



2 December 2021

McKees Legal Solutions Att: Graham McKee (by email)

Dear Graham,

RE: FURTHER INSPECTION OF CREEK, 255 CONDAMINE STREET, BALGOWLAH, NSW

As requested, we have undertaken a further inspection of Burnt Bridge Creek at the above site on 17 November 2021 to consider the following issues:

- Creek bank location .
- Southern bank condition and stability
- Northern bank condition and stability
- Amended concept creek management plan

Creek Bank Location

In our Waterway Assessment Report prepared 26/3/2021 (ref: P1605609JR08V02) we had observed that the active creek bank was at a level of around 0.5 - 0.7 m above the permanent creek water line, with the balance of material above this level within the Site consisting of a historical fill embankment.

During the 17/11/2021 inspection I observed this level as an active floodplain at the western end of the site and within the adjoining property. The floodplain and creek bank are shown in Figure 1, Figure 2 and Figure 3, confirming the following:

- 1. Creek bank: The creek bank is approximately 0.5 0.7 m above the permanent water line. The bank is expressed as a clear break in slope between the near vertical slope to the water's edge and the flat grade of the adjoining floodplain. The creek bank was comprised of largely sandy materials held together with plant roots and some clay content.
- 2. Floodplain: There is a distinctly developed floodplain behind the creek bank. This is variably expressed depending on location, being widest upslope of the site (where it reaches > 5 m width). The floodplain is characterised by sandy sediment which has been deposited by floods (refer to Figure 4). Floodplain vegetation to the west of the site is well established and consists largely of non-endemic species including trees, understorey and ground cover.

By contrast, the fill embankment within the site is entirely anthropogenic, containing a range of fill and waste materials (refer to Figure 5 and Figure 6), likely having been placed near to the time that the existing derelict building was constructed.

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Head Office

Suite 201, 20 George St Hornsby NSW 2077, Australia Ph 02 9476 9999 Fax 02 9476 8767

> mail@martens.com.au www.martens.com.au MARTENS & ASSOCIATES P/L ABN 85 070 240 890 ACN 070 240 890

Southern bank condition and stability

In our Waterway Assessment Report prepared 26/3/2021 (ref: P1605609JR08V02) we had observed that the fill embankment within the site was over steepened and unstable and had been subject to various slippages. We had recommended that the bank and fill embankment be stabilised as part of the site development works.

During the 17/11/2021 inspection I observed that the bank had continued to fail, with evidence of several recent slope failures. These have led over time to portions of the anthropogenic fill being transported to the creek bank below and into the creek (refer to Figure 6 and Figure 7). Implementation of the recommendations contained within our Waterway Assessment Report will provide the means of stabilising the southern creek bank.

Northern bank condition and stability

During the 17/11/2021 inspection we had the opportunity to undertake a more detailed examination of the northern creek bank and embankment, and based on this, reconsider the approach to bank management. The following was observed during the inspection:

- 1. The bank is not a natural bank but rather has been constructed by soil and rock excavation.
- 2. The bank is impacted by anthropogenic filling, including concrete over pours (refer to Figure 8).
- 3. The bank is unstable with evidence of recent bank instability (refer to Figure 9 and Figure 10). In particular, there has been a boulder slide with movement of two large boulders into the creek, likely caused by erosion of unconsolidated material below and around the boulders. These materials are likely to continue to move into the creek and obstruct flow in coming high flow / flood events, this leading to further bank erosion. Bank stabilisation and reconstruction is recommended.

Amended Concept Creek Management Plan

A copy of the amended concept creek management plan is provided in Figure 11. Key elements are:

- 1. <u>Northern bank</u>: The works include stabilisation of the northern bank and embankment. This includes removal of boulders and debris that has moved into the creek, bank stabilisation and revegetation to correct current instabilities and removal anthropogenic materials.
- 2. <u>Southern bank</u>: The works include bank protection and stabilisation, as well as revegetation. The works also include construction of a low floodplain on the southern bank within the western portion of the site by repositioning the creek on the inside bend in the order of 2-3 m. This would create a habitat similar to that observed immediately upstream of the site.

The site inspection of 17/11/2021 has confirmed that both the northern and southern creek banks and fill embankments are unstable and require rectification works.

We are of the view that the amended concept creek management plan is consistent with the objectives Waterway Assessment Report and would serve to ensure the long-term enhancement and protection of the current creek corridor.



Please call our offices if you have any further queries regarding this matter.

For and on behalf of MARTENS & ASSOCIATES PTY LTD

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DR DANIEL MARTENS LLB(Hons1), BSc(Hons1), MEngSc, PhD, FIEAust, CPEng, NER, RPEQ, APEC Eng, IntPE(Aus) Managing Director & Principal Engineer





Figure 1: Northern creek bank and floodplain upstream of site looking west (17 November 2021).



Figure 2: Southern creek bank and floodplain upstream of site looking west (17 November 2021).





Figure 3: Creek banks and floodplain upstream of site looking east (17 November 2021).



Figure 4: Sandy floodplain sediment on southern bank (17 November 2021).





Figure 5: Fill embankment behind creek bank within site looking east (17 November 2021).



Figure 6: Fill embankment adjacent to derelict building within site (17 November 2021).





Figure 7: Fill embankment failure and waste in creek within site (17 November 2021).





Figure 8: Northern Creek bank and embankment within site (17 November 2021).



Figure 9: Northern Creek bank and embankment within site (17 November 2021).





Figure 10: Northern Creek bank and embankment showing bank failure (17 November 2021).





Figure 11: Amended concept creek management plan.

