

22 March, 2018

NettCorp
Att: David De Angelis
By email

Dear David

RE: WALLACIA MEMORIAL PARK – 13-15 PARK ROAD, WALLACIA, NSW: RESPONSE TO COUNCILS LETTER DATED 23 FEBRUARY 2018 (REF:DA17/1092 ECM:8063701)

The following comments are in relation to our completed works for the proposed memorial park and are provided in response to Council's letter (REF: DA17/1092 ECM:8063701). Martens and Associates (MA) report which is referred to in this letter is as follows:

- Martens (2017) – P1706171JR01V01, October 2017 – *Preliminary Geotechnical, Groundwater and Salinity Assessment: Proposed Wallacia Cemetery, Wallacia, NSW*

Our response to questions and concerns that are associated with works we completed is provided as follows.

5. Environmental Waterways

Groundwater / Water Management

The recommendations provided in relation to the management of groundwater in the report prepared by Martens shall be completed prior to the approval being granted. Specifically, further assessment of groundwater condition be undertaken for contamination of the groundwater risk and management considerations, including:

- a) Detailed surveying of the groundwater well locations and levels to obtain more accurate groundwater data.

MA Response:

We understand that surveying for the groundwater wells will be undertaken at the site.

- b) Ensure groundwater monitoring period includes a minimum of 2-3 significant wet weather events and corresponding dry weather periods.

MA Response:

- **Groundwater monitoring was undertaken at monitoring wells (MWs) MW102, MW104, MW105, MW107, MW117 and MW119. Refer to MA 2017 report for BH logs and locations.**
- **With the exception of MW102, groundwater monitoring has been completed from 22.09.2017 up to 02.03.2018 – total of just over 5 months. MW102 data spanned from 22.09.2017 to 23.10.2017, 27.11.2017 to 07.12.2017 and 22.12.2017 to 02.03.2018.**

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- **RAINFALL – Wells have responded to recent rain fall as follows:**
 - Daily rainfall source: Warragamba BOM Station
 - MW104 – approximate 75 cm rise in groundwater level associated with 20.02.2018 rainfall of 18 mm.
 - MW117 - approximately 5-10 cm rises in levels associated with various days with rainfall.
 - MW102, MW105, MW107, MW119 – no response to rainfall. These wells were either dry or effectively dry (either completely dry or contained very small amounts of water which collected in a very small well sump of approximately 5-10 cm).
 - Throughout the monitoring period there has been 14 days of rain equal to or greater than 5 mm; 8 days with rain equal to or greater than 10 mm; and 3 days with rain equal to or greater than 20 mm.
 - Maximum daily rainfall was 53 mm.

A cumulative monthly residual rain mass analysis was completed to assess recent rainfall trends during and leading up to the groundwater monitoring period. The analysis was based on observed rainfall data from Badgerys Creek AWS BOM Station (as it had a full recent record) and long term average rainfall from Badgerys Creek McMasters F.Stn BOM Station (as it had a long record). The analysis indicated generally below average rainfall from March 2017 onwards. Groundwater level trends often follow cumulative residual rain mass trends and therefore groundwater levels in the region are likely to have been generally declining over the monitoring period.

In light of the obtained groundwater level data coinciding with a declining cumulative residual rain mass trend, we recommend extending the groundwater monitoring period for an additional three months. After which point the data will be assessed and this letter updated accordingly. We consider this necessary, as it is possible that higher than monitored groundwater levels will occur during periods which are wetter than that which have occurred during the current monitoring period.

- c) Detailed groundwater modelling (using MODFLOW) of the site to determine groundwater levels over the entire site.

MA Response:

Groundwater levels at the site based on groundwater wells and monitoring period to date is summarised as follows:

- MW102, MW105, MW107, MW119 are considered to be dry (i.e. no water in wells). This corresponds to groundwater being >3.0 mBGL at MW105 and MW107 and >4.0 mBGL at MW102 and MW119.
- MW104 had an peak water level of approximately 2.70 mBGL.
- MW117 had an peak water level of approximately 1.93 mBGL.

Due to limited areas of the site that are considered to have shallow groundwater, we don't see the benefit in creating a groundwater model at this stage. Additionally creating a groundwater model based on the current information we have for this site (i.e. only 2 locations with groundwater) will likely be very difficult, have poor calibration, and therefore unreliable and hence unusable. Furthermore, these types of saturated and unsaturated shallow systems do not lend themselves to being modelled.

If burial plots are proposed in the vicinity of MW104 and MW117 then we recommend additional groundwater wells and monitoring to better determine groundwater levels in these areas.

Following completion of monitoring and analysis of additional rain events, the above results, advice and recommendations shall be updated accordingly.

8. Environmental Waterways

Land Contamination

- c) Salinity has been identified through the DIPNR, 2002 'Salinity Potential in Western Sydney' as having 'moderate salinity potential'. Further investigation on salinity levels are required due to the evidence of scalding and indicator vegetation on historical mapping.

MA Response

Refer to Section 5.0 Salinity Assessment (MA, 2017) which concluded that sub-surface materials at the site can generally be categorised as having a slight salinity risk potential with low lying areas having a moderate risk potential. Therefore specific saline soil management strategies are required at the site where development occurs in low lying areas.

Additional assessments would need to be carried out to confirm and improve characterisation of the site salinity conditions, such as in low lying areas / drainage depressions.

If you have any queries please do not hesitate to contact the undersigned.

For and on behalf of

MARTENS & ASSOCIATES PTY LTD



GRAY TAYLOR

BEng

Project Manager / Senior Engineer