Response to Wallacia Memorial Park Crown Development (DA17/109
Documentation Response Presentation IPC 27th March 2019

My name is [redacted], I have lived in Wallacia for 45years
My background is Masters in Primary Health Care Health Practitioner Nurse Consultant, Virology Nurse, Psychotherapist

Reference : - Assessment V.

In viewing the documents there are **serious omissions** that have not been considered or addressed substantially regarding the community concerns of the mitigation of containments from the proposed cemetery that has potential serious health implications for the well being of the community and the ecology and contamination of Nepean River Even though it appears Stormy Waters Solutions has documented flood mitigation management and Pollutant load reductions on surface pollutants this is now questionable. In addition they have not identified problems that has the likelihood of limitations /variables within their systems. (17) (Peter Gillam, Environmental Engineer, Water sensitive designs) . *Marcomini, 2012; Oliveira et al., 2012)* (21) (22)
For example:

1. How to manage pollutant load contamination from the cemetery if flood levels are not managed as predicted . (17)
2. Management of contaminants from ground water into people properties or Nepean River

Reference : - Flood Storm water and Groundwater V 6.21. 6.2.2

This response is totally inadequate and does not relate to any completed specific Geo Hydro scientific approach that supports fully this proposal for Wallacia site.

(Gilliam) (17) **Highlighted** ***Key Factors Affecting Stormwater Treatment Performance***. *"MUSIC is a conceptualisation tool and it does not account for local hydraulic or pollutant load phenomenon nor how to accommodate these in construction drawings. Furthermore there are certain assumptions made in* ***MUSIC tool*** *that the designer must carry through to construction if treatment elements are to operate as desired. Though this is a seemingly obvious statement, this is not always the case, resulting in ineffective or underperforming systems. Treatment performance estimated in MUSIC assumes that treatment systems are functioning correctly, and unfortunately this performance is not always realised in the field."* Peter Gillam, Environmental Engineer. (17)

(Hoban and Tanner 2017)) *"In a review of Bioretention performance found that large losses have been observed and this has a wide range implication of stormwater management A broad review of field studies on bioretention systems found significant discrepancies between actual and modelled performance. Studies show bioretention systems act much more like a sponge than a filter, resulting in very large reductions in runoff volume (60% on average, a ten-fold increase on MUSIC estimates). Pollutant loads appear to be reduced primarily through* ***volumetric loss****, and multiple studies found* ***no reductions in pollutant concentrations*** *This has wide ranging implications for stormwater management."* (22)

(17). Common Performance Issues with Vegetated WSUD Element
(22 .Facing the MUSIC : A review of Bioretention performance

Reference: - Permisibility Vi. 4.1. Groundwater 6.2.2

RED EARTH GeoSciences assessed the suitability of Varroville site and CMCT is making a comparison **suitability** claim for Wallacia site (p.19) This is an unacceptable comparison using one seemingly suitable site to validate another site :

- Implying suitably of Wallacia proposal by comparing **Red Earth** Varroville Geoscientific suitability analysis have implications in numerous aspects .
- Red Earth is implicated without that company knowing the anomalies /variables controversial floodplains of Wallacia thereby inferring to incriminate Red Earth Company for a comprehensive analysis of the whole suitability to which they did NOT do **By implying suitability could validate CMCTs intention to fast track Wallacia without providing the reports that are required :**
- **Red Earth** is owned by **Boyd Dent** (Managing Principal of Red Earth Geosciences and Researcher).
- *Boyd Dent* (1) *research of over 7 years (2002) with supportive references of 434 documents recommends (p 356) that no operating cemetery should be located on* ***any land*** *subject to inundation 1:100 year flood zone and to keep cemeteries away from waterways..*
- Furthermore by implicating Red Earth would also imply that his research was invalid and to this day is the most comprehensive research that is referenced

Groundwater Salinity and Contamination: - 4.2.2. 5.1.3 6.2.2 6.4.1

"Martens Consulting engineer Geotechnical and Ground Water Report have reported that monitoring of Wallacia proposed memorial park has being carried out during a dry weather period. Groundwater levels will vary in the short term predominantly with minor atmospheric pressure and rainfall infiltration effects. ***"Moderate salinity potential" identified "***

Recommended ***.."Ensure groundwater monitoring period includes at a minimum 2- 3 significant wet weather events and corresponding dry weather periods*** *Detailed groundwater modelling (using MODFLOW) of the site to determine groundwater levels over the entire site … .further assessment of groundwater condition be undertaken for confirmation of the above: Detail surveying of the groundwater well locations and levels to obtain more accurate assessment "*

Salinity 6.4.1 6.2.2. 7.6

"bioretention systems can further raise the salinity profile of the catchment by encouraging infiltration of treated stormwater into the groundwater:"
"Blacktown city soils land Salinity" (12)
Using Bioretention system, more water enters the groundwater and groundwater levels rise.

As groundwater levels rise, they bring with them the salt that is in the groundwater, and also dissolve the salt in the previously unsaturated part of the soil profile. Eventually, low lying areas of valley floors may become fully saturated and the amount and duration of flow in streams and rivers increases

In addition "**increased salinity and flow in streams and wetlands is likely to make an issue of the salt tolerance of vegetation**. Many plants tolerate higher salinities for short periods, but cannot survive long periods of inundation as well " (*Barrett-Lennard EG 2003) (20*) DPI, NSW (19)

"High Salinity levels have been documented at Wallacia "Jerrys Creek "Mulgoa Rd flowing to Nepean River" and "Crossmans reserve " See "Wallacia history streamwatch" https://www.streamwatch.org.au **(18)**

Salinisation of streams

Salinisation of rivers can threaten ecosystems and their constituent species, and may render the water unusable. (13) Finally, it is known that soil media has no appreciable retention of salts. Thus, salts have a high potential for groundwater contamination and documented cases of groundwater contamination by salts exist.

Increased application of stormwater infiltration practices necessitates examination of possible contamination to soil and groundwater—

Legitimate concern for the protection of human and environmental health, with documented cases of bacterial contamination of groundwater wells do exist; certain practices may increase the risks. Pathogens may move vertically and/or horizontally with subsurface water flow and survive for days. The fate and survival of pathogens depends upon multiple parameters and is not thoroughly understood. Contamination of groundwater by pathogens has been documented and thus cannot be ignored.
In addition it is known that soil media has no appreciable retention of salts. Thus, salts have a high potential for groundwater contamination and documented cases of groundwater contamination by salts exist.
https://www.pca.state.mn.us/sites/default/files/stormwater-r-weiss0608.pdf

Wallacia being proposed as a memorial (Cemetery) park would thereby have the probability of increasing contaminates in ground water mitigation by using Bioretention systems.

Salinity Implication and Groundwater contamination Increased Pathogens Evidence :

Dietz (2007) (2) wrote a review of studies related to stormwater infiltration systems and also discussed the potential of groundwater contamination. This review stated that, for residential soil contaminations were pathogens and salts. Fecal coliform, it was stated, is often found in high concentrations and may not be retained well by soil media. Also, salts are highly mobile and can easily travel to shallow groundwater. Some studies reviewed by Deitz (2007) (2) indicated that salt concentrations have been increasing in some waterways in the US and, if this trend continues, salt levels will reach levels that are dangerous and could damage the health of the river.

Dietz concluded that...certain areas may not be good choices for infiltration with, locations with steep slopes, shallow depth (< 3 feet) to bedrock, or seasonal high water tables also may not be appropriate for infiltration systems

.... Furthermore, concentrations of the pollutants in the receiving soil may become elevated **above acceptable levels.** (13) (2) (21) (1) (4)

Trends Concerns of Stormwater Regulators

Some of the worst offenses of various categories that included stormwater regulators programs began in earnest in the 1990's

In addition there is a growing concern of Lawsuits in America regarding stormy water management and their claim for managing pollutants... and today water pollution is significant, presenting both health threats and ecological damage

> "Stormy Regulation - the Problem that result when stormwater and other regulatory programs neglect to account for limitations in scientific and technical information: http://www.chapmanlawreview.com/archives/1186 (7)

Comment

There is significant amount of information on the IPC website regarding management of run off from "Stormy Waters regarding Bioretention Basin in regard to the flood mitigation management and its redirection systems / concepts looks impressive However there is little emphasis placed on " ground water contamination" except what Penrith Council raised and has not been addressed and has not yet been fully investigated. Immerging data is now becoming apparent as Bioretention systems are becoming more familiar and research being published with some of the issues that may have serious or unfavourable implications long term being though **Salinity of salt tables** implicating **Pollutant levels** above acceptable levels of Nepean river due to Ground Water Contamination.

Bioretention Systems 2.1 - Additional Anticipated Problems

1. The probability of the resultant "inadequate" performance just repeating itself due to ongoing high sediment loads, litter loads or public interaction (e.g. people walking on bioretention systems)
2. Inadequate edge treatment around permanent water (especially sediment ponds) • Issues of interaction with high traffic areas (systems in roads)
3. Sediment is particularly a risk to bioretention systems,

The ability to allow free drainage of stormwater into the systems

- Bypass or overflow was occurring in many systems
- Filter blockage. (Asset management for WSUD treatment)
- Bioretention is best employed for **small or medium** sites and becomes expensive (land and development costs) when trying to apply to large areas.
- *"Bioretention systems can further raise* ***the salinity profile*** *of the catchment by encouraging infiltration of treated stormwater into the groundwater."* (1) (NSW Blacktown City Soils Land Salinity.) (12) Deitz (2007).

Bioretention swales, whereas most fine particulate organics can decay away and have minimal impact. High loads of fine particulates however **can smother** and coat the swale. (17) "Common Performance Issues with vegetated WSUD elements "

6. Assesment

"Contamination of groundwater by pathogens is a health issue and thus cannot be ignored."(12)

Flooding Storm water and Groundwater Wallacia Memorial park.

The Departments permission for suitability of this proposal without full investigation of data analysis is not acceptable. By omitting critical variables to make an accurate assessment Implies a severe conflict of data interests favouring the CMCT . This is unacceptable by the CMCT making misleading "comparisons " and have not analysed the full necessary critical data suitability of the cemetery in the best interest of the Village. Documented cases of bacterial contamination of groundwater wells exist; certain practices … Pathogens may move vertically and/or horizontally with subsurface water flow and survive for days. The fate and survival of pathogens depends upon multiple parameters and is not thoroughly understood. Contamination of groundwater by pathogens has been documented and thus cannot be ignored.
https://www.pca.state.mn.us/sites/default/files/stormwater-r-weiss0608.pdf

" Almost all cemeteries have some potential for contamination in natural phenomena like floods or landslip subsidence/settlement act on the graves or inappropriate natural subsoil drainage to streams. (Dent p 393)"

> **"The greatest potential threat is the off site migration of pathogens bacteria or virses** ***(Dent p392)" (1)***

The projection of the anticipated 1% AEP flood level is only "projected" this does not take in account variables such as issues with the spills gates opening in an emergency and uncalculated future variables such as increased flood mitigation from upstream from Camden /Oran park due to Increased impermeable surfaces would consequently affect Wallacia and the proposed cemetery with higher flood levels putting the community at risk

"*There being a clear acceptance that flood risk is increasing, water quality is generally not meeting desirable levels, and that combined population and climate change projections pose a pressing challenge".* UK (16)

This proposed cemetery directly affects Wallacia's Community which is of Public Concern and the Government proposals have the obligation to do **NO harm** to the communities health and well being .

Evaluation

"There by it is the duty of care from the IPC and the CMCT ***to consider to the fullest extent all matters likely to affect the environment or likely to affect the environment by reason of that activity .***

(EP&A Act 4.15. 1, a,b,c. 4.15.3. 1979

(The *Protection of the Environment Administration Act 1991 NO 60.* . 3.6 a b)

(a) protect, restore and enhance the quality of the environment in New South Wales, having regard to the need to maintain ecologically sustainable development, and

(b) to reduce the risks to human health and prevent the degradation of the environment, by means such as the following:

- promoting pollution prevention,
- adopting the principle of reducing to harmless levels the discharge into the air, water or land of substances likely to cause harm to the environment,

For the purposes of subsection (1) (a), ecologically sustainable development requires the effective integration of social, economic and environmental considerations in decision-making processes. Ecologically sustainable development can be achieved through the implementation of the following principles and programs:

(a) the precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions should be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options,

Wallacia Memorial Park Proposal is not in the "Public Interest"

Therefore

I am here to oppose the Wallacia Memorial Park Cemetery Crown Development within the flood prone Golf Course 13-15 Park Wallacia

- **Reference**

- 1.Boyd. B. Dent 2002 The Hydrogeological content of Cemetery Operation and Planning in Australia
- 2.Water air soil pollution
  .Dietz, M.E. 2007. "Low impact development practices: A review of current research and recommendations for future directions," Water Air Soil Pollut, 186:351–363.
- 3.Wallacia Memorial park Assessment report DA 17/1092
- THE IMPACT OF CEMETERIES ON THE ENVIRONMENT AND PUBLIC HEALTH WHO
  4.https://apps.who.int/iris/bitstream/handle/10665/108132/EUR_ICP_EHNA_01_04_01(A).pdf;jsessionid=A16E7458E0661477B8A655B6A40206B5?sequence=1
- 5. Preliminary Geotechnical, Groundwater and Salinity Assessment: Proposed Wallacia Cemetery, Wallacia, NSW
- 6. WALLACIA GOLF COURSE REDEVELOPMENT - FLOOD ASSESSMENT GRC Hydro
- 7 "Stormy Regulation - the Problem that result when stormwater and other regulatory programs neglect to account for limitations in scientific and technical information
- . http://www.chapmanlawreview.com/archives/1186
- **8. Asset Management for WSUD Treatments**
- https://www.melbournewater.com.au/sites/default/files/2017-09/Retarding-Basin-Design-Assessment-Guideline.pdf
- 9. Water Open Access journal
- https://www.mdpi.com/journal/water
- 10. Retarding basins :
- https://www.ancold.org.au/wp-content/uploads/2013/09/040_042wp0813Flood-retarding.pdf
- 11. Lake Superior Streams
  http://www.lakesuperiorstreams.org/stormwater/toolkit/bioretention.html

- 11. Lake Superior Streams
  http://www.lakesuperiorstreams.org/stormwater/toolkit/bioretention.html

- **12. Developer Handbook for water Sensitive Urban Design Blacktown City Council**

- **13. Ground Contaminants**

  https://www.pca.state.mn.us/sites/default/files/stormwater-r-weiss0608.pdf

- 14. Salinity

  https://www.pca.state.mn.us/sites/default/files/stormwater-r-weiss0608.pdf

- 15. Impact of cemeteries on groundwater contamination by bacteria and viruses - a review.
  https://www.ncbi.nlm.nih.gov/pubmed/26042963

- 16. Impacts of urbanisation and climate change on urban flooding water quality : a review of the evidence concerning the United Kingdom

  https://www.sciencedirect.com/science/article/pii/S2214581817300435

- 17. Common Performance Issues with Vegetated WSUD Element Peter Gillam, Environmental Engineer, E

- http://www.equatica.com.au/pdf/Gillam%202011.pdf

- 18Wallacia Stream watch
  . https://www.streamwatch.org.au

- 19. Salinity training

  . http://www.dpi.nsw.gov.au/__data/assets/pdf_file/0008/519632/Salinity-training-manual.pdf

- The interaction between waterlogging and salinity in higher plants: causes, consequences and implications

- 20. https://link.springer.com/article/10.1023/A:1024574622669

- *21.* http://www.scielo.br/pdf/urbe/2017nahead/2175-3369-urbe-2175-3369009002AO05.pdf

- 22.http://blightanner.com.au/wp-content/uploads/2017/11/2017-11-08-Facing-the-MUSIC.pdf Facing the MUSIC: a review of Bioretention systems

- **Additional Information**
- **Health Impacts**

"As sites where human matter undergoes changes through the action of biological, physical or chemical agents, cemeteries pose environmental risks for the population due to the levels of contaminants released (Marcomini, 2012; Oliveira et al., 2012). Cemeteries represent a source of environmental liability due to their potential to accumulate and release large quantities of contaminants generated by the decomposition of corpses. Effluents can carry microorganisms and heavy metals through the soil to water resources. Since these environments have concentrated potential polluters (i.e., are pollution point sources), populations living close to cemeteries may be exposed to elevated levels of highly harmful contaminants to human health (Oliveira et al., 2012). This is exacerbated by the lack of management and treatment of highly pathogenic effluents released by corpses (necroleachate) during the decomposition process." (21)
. http://www.scielo.br/pdf/urbe/2017nahead/2175-3369-urbe-2175-3369009002AO05.pdf

LIST OF ABBREVIATIONS

The following abbreviations have been used in this plan:

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
AIIMS	Australasian Inter-service Incident Management System
ARI	Average Recurrence Interval (Years)
ALERT	Automated Local Evaluation in Real Time
AWRC	Australian Water Resources Council
Bureau	Australian Government Bureau of Meteorology
DCF	Dam Crest Flood
DECCW	Department of Environment, Climate Change and Water
DSC	Dams Safety Committee
DISPLAN	Disaster Plan
DSEP	Dam Safety Emergency Plan
DVR	Disaster Victim Registration
NOW	NSW Office of Water
GIS	Geographic Information System
GRN	Government Radio Network
IFF	Imminent Failure Flood
LEMO	Local Emergency Management Officer
LEOCON	Local Emergency Operations Controller
OAP	Operational Action Plan
PMF	Probable Maximum Flood
PMR	Private Mobile Radio
PMP	Probable Maximum Precipitation
RMS	Roads and Marine Services
SEOCON	State Emergency Operations Controller
SERCON	State Emergency Recovery Controller
SES	NSW State Emergency Service
SEWS	Standard Emergency Warning Signal
TMC	Transport Management Centre
VRA	Volunteer Rescue Association
WICEN	Wireless Institute Civil Emergency Network