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TOOWOOMBA
REGIONAL COUNCIL

14 September 2026
Ref No. 28059 Revision A

Corkal Investments Pty Ltd
193 Paulsen's East Road
Gowrie Junction QLD 4352

Email: accounts@carwashexpress.net.au

Dear Sir,

Re: PROPOSED DEVELOPMENT AT No. 128-130 CARRINGTON ROAD, TORRINGTON TO SUBDIVIDE ONE (1) LOT INTO SIXTEEN (16) LOTS

CONCEPTUAL STORMWATER MANAGEMENT REPORT

1.00 INTRODUCTION

1.01 This report was prepared to address the stormwater management issues relating to this proposed development and was prepared upon the basis of: -

(i) Calculations completed in accordance with normally accepted engineering principles and practices using the *Rational Method of Hydrological Analysis* supplemented with computer modelling using *'DRAINS'* to evaluate the pre and post development stormwater conditions which are relevant to this project.

(ii) Compliance with the general intent of *The Queensland Urban Drainage Manual* (QUDM).

(iii) Compliance with the intent of normally accepted principles, codes and policies including the *Toowoomba Regional Council's Planning Scheme Policy*.

(iv) Detailed topographical survey of the site, critical downstream stormwater infrastructure and site evaluations supplemented by reference to aerial mapping with respect to the external stormwater catchment areas and adjacent properties.

(v) Reference to Queensland LiDAR Data captured as part of the Toowoomba – Lockyer Valley 2015 project on 18 August 2015.

(vi) Hydraulic Calculations to "model" stormwater flows in the downstream "open channel drainage" and culvert systems.

1.02 The proposed development seeks to develop predominantly vacant land into sixteen (16) smaller lots, together with associated vehicle manoeuvring areas, pavements, etc. The proposed general layout of the site development is documented on Drawing No. 28059 Sheet 2 Issue C – The Conceptual Subdivisional Layout Plan.

2.00 STORMWATER QUALITY CONSIDERATIONS

2.01 The site area exceeds 2,500 square metres meaning there is a requirement to treat stormwater for quality.

MUSIC modelling has been undertaken which suggests that a bio-detention basin with a filter area of 65 square metres will be needed to achieve the stormwater quality benchmarks nominated in the State Planning Policy (Healthy Waters). The only practical location for such a basin is at the front of the site bordering Carrington Road. It is considered that a conventional in ground bio-detention basin of this nature will be unsightly unless regularly maintained.

(The developer would be agreeable to entering into an infrastructure agreement and providing a cash contribution in lieu of the provision of bio-detention if Council were to consider that the ongoing maintenance costs of such a system were too onerous. The cash contribution being utilised to provide similar and more extensive infrastructure elsewhere in the city). That is, similar to the offer from Toowoomba Regional Council to the Land Developer for Application No. RAL/2022/3905 Condition 29.6.

The *MUSIC* Analysis Summary Sheet/printout is appended to this report.

3.00 PRE- AND POST-DEVELOPMENT STORMWATER ANALYSIS AND STORMWATER DRAINAGE CHARACTERISTICS

3.01 The *pre-development* stormwater drainage characteristics of the actual development site are described as follows:

(i) No. 128-130 Carrington Road currently contains a house, a shed, and various paved surfaces. Surface levels and gradients are documented on this firm's Topographical Survey Drawing No. 28059 Sheet 1.

(ii) Pre-development upper catchment flows entering the site are generated on: -

- Nos. 30 and 32 Basset Crescent
- No. 631 Troys Road
- No. 126 Carrington Road

Details of the upper stormwater catchment area/s contributing to overland stormwater flows entering the site are documented on *Stormwater Analysis Plan* Drawing No. 28059 Sheet 4 – The Stormwater Analysis Plan No. 1.

Stormwater flows leaving the site are captured in the open channel stormwater drainage channel located on the southern side of Carrington Road and conveyed to the pipe culvert at the intersection of Troys Road and Carrington Road. Refer catchment details documented on Drawing No. 28059 Sheet 5 – Stormwater Analysis Plan No. 2.

(iii) Pre-development upper catchment stormwater flows drain into the Open Channel Drainage System on the southern side of Carrington Road via the process of overland stormwater flow.

3.02 It is proposed to develop this land in a manner which continues to accept upper catchment stormwater flows, captures the overland flow into pipework and allows this stormwater to pass through the property to the legal point of discharge (i.e. the drainage channel in Carrington Road).

How it is proposed to achieve this outcome is conceptually demonstrated on Drawing No. 28059 Sheet 6.

3.03 An overview of the proposed stormwater management solution is described as follows:

(i) Stormwater generated on the developed land will be captured into underground stormwater infrastructure and directed via the proposed bio-detention basin to the existing open channel drainage system in Carrington Road.

(ii) Upper catchment flows will continue to be accepted into the site, captured into underground stormwater infrastructure and conveyed to the *legal point of discharge* – i.e. the drainage channel in Carrington Road.

3.04 The critical locations for assessing the impact of the development upon downstream conditions and adjoining properties are as follows:-

(i) The eastern property boundary which accepts upper catchment stormwater flows across Line X as defined on Drawing No. 28059 Sheet 4.

(ii) The southern property boundary which accepts upper catchment stormwater flows across Line W as defined on Drawing No. 28059 Sheet 4.

(iii) The western property boundary of the land where stormwater flows pass into the downstream land at No. 132 to 134 Carrington Road across Line Y as defined on Drawing No. 28059 Sheet 4 prior to entering the open channel drainage system on the southern side of Carrington Road.

(iv) The northern property boundary of the land where stormwater flows enter the open channel stormwater drainage system on the southern side of Carrington Road, across Line Z as defined on Drawing No. 28059 Sheet 4.

(v) The open drainage channel which is located along the southern side of Carrington Road.

(vi) The (pipe) culverts which form the “cross-overs” into the properties located at No. 132-134 Carrington Road and 136 to 138 Carrington Road – assessed at Point B as defined on Drawing No. 28059 Sheet 5.

(vii) The pipe culvert system which conveys stormwater under the r*oundabout* at the intersection of Troys and Carrington Roads and defined as Point A on Drawing No. 28059 Sheet 5.

(viii) Points C and D at the proposed points of concentrated stormwater discharge into the open channel drainage system in Carrington Road.

Pre- and Post-development flows at each of the critical locations are tabulated in Table 3.1. The results of the *Rational Method* and *DRAINS* modelling and calculations verify that the proposed stormwater management solution will achieve a result which is compliant with normally accepted assessment criteria.

3.05 The magnitude of stormwater discharge into the existing *open channel* drainage system, and the potential for these flows to impact the road infrastructure has been assessed upon the basis of the additional impervious areas which will be created and are detailed below:-

The impervious area of the developed site has been assessed on the basis of the following criteria:-

(i) The area of roads and paved surfaces within the road reserve.

(ii) Impervious site coverage of 60% on proposed Lot Nos. 1 to 8 and 11 to 16. (Low Density Residential)

(iii) Impervious site coverage of 30% on proposed Lot Nos. 9 and 10. (Low Density Residential with 50% of blocks unable to be developed due to steep terrain).

4.00 OVERVIEW OF PROPOSED CONCEPTUAL STORMWATER MANAGEMENT SOLUTION

4.01 It is proposed to construct an above ground stormwater catchment drain within a drainage easement located along the eastern alignment of proposed Lot 10 to intercept upper catchment flows and convey that stormwater to a “Stormwater Capture” structure which will discharge into the road drainage system. (Refer Drawing No. 28059 Sheet 4.)

4.02 The magnitude of upper catchment flows approaching the eastern property boundaries of Lot Nos. 11 to 16 does not warrant the provision of inter-allotment drainage. The magnitude of such flows will be significantly reduced when No. 126 Carrington Road is developed, and currently only involves Q_2 sheet flows in the order of 0.5 litres per second spread over each 17 metre boundary – which is negligible.

4.03 Stormwater flows leaving the site will enter the open channel stormwater drainage system on the southern side of Carrington Road and flow westward to the 3/600mm diameter RCP culvert system which conveys stormwater under the *round-about* beneath Troys Road.

The following assessments have been made regarding flow conditions downstream from the site:-

(i) The open channel drainage system in Carrington Road is estimated to have the capacity to convey in excess of 1.4 m^3/s which is sufficient to contain in excess of Q_{100} flows during post-development flow conditions. The channel drain does not require to be upgraded.

(i) The pipe culvert and driveway cross-over outside No. 132-134 Carrington Road comprises a 600mm diameter RC pipe with an estimated flow capacity of 399 litres/second.

(iii) The pipe culvert and driveway cross-over outside No. 136 Carrington Road comprises 2/450mm diameter RC pipes with an estimated flow capacity of 412 litres/second. This culvert will need to be upgraded to cater for the increased stormwater flows. (Operational works design assessment).

4.04 Detailed topographical survey has been undertaken to define the location, gradients, etc. and to provide analytical data to determine the flow capacity of the 3/600 RCP culvert system at the *round-about*. Refer Drawing No. 28059 Sheet 10.

4.05 The stormwater catchment area which directs stormwater flow to the Carrington Road r*ound-about* culvert crossing is documented on Drawing No. 28059 Sheet 5. This catchment area draining into this culvert has been analysed using the analytical program *DRAINS.* The following summary is provided:-

(i) Stormwater Catchment Area draining to culvert — 32.3 Ha

(ii) Flow Capacity of culverts at the point of overtopping (Refer Print-out analysis – "Culvert Report Sheet No. 1") — 2100 L/sec

It is apparent that the culvert system currently has the capacity to cater for Q_{20} flow conditions before overtopping. The additional flow during post development Q_{20} conditions equates to an increase of $\frac{2063-2052}{100}$ = 0.1% (which is negligible).

ARI	Pre -Development Flows (L/sec)	Post-Development Flows (L/sec)
Q_2	1009	1134
Q_{10}	1743	1177
Q_{20}	2052	2063
Q_{50}	2510	2653
Q_{100}	2874	2920

Table 4.1

Pre- and Post- development Q_{20} stormwater flow conditions have been assessed in order to establish the change in "sheet flow" depth and v.d effects resulting from the anticipated additional impervious surfaces. (Refer Culvert Report Sheets 2 and 3). The results of these assessments are summarised below:

	Flow overtopping culvert	Estimated Depth of Sheet Flow Overtopping (m)	Estimated Velocity (m/s)	v.d (m^2/sec)
Pre-development (Q_{50})	343 L/sec	0.017	1.0	0.017 – OK.
Post-development (Q_{50})	450 L/sec	0.023	1.0	0.023 – OK.

Table 4.2

The change of flow depth for sheet flows overtopping Carrington Road during Q_{50} conditions are demonstrated to be acceptable and of negligible effect.

5.00 CONCLUSIONS

5.01 The peak stormwater flows are summarised as follows:

Station	ARI	Pre -Development Flows (L/sec)	Post-Development Flows (L/sec)	Comments
Flows passing into the site across the southern alignment across *Line W*	Q_2	21.9	21.9	No change OK
	Q_{20}	45.9	45.6	No change OK
Flows passing across *Line X* into the site – *the Eastern Boundary with No. 126 Carrington Road and No. 30 Basset Crescent*	Q_2	39.4	39.4	No change OK
	Q_{20}	82.0	82.0	No change OK
Flows passing out of the site across *Line Y – North-western boundary with No. 123-134 Carrington Road (i.e., out to Carrington Road)*	Q_2	88.9	Negligible	Reduction
	Q_{20}	203.1	Negligible	Reduction
Flows passing *Line Z* as Sheet Flow	Q_2	72.2	Negligible	Minor and Acceptable increase ∴ OK
	Q_{20}	165.0	Negligible	Minor and Acceptable increase ∴ OK
Flows discharging to *Point A* (The Troys Road pipe culvert)	Q_2	1009	1134*	OK
	Q_{20}	2052	2063*	OK
	Q_{50}	2510	2653*	OK
Flows passing *Point B* – The pipe/culvert cross-over into 132-134 Carrington Road	Q_2	220.5	307.8	Culvert. Upgrade to be assessed*#
	Q_{20}	503.6	646.3	Culvert. Upgrade to be assessed*#
Discharge at *Point C – Pipe Discharge to Open Channel Drain*	Q_2	N/A	124.1	Scour Protection Required
	Q_{20}	N/A	258.8	Scour Protection Required
Discharge at *Point D – Pipe Discharge to Open Channel Drain*	Q_2	N/A	143.4	Scour Protection Required
	Q_{20}	N/A	299.0	Scour Protection Required

Table 3.1

**Refer Section 4.05*

 # During Operational Works Design

5.02 This report demonstrates that there will be an acceptable increase in peak stormwater flow conditions downstream of the site subject to the upgrading work to increase the capacity of the existing pipe/culvert crossovers which currently provides access into the properties at No. 132-134 Carrington Road and No. 136 Carrington Road.

5.03 It is considered that this report demonstrates that when the proposed stormwater management system is implemented, a satisfactory stormwater management solution which complies with Council's Planning Policy requirements, the QUDM and with normally accepted engineering principles will be achieved.

Yours faithfully,



LINDSAY B. REID *BE(Hons1), MIEAust, RPEQ, CPEng, NER, APEC Engineer, IntPE(Aus)*

ATTACHMENTS:

- Design Certificate No. 28059/A dated 14 September 2026
- Reid Consulting Engineers Pty Ltd Drawing No. 28059 Sheet 1 Issue A – Topographical Survey Plan – 128-130 Carrington Road
- Reid Consulting Engineers Pty Ltd Drawing No. 28059 Sheet 2 Issue C – Conceptual Subdivision Layout Plan
- Reid Consulting Engineers Pty Ltd Drawing No. 28059 Sheet 3 Issue B – Conceptual Road Layout Plan
- Reid Consulting Engineers Pty Ltd Drawing No. 28059 Sheet 4 Issue A – Stormwater Analysis Plan – Sheet 1
- Reid Consulting Engineers Pty Ltd Drawing No. 28059 Sheet 5 Issue A – Stormwater Analysis Plan – Sheet 2
- Reid Consulting Engineers Pty Ltd Drawing No. 28059 Sheet 6 Issue A – Conceptual Stormwater Management Plan – Stormwater Layout Plan
- Reid Consulting Engineers Pty Ltd Drawing No. 28059 Sheet 7 Issue A – Conceptual Stormwater Management Plan – Stormwater Longitudinal Sections
- Reid Consulting Engineers Pty Ltd Drawing No. 28059 Sheet 8 Issue A – Conceptual Sewer Layout Plan
- Reid Consulting Engineers Pty Ltd Drawing No. 28059 Sheet 9 Issue A – Conceptual Water Supply Layout Plan
- Reid Consulting Engineers Pty Ltd Drawing No. 28059 Sheet 10 Issue A – Topographical Survey at Existing Pipe Culvert Crossing - Round-About
- *DRAINS* output data (1 sheet)
- *Culvert Studio* reports (5 sheets)
- *MUSIC* analysis output (1 page)