1.91-1.93m:SZ, RO, CN
																					1.95-2.00m:SS, IR, RO, CN
			85	26	16	2														2.00-2.10m:SS, IR, RO, CN	
																				2.17-2.19m:JT, 5°, ST, RO, CN	
																				2.26-2.26m:JT, 2°, UN, RO, CN	
																				2.37-2.38m:PT, CU, RO, CN	
																				2.52-2.52m:PT, PL, RO, CN	
																				2.54-2.55m:PT, PL, RO, CN	
																				2.67-2.68m:PT, IR, RO, CN	
																				2.68-2.73m:SS, 70°, PL, RO, CN	
																				2.74-2.93m:CRS	
																				2.93-3.00m:SS, IR, RO, CN	
																				3.27-3.43m:SZ, RO, CN	
																				3.43-3.56m:SS, 90°, IR, RO, CN	
																				3.62-3.62m:PT, IR, RO, CN	
																				3.65-3.66m:PT, PL, RO, CN	
																				3.74-3.74.00m:JT, 2°, PL, RO, CN	
																				3.84-3.89m:SZ, RO, CN	
																				4.07-4.08m:CRS, CU, RO	
																				4.15-4.16m:JT, 5°, IR, RO, CN	
																				4.21-4.30m:SZ, IR, RO, CN	
																				4.30-4.34m:CRS, RO	
																				4.34-4.50m:SZ, RO, CN	
																				4.61-4.70m:SZ, RO, CN	
Termination reason: Target Depth Remarks:																					
This report must be read in conjunction with accompanying notes and abbreviations.																					

BOREHOLE LOG - BH3

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 15/07/2026



1:25 Sheet 2 of 2

Logged by: NB		Position: E.1717515m N.2471145m		Plant: Trailer rig scout 1750	
Checked by:		Elevation: 39.9204 m (mAHD)		Angle from horizontal: 0° Contractor: PRJ Drilling	

Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength						Cementation/Weathering	Defect Spacing (mm)	Samples, test results and additional Data
			TCR	SCR	RQD							VL	L	M	H	VH	EH			
NML C			88	31	0		5		PORCELLENITE : fine, orange brown mottled white, Distinctly weathered, medium to high strength, dry											4.80-4.82m:SZ, RO, CN
																				4.89-4.90m:PT, UN, RO, CN
																				4.94-4.94m:PT, CU, RO, CN
																				5.00-5.09m:SS, UN, RO, CN
			85	0	0		34.7		CI: CLAY: medium plasticity, orange brown mottled white trace gravel, fine grained, trace sand, fine to coarse grained.(EXTREMELY WEATHERED MATERIAL)											5.09-5.14m:EWS
							34.6		PORCELLENITE : fine, orange brown mottled white, Distinctly weathered, medium to high strength, dry ... from 5.45m to 5.52m, CORE LOSS											5.18-5.18m:JT, 5°, PL, RO, SN, Rio staining
							34.0		GP: Sandy GRAVEL: fine to medium grained, sub-angular , orange brown mottled white ; sand, fine to coarse grained; with clay, medium plasticity. (EXTREMELY WEATHERED MATERIAL). Borehole terminated at 6.0 m											5.24-5.36m:EWS
							6													5.36-5.43m:SS, IR, RO, SN, Iron staining
																				5.52-5.77m:SZ, IR, RO, SN, (Iron staining)
																				5.77-5.88m:SS, IR, RO, SN, Iron staining
																				5.88-6.00m:EWS
Termination reason:		Target Depth																		
Remarks:																				

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - BH3

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 15/07/2026



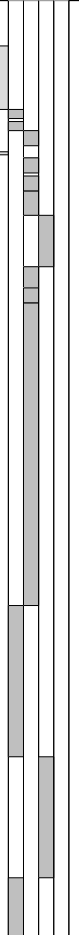
BH3 0.0m to 5.0m_10-56-25



BH3 0.0m to 5.0m_11-25-36

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 14/07/2026



Logged by: NB				Position: E.1717770m N.2471592m				Plant: Trailer rig scout 1750																						
Checked by:				Elevation: 33.7552 m (mAHD)				Angle from horizontal: 0° Contractor: PRJ Drilling																						
Drilling Method	Well	Groundwater	Coring			RL (m)	Depth (m)	Graphic Log	Rock/Soil Description	Consistency	Moisture Condition	Rock Strength						Cementation/Weathering	Defect Spacing (mm)				Samples, test results and additional Data							
			TCR	SCR	RQD							VL	L	M	H	VH	EH		<20	20-40	40-100	100-300		300-1000	>1000					
NML C			81	39	15	33.8			GRAVEL: fine to coarse, orange brown; trace sand, fine to coarse. (RESIDUAL)	MD						MW			0.00-0.15m: CORE LOSS											
						33.6			PORCELLENITE : fine, orange brown mottled white, Distinctly weathered, medium to high strength, dry										0.15-0.33m:SZ, RO, SN											
																												0.37-0.38m:PT, 0°, UN, RO, SN		
																												0.41-0.42m:JT, 5°, CU, RO, SN		
																												0.47-0.48m:PT, PL, RO, SN		
																													0.49-0.50m:JT, 5°, ST, RO, SN	
																													0.55-0.56m:JT, UN, RO, SN	
																													0.61-0.64m:JT, PL, RO, SN	
																														0.69-0.70m:JT, 5°, PL, RO, SN
																														0.86-0.87m:JT, 5°, UN, RO, SN
0.93-0.94m:PT, 0°, UN, RO, SN																														
																			1.14-1.14m:JT, 2°, UN, RO, SN											
																			1.24-1.23m:PT, UN, RO, SN											
																			1.40-1.41m:JT, 0°, UN, RO, SN											
																			1.49-1.51m:EWS											
																			1.65-1.66m:JT, 2°, UN, RO, SN											
																			1.76-1.75m:JT, 5°, UN, RO, SN											
																			1.81-1.82m:JT, 10°, UN, RO, SN											
																			1.89-1.90m:PT, 0°, CU, RO, SN											
																			2.05-2.14m:SZ, RO, SN											
																			2.20-2.25m:PT, UN, RO											
																			2.25-2.28m:SZ, RO, SN											
																			2.33-2.34m:PT, UN, RO											
																			2.40-2.41m:PT, UN, RO											
																			2.47-2.54m:SZ, RO, SN											
2.93-2.94m:PT, 5°, UN, RO, SN																														
3.06-3.06m:PT, UN, RO, SN																														
									Borehole terminated at 3.2 m																					

Termination reason:

terminated

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - BH4

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 14/07/2026



TEST PIT LOG - TP01

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1718155m N.2470787m Plant: 5.5t excavator
Checked By: Elevation: 19.6868 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
▼	1.1 - 1.2	TP01_01 D	19.6	1		TOPSOIL : Silty SAND: fine to coarse grained, pale brown; silt, low plasticity, trace gravel ... from 0.00m to 0.10m, some rootlets		L	2			
						SC: Clayey SAND: fine to coarse grained, orange brown mottled yellow; clay, low plasticity; trace gravel; fine. (RESIDUAL)		L	3			
								L	2			
								L	2			
								L	2			
								L	3			
								L	2			
								L	2			
								L	3			
								L	2			
			19.0	1		CL: Gravelly CLAY: low plasticity, orange brown; gravel, fine to medium grained, angular to sub-angular; with sand, fine to coarse grained. (RESIDUAL)		~PL	5			
								St	7			
								St	6			
								St	4			
								St	8			
								St	7			
								St	7			
								St	4			
								St	7			
								St	7			
			18.0	1				H	25			
								H				
								H				
								H				
								H				
								H				
								H				
								H				
								H				
								H				
			17.7	2		GC: Clayey GRAVEL: fine to coarse grained, angular to sub-angular red brown mottled orange clay, low plasticity, with sand, fine to coarse grained. (EXTREMELY WEATHERED MATERIAL)	W	VD				
								VD				
								VD				
								VD				
								VD				
								VD				
								VD				
								VD				
								VD				
								VD				
			17.7	2		Test pit terminated at 2.00 m						

DCP Equipment Ref.: In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

Termination Reason: Target Depth

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP01

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



TP01_10-51-09



TP01_10-51-55

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Sheet 1 of 1

Dimensions : 0.45m x 2.00m

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP02

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



TP02_11-25-12



TP02_11-25-43

TEST PIT LOG - TP03

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717903m N.2470944m Plant: 5.5t excavator
Checked By: Elevation: 25.0944 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			24.9			TOPSOIL : Silty SAND: fine to coarse grained, pale brown; silt, low plasticity, trace gravel, fine grained. ... from 0.00m to 0.20m, trace rootlets GW: Sandy GRAVEL: fine to coarse grained, angular to sub-angular orange brown; sand, fine to coarse grained, with clay, low plasticity. (RESIDUAL)	L	2				
							MD	6				
								9				
									16			
									17			
									25			
												0.70-0.80m: DCP refusal
	1.2 - 1.3	TP03_01 D	24.1	1		GC: Clayey Sandy GRAVEL: fine to medium grained, angular to sub-angular, orange brown mottled white; clay, medium plasticity, sand, fine to coarse grained. (RESIDUAL)	D	VD				
	1.80	PP=260kPa	23.1	2		Test pit terminated at 2.00 m						
				3								

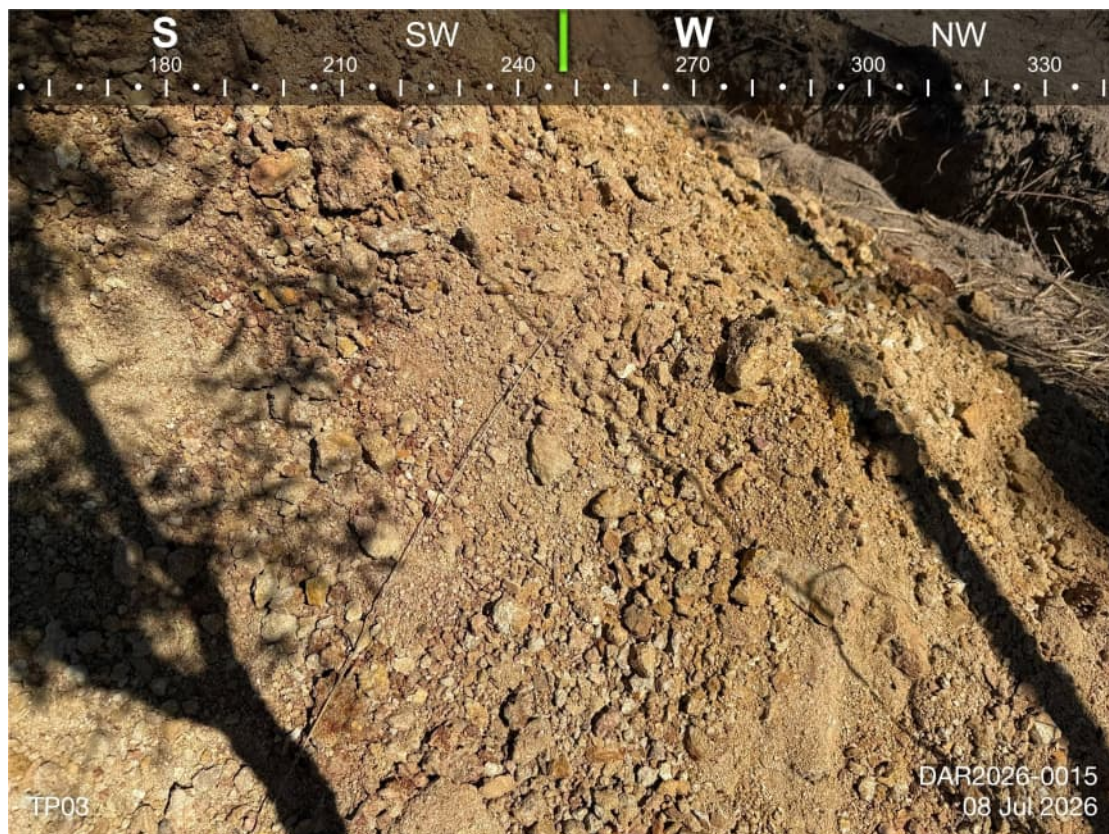
DCP Equipment Ref.:	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Target Depth		
Remarks:		
This report must be read in conjunction with accompanying notes and abbreviations.		

PHOTOGRAPH SHEET - TP03

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



TP03_12-08-34



TP03_12-16-49

TEST PIT LOG - TP04

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



1:20

Sheet 1 of 1

Logged by: NB Position: E.1717790m N.2470998m Plant: 5.5t excavator
Checked By: Elevation: 27.3472 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			27.1			TOPSOIL: Silty SAND: fine to coarse grained, pale brown grey silt, low plasticity, trace gravel, fine grained ... from 0.00m to 0.30m, some rootlets GC: Clayey GRAVEL: fine to coarse grained, angular to sub-angular pale orange brown; clay, low plasticity, with sand, fine to coarse grained.(RESIDUAL) ... from 0.30m to 0.40m, trace rootlets		L to MD	3	7	11	
				1			D	VD	15	13	12	
									14	9	12	
									18	22	15	
									15	14	13	
			25.9			CI: CLAY: medium plasticity, white brown with gravel, fine to medium grained, trace sand, fine grained. (EXTREMELY WEATHERED MATERIAL)	<PL	H	13	12	14	
									14	15	16	
			25.3	2		Test pit terminated at 2.00 m						
				3								

DCP Equipment Ref.:	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Target Depth		
Remarks:		
This report must be read in conjunction with accompanying notes and abbreviations.		

PHOTOGRAPH SHEET - TP04

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



TP04_13-54-44



TP04_13-55-41

TEST PIT LOG - TP05

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717672m N.2471089m Plant: 5.5t excavator
Checked By: Elevation: 34.2924 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			34.1			GW: GRAVEL: fine to coarse grained, angular to sub-angular red brown mottled orange. (RESIDUAL)	D	MD	8			0.20-0.30m: DCP refusal
			34.0			PORCELLENITE : fine, red brown mottled white yellow, amorphous, dry, moderately weathered, medium to high strength. Test pit terminated at 0.30 m				25		
				1								
				2								
				3								
				4								

PSP Equipment Ref.:In Situ Vane Equipment Ref.:Pocket Penetrometer Equipment Ref.:

Termination Reason: Refusal

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP05

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



TP05_14-29-03



TP05_14-29-24

TEST PIT LOG - TP06

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717543m N.2471123m Plant: 5.5t excavator
Checked By: Elevation: 38.9616 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			38.9			TOPSOIL: Silty SAND: fine to coarse grained, pale brown grey; silt, low plasticity, trace gravel, fine grained ... from 0.00m to 0.10m, trace rootlets	D	D	12			0.30-0.40m: DCP refusal
						LATERISED SILTSTONE: fine, orange brown mottled yellow, Distinctly weathered, medium to high strength, dry ... from 0.20m to 0.60m, recovered as GRAVEL with sand			19			
									21			
									25			
			38.4			Test pit terminated at 0.60 m						
				1								
				2								
				3								

DCP Equipment Ref.: In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

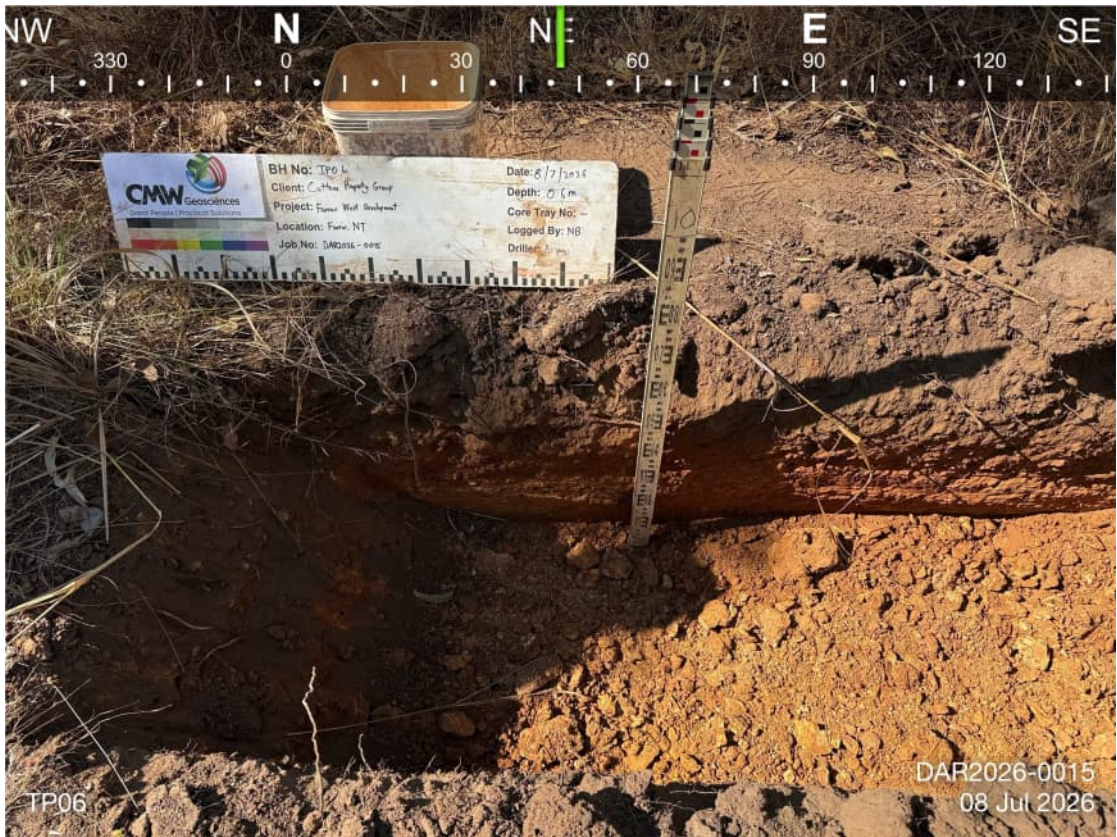
Termination Reason: Practical Refusal

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP06

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



TP06_15-01-03



TP06_15-01-48

TEST PIT LOG - TP07

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717433m N.2471186m Plant: 5.5t excavator
Checked By: Elevation: 38.1696 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			38.1			TOPSOIL: Silty SAND: fine to coarse grained, pale brown grey; silt, low plasticity, trace gravel, fine grained ... from 0.00m to 0.10m, some rootlets	D	VD		25		0.00-0.10m: DCP refusal
			38.0			PORCELLENITE : fine, red brown mottled white yellow, amorphous, dry, moderately weathered, medium to high strength. ... from 0.10m to 0.20m, DARWIN MEMBER GROUP Test pit terminated at 0.20 m						
				1								
				2								
				3								

DCP Equipment Ref.: In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

Termination Reason: Practical refusal

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP07

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



TP07_15-32-39



TP07_15-32-44

TEST PIT LOG - TP08

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717394m N.2471262m Plant: 5.5t excavator
Checked By: Elevation: 40.2108 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
	0.3 - 0.4	TP08_01 B	40.0			TOPSOIL : Silty SAND: fine grained, pale brown fines, fine grained, trace gravel, fine grained	D	L to MD	2			
						CL: Gravelly CLAY: low plasticity white mottled orange; gravel, fine to coarse grained, angular ot sub-angular; with sand, fine to coarse grained (EXTREMELY WEATHERED MATERIAL)	<PL	H	7			
									7			
									12			
									12			
									25			
			39.4			PORCELLENITE : fine, red brown mottled white yellow, amorphous, dry, moderately weathered, medium to high strength.						
			39.2	1		Test pit terminated at 1.00 m						
				2								
				3								

DCP Equipment Ref.:	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Practical Refusal		
Remarks:		
This report must be read in conjunction with accompanying notes and abbreviations.		

PHOTOGRAPH SHEET - TP08

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 08/07/2026



TP08_16-33-20



TP08_16-33-46

TEST PIT LOG - TP09

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 07/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1718220m N.2470880m Plant: 5.5t excavator
Checked By: Elevation: 19.6908 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
▼			19.5			TOPSOIL : Sandy CLAY: medium plasticity, dark brown sand, fine grained.	<PL	S	1			0.80-0.90m: DCP refusal
						Cl: CLAY: medium plasticity, dark brown; with sand, fine grained. (ALLUVIUM)			1			
			19.2			GW: Sandy GRAVEL: fine to coarse grained, orange brown mottled white, sand, fine to coarse, with clay, low plasticity. (EXTREMELY WEATHERED MATERIAL)			8			
							M to W	D to VD	12			
			18.8						13			
									15			
			18.7			LATERISED SILTSTONE: fine, orange brown, highly weathered, medium to high strength, dry			25			
				1		Test pit terminated at 1.00 m						
				2								
				3								

DCP Equipment Ref.: In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

Termination Reason: Pratical Refusal

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP09

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 07/07/2026



TP09_16-18-44



TP09_16-19-25

TEST PIT LOG - TP10

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 09/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1718066m N.2470947m Plant: 5.5t excavator
Checked By: Elevation: 23.12 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)	Structure & other observations
	Depth	Type & Results								
	0.4 - 0.6	TP10_01 D	22.9			TOPSOIL : Gravelly SAND: fine to coarse grained, pale brown; gravel, fine grained, sub-rounded to rounded; trace silt, low plasticity. ... from 0.00m to 0.10m, some rootlets GP: Sandy GRAVEL: fine to medium grained, sub-angular to sub-rounded yellow brown; sand, fine to coarse grained, trace clay, low plasticity. (RESIDUAL)	M	MD to D	4 6 8 12 10 6 7	0.70-0.80m: DCP refusal
			22.3			LATERISED SILTSTONE: fine, orange brown mottled white, highly weathered, low to medium strength, moist ... from 0.90m to 1.00m, root observed				
			22.0	1		Test pit terminated at 1.10 m				

DCP Equipment Ref.:	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Practical refusal		
Remarks:		
This report must be read in conjunction with accompanying notes and abbreviations.		

PHOTOGRAPH SHEET - TP10

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 09/07/2026



TP10_10-20-34



TP10_10-20-54

TEST PIT LOG - TP11

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 09/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717958m N.2471013m Plant: 5.5t excavator
Checked By: Elevation: 24.994 m (mAHD) Contractor: Arjays Dimensions : m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			24.8			TOPSOIL : Silty SAND: fine to medium grained, pale brown; silt, low plasticity; trace gravel, fine grained, sub-angular to sub-rounded ... from 0.00m to 0.20m, some rootlets	D	MD	5			0.00-0.20m: DCP refusal
			24.3			LATERISED SILTSTONE: fine, orange brown mottled white, Distinctly weathered, medium strength ... from 0.20m to 0.70m, recovered as sandy GRAVEL				25		
						Test pit terminated at 0.70 m						
				1								
				2								
				3								

DCP Equipment Ref.: In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

Termination Reason: Practical refusal
Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP11

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 09/07/2026



TP11_09-45-24



TP11_09-45-45

TEST PIT LOG - TP12

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 09/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717809m N.2471073m Plant: 5.5t excavator
Checked By: Elevation: 28.0608 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			28.0			TOPSOIL : Gravelly SAND: fine to coarse grained, pale brown; gravel, fine grained, sub-angular to sub-rounded; trace silt, low plasticity. ... from 0.00m to 0.10m, some rootlets GP: Sandy GRAVEL: fine grained, sub-angular to sub-rounded, red brown; sand, fine to coarse grained, trace clay, low plasticity. (RESIDUAL)	D	MD	4			
			27.7			PORCELLENITE : fine, orange brown mottled white, Distinctly weathered, medium to high strength, dry ... from 0.40m to 0.90m, fractured rock, recovered as MIXTURE GRAVEL AND COBBLES.		D	9	13	16	
			27.2			Test pit terminated at 0.90 m			12	10	25	
				1								
				2								
				3								

DCP Equipment Ref.: In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

Termination Reason: Practical Refusal

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP12

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 09/07/2026



TP12_09-06-57



TP12_09-07-21

TEST PIT LOG - TP13

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 09/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717707m N.2471171m Plant: 5.5t excavator
Checked By: Elevation: 32.79 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
	0.1 - 0.3	TP13_01 B	32.7			TOPSOIL: Gravelly SAND: fine to coarse grained, pale brown gravel, fine grained, sub-angular to sub-rounded trace silt, low plasticity. ... from 0.00m to 0.10m, trace rootlets GW: Sandy GRAVEL: fine to coarse grained, angular to sub-angular, brown; sand, fine to coarse grained, with silt, low plasticity. (RESIDUAL) PORCELLENITE : fine, orange brown mottled white, Distinctly weathered, medium to high strength, dry Test pit terminated at 0.40 m	D	MD	6			0.20-0.30m: DCP refusal
			32.5					VD		13		
			32.4							25		
				1								
				2								
				3								

DCP Equipment Ref.: In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

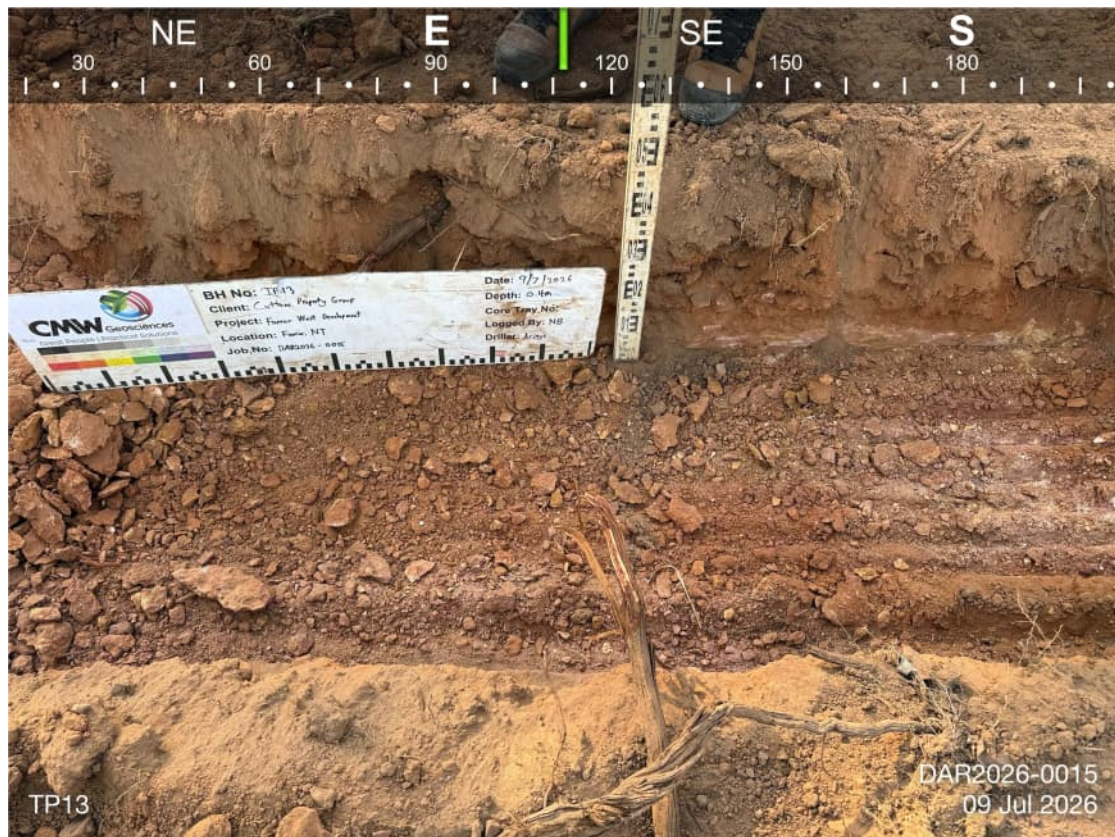
Termination Reason: Practical Refusal

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP13

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 09/07/2026



TP13_08-21-58



TP13_08-25-26

TEST PIT LOG - TP14

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 10/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717861m N.2471173m Plant: 5.5t excavator
Checked By: Elevation: 27.0432 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			26.9			TOPSOIL : Sandy GRAVEL: fine grained, sub-angular to sub-rounded, pale brown; sand, fine to coarse grained; trace clay, low plasticity.		MD	7			
						GP: Sandy GRAVEL: fine grained, angular to sub-angular; pale brown, sand, fine to coarse grained; trace clay, low plasticity. (RESIDUAL)			8			
			26.6			GC: Clayey GRAVEL: fine to coarse grained, angular to sub-angular orange brown mottled white clay, medium plasticity; with sand, fine to coarse grained. (EXTREMELY WEATHERED MATERIAL)		D		17		
										20		
										25		
				1								0.50-1.00m: DCP refusal at 0.5 m and continued at 1.0m after excavation.
								VD				
										25		1.00-1.10m: DCP refusal
								M				
	1.6 - 1.7	TP14_01 D										
			25.0	2		Test pit terminated at 2.00 m						
				3								

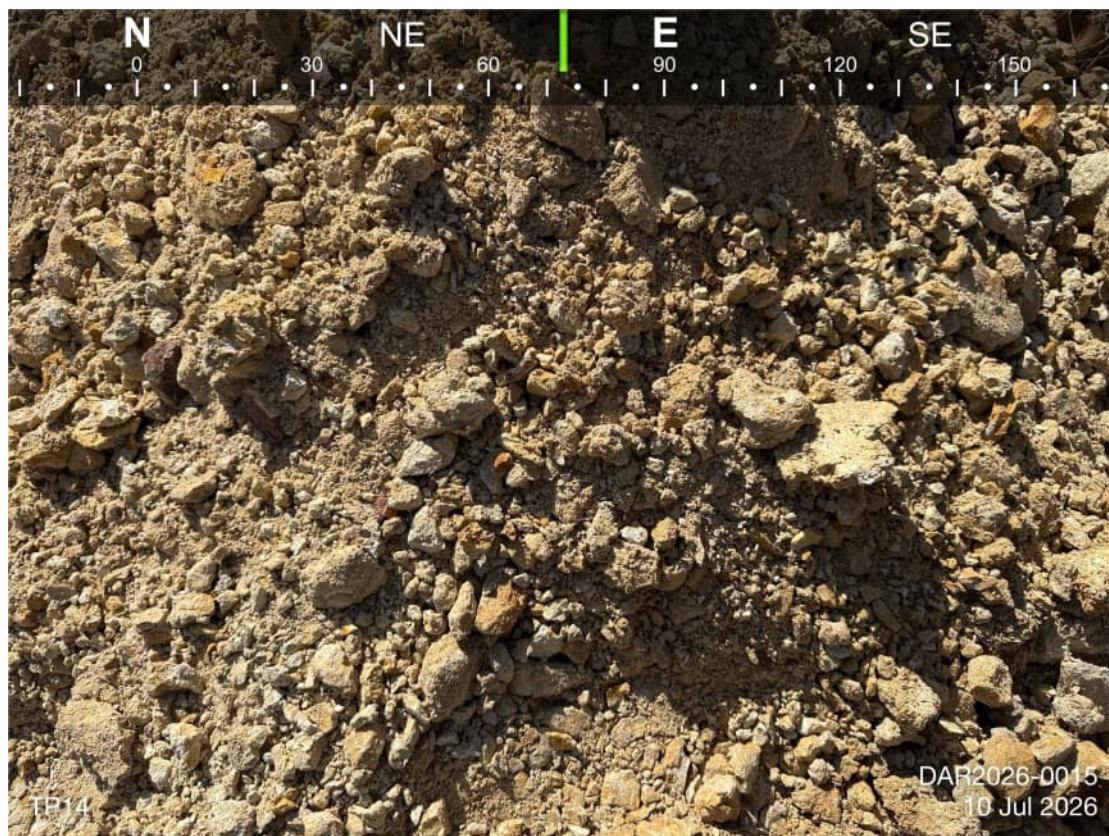
DCP Equipment Ref.:	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Target Depth		
Remarks:		
This report must be read in conjunction with accompanying notes and abbreviations.		

PHOTOGRAPH SHEET - TP14

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 10/07/2026



TP14_11-00-41



TP14_11-01-03

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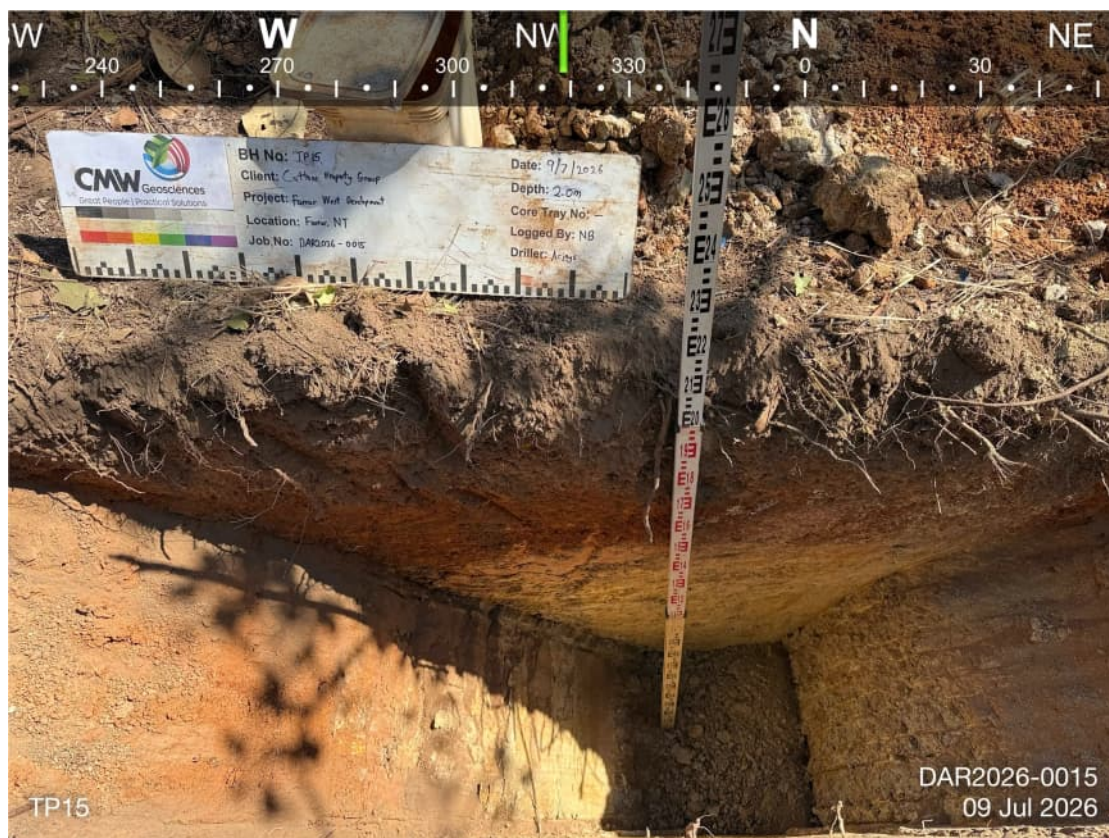
1:20 Sheet 1 of 1

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations	
	Depth	Type & Results							5	10	15		
1.5 - 1.6	TP15_01 D	23.0	22.5	1	TOPSOIL : Silty SAND: fine to coarse grained, pale brown; silt, low plasticity ... from 0.00m to 0.20m, some rootlets	D	L	1					1.80-1.90m: DCP refusal
					M	D	5						
							16						
							17						
							14						
							10						
					M	VD	10						
							6						
							3						
							5						
5													
M	VD	7											
		7											
		9											
		5											
		7											
M	VD	11											
		25											
1.5 - 1.6	TP15_01 D	21.5	21.2	2	GC: Clayey GRAVEL: fine to coarse grained, angular to sub-angular orange brown mottled white, clay, medium plasticity, with sand, fine to coarse grained.(EXTREMELY WEATHERED MATERIAL)	M	VD					1.80-1.90m: DCP refusal	
					M	VD							
					M	VD							
1.5 - 1.6	TP15_01 D	21.2	2	Test pit terminated at 2.00 m								1.80-1.90m: DCP refusal	
				M	VD								
				M	VD								

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP15

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 09/07/2026



TEST PIT LOG - TP16

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 10/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717722m N.2471313m Plant: 5.5t excavator
Checked By: Elevation: 30.49 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			30.3			TOPSOIL : Silty SAND: fine to coarse grained, brown silt, low plasticity, trace gravel, fine to coarse grained.	D	MD	5			0.20-0.30m: DCP Refusal
						PORCELLENITE : fine, orange brown mottled white, Distinctly weathered, medium to high strength, dry ... from 0.20m to 0.30m, fractured rock			8			
			30.1						7			
						Test pit terminated at 0.40 m				25		
				1								
				2								
				3								

DCP Equipment Ref.: In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

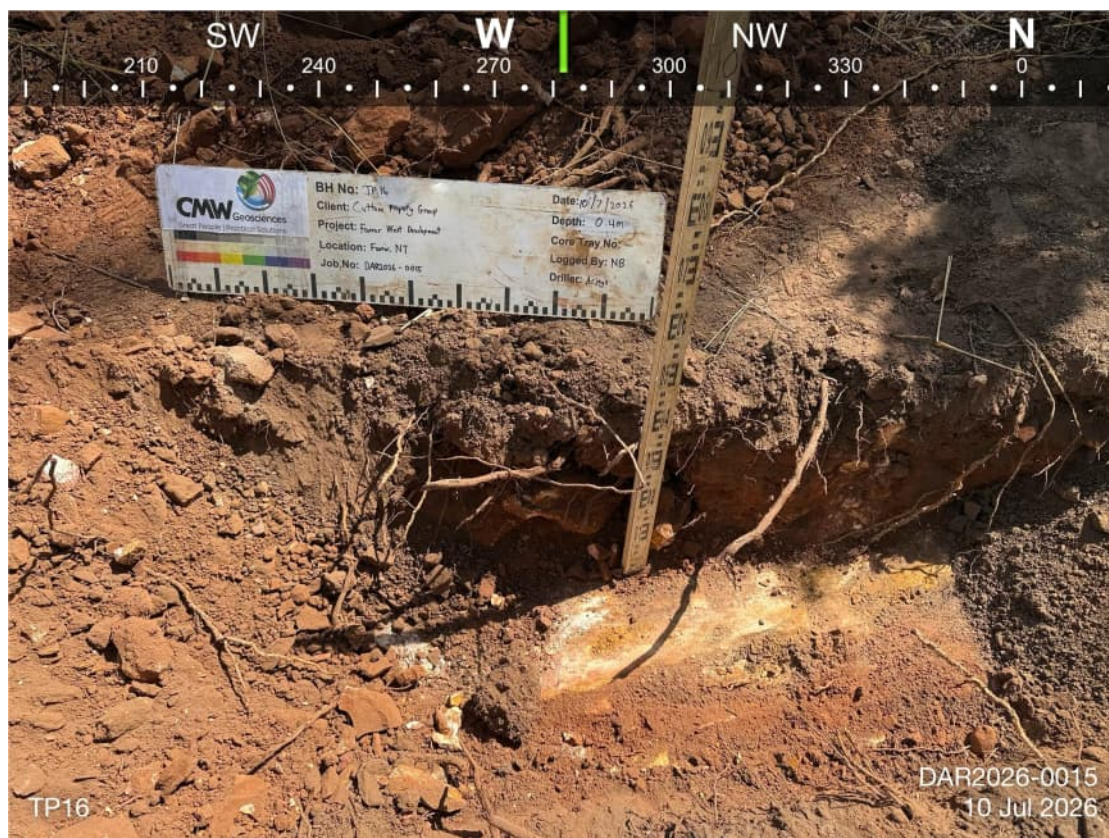
Termination Reason: Practical refusal

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP16

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 10/07/2026



TP16_14-03-44



TP16_14-04-16

TEST PIT LOG - TP17

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 10/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717782m N.2471314m Plant: 5.5t excavator
Checked By: Elevation: 28.6632 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			28.5			GW: GRAVEL: fine to coarse grained, angular to sub-angular, orange brown; trace clay, low plasticity, ... from 0.00m to 0.20m, trace rootlets	D	MD to D	10			0.00-0.20m: DCP refusal
			28.1			PORCELLENITE : fine, orange brown mottled white, Distinctly weathered, medium to high strength, dry ... from 0.20m to 0.60m, fractured, recovered as Cobbly GRAVEL			25			
						Test pit terminated at 0.60 m						
				1								
				2								
				3								

DCP Equipment Ref.: In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

Termination Reason: Practical refusal

Remarks:

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP17

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 10/07/2026



TP17_14-43-57



TP17_14-44-25

TEST PIT LOG - TP18

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 13/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717935m N.2471324m Plant: 5.5t excavator
Checked By: Elevation: 25.9644 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
	0.2 - 0.4	TP18_01 B	25.8			TOPSOIL : Silty SAND: fine to coarse grained, brown silt, low plasticity, trace gravel, fine grained,. ... from 0.00m to 0.20m, trace rootlets	D	MD	8			
			25.6			GW: Sandy GRAVEL: fine to coarse grained, angular to sub-angular brown sand, fine to coarse grained, trace clay, low plasticity..(RESIDUAL)			20			
						GW: Clayey GRAVEL: fine to coarse grained, angular to sub-angular orange brown mottled white ; clay, medium plasticity ; trace sand, fine to coarse grained. (EXTREMELY WEATHERED MATERIAL)			17			
									24			
									21			
									21			
									25			
												0.60-0.70m: DCP refusal
			24.2	1			M	VD				
				2								
				3								
						Test pit terminated at 1.80 m						

DCP Equipment Ref.:	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Practical Refusal		
Remarks:		
This report must be read in conjunction with accompanying notes and abbreviations.		

PHOTOGRAPH SHEET - TP18

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 13/07/2026



TP18_09-17-15



TP18_09-19-41

TEST PIT LOG - TP19

Client:

Project: Farrar West Development

Location: Farrar, Palmerston

Project ID: DAR2026-0015

Date: 13/07/2026



1:20

Sheet 1 of 1

Logged by: NB

Position: E.1717862m N.2471418m

Plant: 5.5t excavator

Checked By:

Elevation: 28.575201 m (mAHD)

Contractor: Arjays

Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			28.4			TOPSOIL : Gravelly SAND: fine to coarse grained, dark brown gravel, fine grained, trace clay, low plasticity. ... from 0.00m to 0.20m, Trace rootlets	D	VL				
						GC: Clayey GRAVEL: fine to coarse grained, angular to sub-angular orange brown mottled white ; clay, medium plasticity ; trace sand, fine to coarse grained. (EXTREMELY WEATHERED MATERIAL)		MD	8			
				1					10			
									25			0.30-0.40m: DCP refusal
			27.0			Test pit terminated at 1.60 m	D to M	VD				
				2								
				3								

DCP Equipment Ref.:	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Practical Refusal		
Remarks:		
This report must be read in conjunction with accompanying notes and abbreviations.		

PHOTOGRAPH SHEET - TP19

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 13/07/2026



TP19_10-34-18



TP19_10-35-16

TEST PIT LOG - TP20

Client:

Project: Farrar West Development

Location: Farrar, Palmerston

Project ID: DAR2026-0015

Date: 13/07/2026



1:20

Sheet 1 of 1

Logged by: NB

Position: E.1717756m N.2471476m

Plant: 5.5t excavator

Checked By:

Elevation: 30.6988 m (mAHD)

Contractor: Arjays

Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
	0.3 - 0.4	TP20_01 D	30.5			TOPSOIL : Silty SAND: fine to coarse grained, pale brown ; silt, low plasticity, trace gravel, fine grained. ... from 0.00m to 0.20m, some rootlets GW: Sandy GRAVEL: fine to coarse grained, angular to sub-angular pale orange brown mottled white ; sand, fine to coarse grained; trace clay, low plasticity. (RESIDUAL) PORCELLENITE : fine, orange brown mottled white, Distinctly weathered, medium to high strength, dry Test pit terminated at 0.60 m	D	D to VD	12	10	19	0.50-0.60m: DCP refusal
			30.2						11	12	25	
			30.1									
				1								
				2								
				3								

DCP Equipment Ref.:	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Practical refusal		
Remarks:		
This report must be read in conjunction with accompanying notes and abbreviations.		

PHOTOGRAPH SHEET - TP20

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 13/07/2026



TP20_11-33-16



TP20_11-33-44

TEST PIT LOG - TP21

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 13/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1717719m N.2471569m Plant: 5.5t excavator
Checked By: Elevation: 32.65 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			32.4			TOPSOIL : Sandy GRAVEL: fine to coarse grained, angular to sub-angular brown ; sand, fine to coarse grained, with clay, low plasticity. ... from 0.00m to 0.40m, Some rootlets	D	MD	6			0.30-0.40m: DCP refusal
								10				
								7				
			32.2			PORCELLENITE : fine, orange brown mottled white, distinctly weathered, medium to high strength, dry				25		
						Test pit terminated at 0.50 m						
				1								
				2								
				3								

DCP Equipment Ref.: In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:

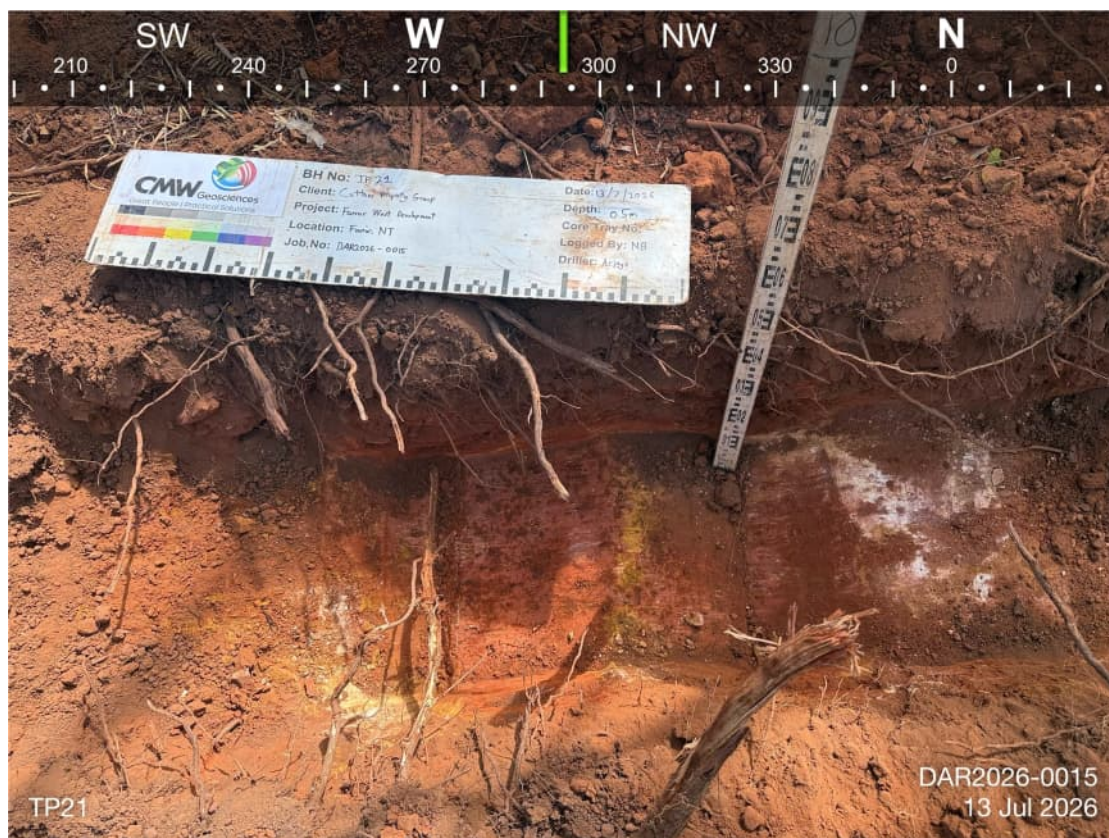
Termination Reason: Practical refusal

Remarks:

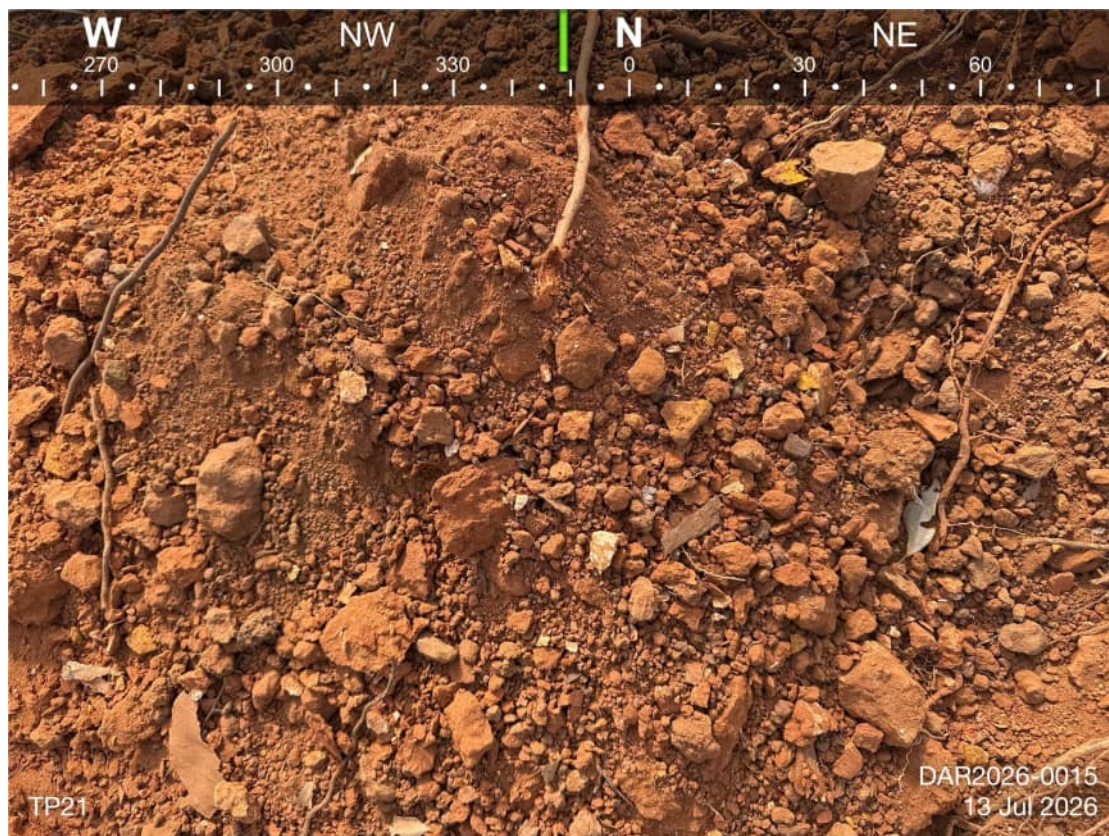
This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP21

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 13/07/2026



TP21_14-43-54



TP21_14-44-22

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Sheet 1 of 1

Dimensions : 0.45m x 2.00m

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP22

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 13/07/2026



TP22_14-03-56



TP22_13-55-10

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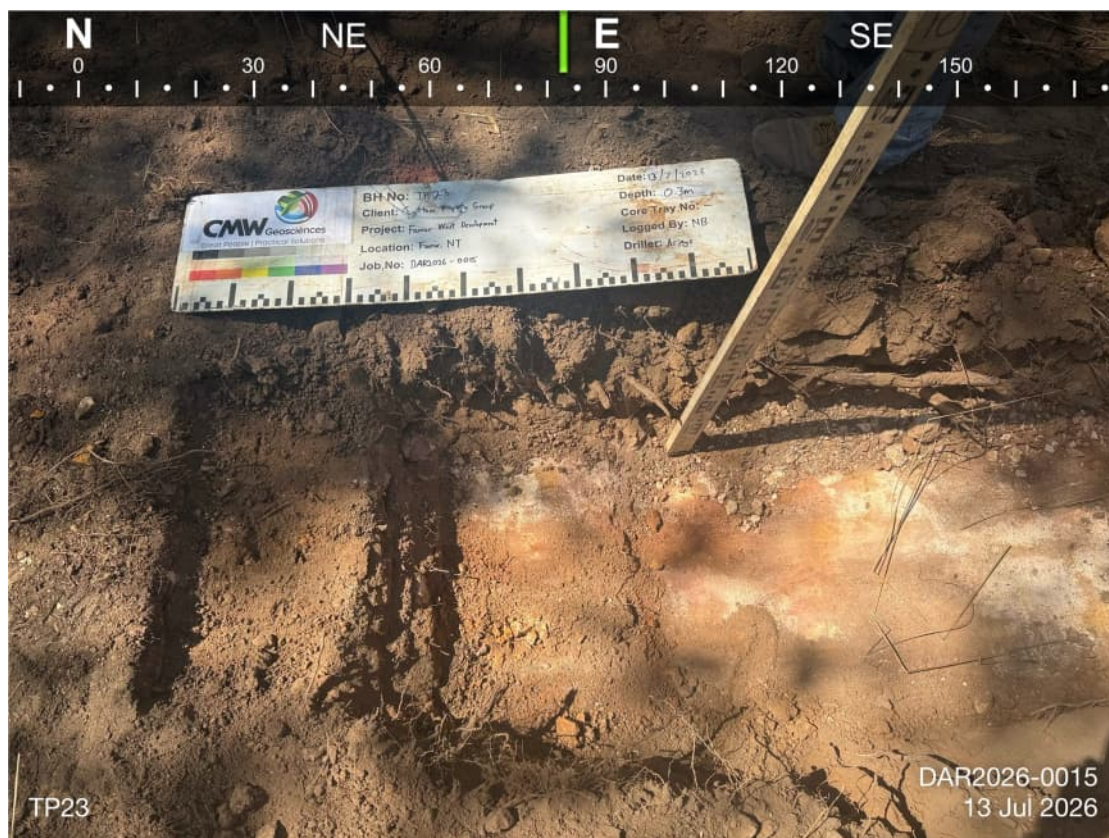
Sheet 1 of 1

Dimensions : 0.45m x 2.00m

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP23

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 13/07/2026



TP23_12-57-25



TP23_13-03-25

TEST PIT LOG - TP24

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 06/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1718604m N.2470898m Plant: 5 tonne excavator
Checked By: Elevation: 22.1504 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			22.1			TOPSOIL Sandy GRAVEL: fine to medium grained, sub-angular to sub-rounded pale brown sand, fine to coarse grained, trace silt. (Alluvial) ... from 0.00m to 0.10m, trace rootlets GW: Sandy GRAVEL: fine to medium grained, sub-angular to sub-rounded pale brown sand, fine to coarse grained, trace silt. (ALLUVIUM)	M	L to MD	3	6		
								VD	3	7	15	
			21.5			CI: CLAY: medium plasticity, white mottled orange brown trace sand, fine grained. (EXTREMELY WEATHERED MATERIAL: PHYLLITE) ... from 0.70m to 3.00m, BURRELL CREEK FORMATION	H			22		
	0.80	PP=300kPa								16		
										17		
				1				F to St	5			
									2			
									2			
									3			
									2			
									4			
	1.60	PP=400kPa					<PL		3			
				2				Vst to H				
			19.9			GC: Clayey Sandy GRAVEL: fine to medium grained, angular to sub-angular; white mottled pale brown ; clay, medium plasticity; sand, fine to coarse. (EXTREMELY WEATHERED MATERIAL: PHYLLITE)						
	2.6 - 2.8	TP24_01 D					>PL	D to VD				
			19.2	3		Test pit terminated at 3.00 m						

DCP Equipment Ref.:	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Target Depth		
Remarks:		
This report must be read in conjunction with accompanying notes and abbreviations.		

PHOTOGRAPH SHEET - TP24

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 06/07/2026



TP24_10-22-36



TP24_10-23-18

TEST PIT LOG - TP25

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 06/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1718548m N.2470854m Plant: 5.5 t
Checked By: Elevation: 20.126 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			19.9			TOPSOIL GRAVEL: fine grained, sub-angular to sub-rounded, brown with clay, low plasticity, with sand, fine to coarse grained. ... from 0.00m to 0.10m, trace rootlets		MD	7			
						GP: Sandy GRAVEL: fine grained, sub-angular to sub-rounded pale brown sand, fine to coarse grained, with clay, low plasticity. (ALLUVIUM)		D	6	14		
									12			
			19.5			GW: Clayey GRAVEL: fine to coarse grained, angular to sub-angular orange brown clay, low plasticity, with sand, fine to coarse grained. (RESIDUAL)		D	14			
								VD	20			
									25			0.60-0.70m: DCP refusal
			19.2			LATERISED SILTSTONE: fine, orange brown, highly weathered, low to medium strength, dry						
			19.1	1		Test pit terminated at 1.00 m						
				2								
				3								

DCP Equipment Ref.:	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Refusal		
Remarks:		
This report must be read in conjunction with accompanying notes and abbreviations.		

PHOTOGRAPH SHEET - TP25

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 06/07/2026



TP25_12-00-52



TP25_12-05-22

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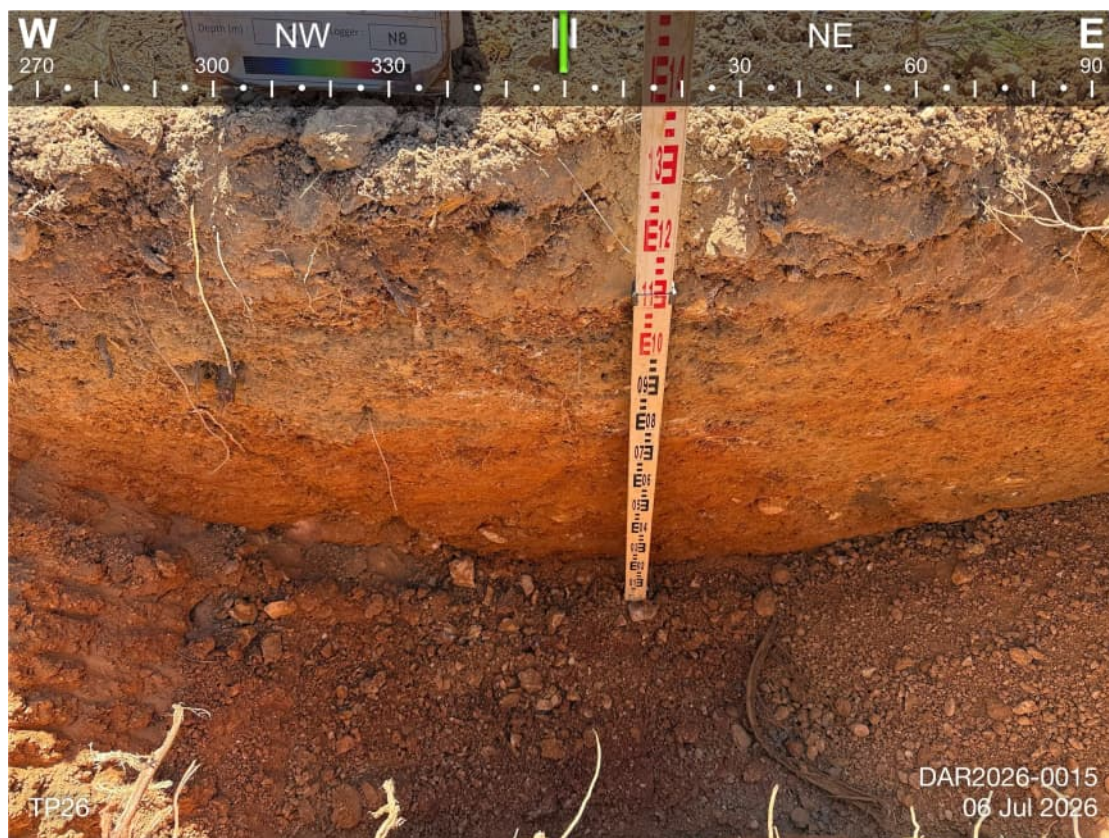
Sheet 1 of 1

Dimensions : 0.45m x 2.00m

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP26

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 06/07/2026



TP26_13-03-39

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Sheet 1 of 1

Dimensions : 0.45m x 2.00m

This report must be read in conjunction with accompanying notes and abbreviations.

This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP27

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 06/07/2026



TP27_14-13-10



TP27_14-14-07

TEST PIT LOG - TP28

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 07/07/2026



1:20 Sheet 1 of 1

Logged by: NB Position: E.1718446m N.2470707m Plant: 5.5t excavator
Checked By: Elevation: 19.4172 m (mAHD) Contractor: Arjays Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
			19.2			CL: TOPSOIL Silty CLAY: low plasticity, grey brown with sand, fine grained. (ALLUVIUM) GC: Clayey GRAVEL: fine to coarse grained, angular to sub-angular orange brown clay, low plasticity, with sand, fine to coarse grained. (RESIDUAL)	<PL	S to F	2 5 6 10 14 25			0.30-0.60m: difficult excavation
	1.60	PP=250kPa	18.4	1		CI: CLAY: medium plasticity, white mottled orange brown; with gravel, fine to coarse; trace sand, fine; (EXTREMELY WEATHERED MATERIAL:PHYLLITE)	≈PL	St	4 4 4 7 5			1.70-1.80m: difficult to advance excavation due to rock capping between 0.3m to 0.6m
			17.6			Test pit terminated at 1.80 m						
				2								
				3								

DCP Equipment Ref.: In Situ Vane Equipment Ref.: Pocket Penetrometer Equipment Ref.:
Termination Reason: difficult to advance excavation due to rock capping at surface
Remarks:
This report must be read in conjunction with accompanying notes and abbreviations.

PHOTOGRAPH SHEET - TP28

Client:
Project: Farrar West Development
Location: Farrar, Palmerston
Project ID: DAR2026-0015
Date: 07/07/2026



TP28_09-22-49



TP28_09-31-24

TEST PIT LOG - TP29

Client:

Project: Farrar West Development

Location: Farrar, Palmerston

Project ID: DAR2026-0015

Date: 07/07/2026



1:20

Sheet 1 of 1

Logged by: NB

Position: E.1718357m N.2470698m

Plant: 5.5t excavator

Checked By:

Elevation: 19.4968 m (mAHD)

Contractor: Arjays

Dimensions : 0.45m x 2.00m

Groundwater	Samples & Insitu Tests		RL (m)	Depth (m)	Graphic Log	Material Description Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Dynamic Cone Penetrometer (Blows/100mm)			Structure & other observations
	Depth	Type & Results							5	10	15	
				19.3		TOPSOIL Sandy GRAVEL: fine grained, sub-angular to sub-rounded pale grey brown; sand, fine to coarse grained; with clay, low plasticity, ... from 0.00m to 0.20m, some rootlets	D	D	2	7		
						LATERISED SILTSTONE: fine, orange brown, highly weathered, low strength, dry				13	25	
				19.0		GP: Sandy GRAVEL: fine to medium grained, sub-angular to sub-rounded pale grey brown sand, fine to coarse grained, trace silt, low plasticity. (RESIDUAL)	D	VD				
				18.8		CI: CLAY: medium plasticity, white mottled orange brown; with gravel, fine to coarse; trace sand, fine; (RESIDUAL)			4	6		
				1			<PL	St to VSt	4	7		
				18.3		CI: Gravelly CLAY: medium plasticity, white mottled orange brown; gravel, fine to medium, angular to sub-angular; trace sand, fine to coarse. (EXTREMELY WEATHERED MATERIAL: PHYLLITE)				18	17	18
	1.60	PP=400kPa		2								
							≈PL	H				
				16.5	3	Test pit terminated at 3.00 m						

DCP Equipment Ref.:	In Situ Vane Equipment Ref.:	Pocket Penetrometer Equipment Ref.:
Termination Reason: Target Depth		
Remarks:		
This report must be read in conjunction with accompanying notes and abbreviations.		