

Our Ref: 23-003

DESIGN CERTIFICATE FOR CIVIL ENGINEERING DRAWINGS AND DETAILED STORMWATER MANAGEMENT PLAN FOR OPERATIONAL WORKS SUBMISSION

Ensilon Pty Ltd certifies that the civil engineering drawings, civil engineering reports and supporting calculations as listed in Schedule 1 have been prepared generally in accordance with:

- Development Approval Negotiated Decision Notice for RAL/2024/3753/A
- Toowoomba Regional Council's Planning Scheme, PSP No.2 & PSP No. 3
- IPWEA Street Design Manual
- AUSTRROADS Guide to Road Design Part 3 & 4A
- Queensland Urban Drainage Manual

TRC DA Ref: RAL/2024/3753/A

Project: Rural Residential Subdivision – 1 into 23 Lots

Site Address: 278-288 Kearney Street, Top Camp QLD 4350

RP Description: Lot 870 on SP343467

Client: Acreage Development Toowoomba Pty Ltd

Scope of Certification: Operational Works design of earthworks, roadworks, stormwater drainage and water reticulation.

Exclusions: Exclusions cover the following (but not limited to): Erosion and Sediment Control (to be undertaken by Contractor's CPESC), Structural Engineering, Retaining Walls, Geotechnical Engineering, Geotechnical Engineering certification of batters, Water Reticulation Network Analysis/Modelling/Infrastructure Sizing, Pavement Design (details to be confirmed subject to geotechnical testing during construction), Flood Hydraulics, Water Quality, Sewerage & Waste Disposal, Bushfire, Ecology, Landscape Architecture, Electrical/Street Lighting, Building Work.

Deviations from the listed documents, that the design has been completed generally in accordance with, are summarised on the following pages.

Signature of RPEQ:



Full Name: Kevin Clancy of Ensilon Pty Ltd

RPEQ No: 21558

Date: 30 January 2026

This certification does not cover work, works or services conducted by other entities, service providers, subcontractors, subconsultants and consultants associated with this operational works application. Documents described in this certification must not be relied upon for civil construction unless expressly referenced in approved OPW documents.

DESIGN DEVIATIONS SUMMARY

The civil engineering design for the rural residential subdivision has been undertaken generally in accordance with the Negotiated Decision Notice issued by Toowoomba Regional Council for RAL/2024/3753/A and Toowoomba Regional Council Planning Scheme Policies No. 2 Engineering Standards - Roads and Drainage Infrastructure and No. 3 Engineering Standards - Water and Waste Water Infrastructure (noting that no waste water infrastructure is proposed).

Notwithstanding, due to various constraints, some deviations from Toowoomba Regional Council standards are proposed in the design as a result. These instances of deviations, which in our opinion, still reflect sound engineering practice, or are from instruction/conditioned by Council, are outlined below.

Water Network Analysis

As the Negotiated Decision Notice issued by Toowoomba Regional Council conditioned the development to construct a new water reticulation main along the proposed internal access road connecting to the existing DN150 water main in Kearney Street and the existing DN150 uPVC main in the Tranter Street verge, no water network analysis has been undertaken for the development.

We request Council's confirmation that no water network analysis is required for the development given the specific conditions of water reticulation for the works.

A DN150 mPVC water main is proposed along the internal access road connecting to the respective water mains at each end of the road as conditioned.

Safe Intersection Sight Distance (SISD) at Site Entry / Kearney Street Intersection

As described in detail in the *Traffic Impact Statement Rural Residential Subdivision 278-288 Kearney Street, Top Camp Issue A* by Ensilon Consulting dated 17/05/2024, whilst Kearney Street has a posted speed of 60km/h (with assumed design speed of 70km/h), a lower operating speed of 45km/h has been used for westbound traffic approach for SISD due to the proximity to the start of Kearney Street from the New England Highway intersection (SISD for 70km/h is over 150m which extends out to the New England Highway intersection from the proposed intersection).

A Stop Sign is proposed at the Kearney Street intersection given the site constraints and the limitations on sight lines resulting from existing vegetation in the road reserve. Whilst SISD for 45km/h is achieved for westbound traffic, we recommend Council permit the removal of the existing vegetation from the road reserve opposite Fig Tree Place to improve sight lines to/from westbound traffic on Kearney Street.

Reverse curves at road connection to Crebra Crescent

Throughout the Development Application process, Council specifically requested and conditioned through road connection to Crebra Crescent to the north. Due to the misalignment between the existing Crebra Crescent and the development site, back to back reverse curves are required in the new road for the roadworks to be contained within the development site and not encroach on the neighbour's private property to the east. Given this non-standard reverse curve arrangement, Ensilon proposed a narrowed 3m carriageway width, one-lane slow point, to reduce operating speeds through the reverse curves, however, Council conditioned a minimum carriageway width of 6m (refer RAL/2024/3753/A including approved plans), conditioning that the one-lane slow point was not permitted.

As such, in lieu of the 3m wide one-lane slow point, and to comply with Council's RAL/2024/3753/A Development Conditions, a minimum 6m wide carriageway is proposed with Reverse Curve warning signs (W1-4) on both approaches with a barrier line and yellow bi-directional RRPMs to warn approaching traffic, and provide improved visibility, of the reverse curve road geometry.

Non-standard road profile at connection to, and road widening of, Crebra Crescent

Modified road profiles including one way crossfall (with edge restraint on the low side) and batter slope up to 1V:3H are proposed to connect with the existing Crebra Crescent. Batter slope of up to 1V:3H is proposed on the high side to reduce the extents of clearing within the Category C regulated vegetation and Koala Habitat Area. One way crossfall is proposed at the road connection as this is the profile of the existing termination of Crebra Crescent. This will also facilitate the general retention of the existing drainage regimes at the existing Crebra Crescent cul-de-sac.

As per the Negotiated Decision Notice conditions, the development is conditioned to widen Crebra Crescent to achieve a 6m wide pavement. Crebra Crescent is an existing road which has a non-standard Council road profile, including pavement crossfalls that exceed Council's standard. To achieve the road widening, the existing pavement crossfalls are generally retained within the road widened at the same crossfall so as to not introduce irregularities in the road pavement.

Road 1 CH569 Sag Vertical Curve K Value (at Site Entry from Kearney Street)

This sag in Road 1 at the Site Entry tee intersection with Kearney Street is to locate the gully pit sag at the tangent point of the kerb return (high side) and enable the low side kerb return to grade out to maintain flow regimes and discharge points.

It is acknowledged that a minimum sag vertical curve 'K' value for comfort criteria for 40km/h vehicle speed ('K' of 2.52 as per AGRD3 Equation 20) has not been applied for this sag vertical curve, due to its proximity to the intersection where vehicle operating speeds are lower and to achieve the desired grading and connection to the existing Kearney Street.

IPWEA Street Design Manual and Queensland Streets indicate street "End Conditions", which includes T-intersections, reduces vehicle speed to 20-25km/h. This reduced speed environment is further reinforced for southbound vehicles on Road 1 approaching the intersection having a Stop condition imposed by the Stop Line & Sign.

Section 2.10 of Queensland Streets describes this scenario, of a sag vertical curve on the non-priority street leg of a 'T' intersection, where visual warning of the intersection to approaching vehicles will slow speeds to Intersection Speed of 25km/h.

For the purpose of establishing a suitable sag vertical curve that suits the constraints of the site, a design speed of 30km/h was adopted (on the basis that this is expected to exceed the 85th operating speeds of vehicles given the proximity to the 'T' intersection).

In accordance with Austroads Guide to Road Design Part 3 Section 8.6.4 Equation 20, to limit vertical acceleration to a value of less than 0.05g for 30km/h vehicle speed:

The minimum sag vertical curve K value for comfort criteria can be calculated by using Equation 20.

$$K = \frac{V^2}{1296 a} \quad 20$$

where

- K = length of vertical curve in metres for 1% change in grade
- a = vertical acceleration (m/sec²) = 0.05g (max)
- V = speed of the vehicle (km/h)
- g = acceleration due to gravity = 9.81 m/sec²

$$V = 30\text{km/h}$$

$$a = 0.05 \times 9.81\text{m/s}^2$$

$$K = 1.42$$

The minimum curve length, $L = KA$, where $A = 12.1\%$, is:

$$L = 17.2\text{m}$$

A curve length of 20m has been used in the design for the sag vertical curve at CH569 of Road 1.

It is also worth noting that a 20m vertical curve length limits vertical acceleration to less than 0.1g, which is considered appropriate for 'Low Standard Roads' in Austroads Guide to Road Design Part 3 (the TMR Road Planning and Design Manual 1st edition Chapter 12 Section 12.3.4 also included intersections for the 0.1g limit):

$$V = 40\text{km/h}$$

$$a = 0.1 \times 9.81\text{m/s}^2$$

$$K = 1.26$$

$$A = 12.1\%$$

The minimum curve length for 0.1g vertical acceleration, $L = KA$ where $A = 12.1\%$ is:

$$L = 15.25\text{m}$$

For the 20m curve length, vertical acceleration is limited to 0.076g for 40km/h speed.

A risk assessment for vehicle 85th operating speeds >30km/h, up to the TRC PSP2 40km/h design speed, is considered as follows:

- Likelihood – Unlikely
 - Given the physical constraints for the approach and proximity to the intersection, it is unlikely that 85th vehicle operating speeds will exceed 30km/h through the sag on the non-priority leg of the 'T'-intersection, particularly with Stop condition for southbound vehicles.
- Consequence – Insignificant
 - Consequence of a vehicle driving through the sag vertical curve at speeds >30km/h may result in discomfort of vehicle occupants, however, it is highlighted that the sag vertical curve length exceeds the minimum required for 0.1g vertical acceleration for vehicle speed of 40km/h, which is noted as per AGRD3 as suitable for Low Standard Roads. This reinforces that any discomfort experienced as a result of vehicle speeds >30km/h up to 40km/h will be minor.
- Risk – Low

It is considered that the 20m sag vertical curve length at Road 1 CH569 has a low risk for vehicle occupant discomfort and is acceptable given the geometrical constraints and desired road grading at the intersection.

Reduced Clearances from Stormwater Pipes to services

Whilst the minimum 300mm clearance from stormwater pipes to other services, as per SC6.2.8.3.10 of TRC PSP2, has generally been achievable, there are some instances where this may not be achieved to existing services. The depths of these services are to be confirmed prior to works commencing to confirm clearances.

These locations are constrained by discharging stormwater to the existing drainage network at Kearney Street and by crossing existing services (though the water main is to be decommissioned and replaced with a DICL crossing). In these instances, reduced clearance of 150mm to the water main to be decommissioned is proposed and 200mm to the existing telecommunications given the constraints.

Water main alignment through widened road reserve

Given the non-standard road reserve width at the northern end of the new road (required to facilitate clearing for the road construction), the water main is proposed to continue on what would be a typical/standard alignment when measured from the kerb alignment, in lieu of maintaining a 1.5m alignment from the RP boundary which would position the water main within the batter profile.

Hydrants not aligned to some side boundaries

To facilitate air release, and draining for maintenance purposes, of the water main at high points and low points, respectively, hydrants have been included at these locations which do not align with property boundaries.

Furthermore, to facilitate compliance with the approved Bushfire Management Plan for future building approvals, hydrant spacing of maximum 80m is proposed, such that hydrants could not be only placed in-line with side boundaries to achieve this spacing.

SCHEDULE 1

Document Title	Ref/Dwg No.	Revision
Detailed Stormwater Management Plan 278-288 Kearney St, Top Camp		A
Civil Operational Works Drawings 278-288 Kearney St, Top Camp:		
DRAWING INDEX AND LOCALITY PLAN	1000	A
SITE LAYOUT PLAN	1001	A
SAFETY IN DESIGN	1005	A
TYPICAL DETAILS	1010	A
BULK EARTHWORKS LAYOUT PLAN SHEET 1 OF 2	1100	A
BULK EARTHWORKS LAYOUT PLAN SHEET 2 OF 2	1101	A
EARTHWORKS SECTIONS NOTES AND DETAILS	1102	A
ROADWORKS AND DRAINAGE LAYOUT PLAN SHEET 1 OF 2	1200	A
ROADWORKS AND DRAINAGE LAYOUT PLAN SHEET 2 OF 2	1201	A
ROADWORKS AND DRAINAGE NOTES AND DETAILS	1202	A
ROAD ALIGNMENT LAYOUT PLAN SHEET 1 OF 2	1210	A
ROAD ALIGNMENT LAYOUT PLAN SHEET 2 OF 2	1211	A
ROAD ALIGNMENT TABLES	1212	A
ROAD 1 LONG SECTIONS	1220	A
ROAD 1 CROSS SECTIONS SHEET 1 OF 3	1221	A
ROAD 1 CROSS SECTIONS SHEET 2 OF 3	1222	A
ROAD 1 CROSS SECTIONS SHEET 3 OF 3	1223	A
CREBRA CRES WIDENING LONG SECTIONS CROSS SECTIONS	1224	A
INTERSECTIONS LAYOUT PLAN	1240	A
DRIVEWAY LAYOUT PLAN	1241	A
STORMWATER CATCHMENT PLAN SHEET 1 OF 2	1300	A
STORMWATER CATCHMENT PLAN SHEET 2 OF 2	1301	A
STORMWATER DRAINAGE LONG SECTIONS SHEET 1 OF 2	1320	A
STORMWATER DRAINAGE LONG SECTIONS SHEET 2 OF 2	1321	A
STORMWATER DRAINAGE CALCULATION TABLES SHEET 1 OF 2	1340	A
STORMWATER DRAINAGE CALCULATION TABLES SHEET 2 OF 2	1341	A
STORMWATER DRAINAGE DETAILS SHEET 1 OF 1	1360	A
STORMWATER CULVERT LAYOUT PLAN	1370	A
STORMWATER CULVERT CROSS SECTION	1371	A
WATER RETICULATION NOTES AND DETAILS	1500	A

WATER RETICULATION LAYOUT PLAN SHEET 1 OF 2	1501	A
WATER RETICULATION LAYOUT PLAN SHEET 2 OF 2	1502	A
EROSION AND SEDIMENT CONTROL MANAGEMENT PLAN SHEET 1 OF 2	1600	A
EROSION AND SEDIMENT CONTROL MANAGEMENT PLAN SHEET 2 OF 2	1601	A
EROSION AND SEDIMENT CONTROL NOTES AND DETAILS	1610	A