



Project No: S15074

5 April 2016

Medowie Christian School
c/- epm Projects Pty Ltd
Suite 2, Level 5
655 Pacific Highway
ST LEONARDS NSW 2065

Attention: Todd Ewart

Dear Todd

**MEDOWIE CHRISTIAN SCHOOL CONCEPT PROPOSAL & STAGE 1 ADMINISTRATION BUILDING
STORMWATER MANAGEMENT STRATEGY**

This letter outlines the stormwater management strategy associated with the concept proposal and Stage 1 Administration Building at Medowie Christian School. The letter should be read in conjunction with BG&E Civil Works drawings and architectural plans prepared by Smith and Tracey Architects.

1 EXISTING SITE

The site contains an area of 8.1 hectares (ha) and is located within the Port Stephens Local Government Area (LGA) on land that is described as Lot 1 DP 868525, Lot 22 and Lot 23 DP 1036306 Nos. 6, 6A, and 6B Waropara Road, Medowie (Figure 1). The site is regular in shape and has a 201 metre (m) frontage to Waropara Road as noted on the site survey prepared by Carman Surveyors.

An existing educational establishment (MCS) currently operates on the site together with a place of worship known as Medowie Baptist Community Church and other medical centre/community facility uses with associated car parking and access from Waropara Road.

1.1 Area of Interest

The stormwater management strategy is limited to the area of interest shown in Figure 1 which has been developed as MCS. Key features of this area include:

- The site area is approximately 2.5 hectares.
- Topography ranges from approximately 25 mAHD in the south western corner to 9 mAHD in the north-eastern corner.
- The impervious area of the site (pavements, buildings etc.) is approximately 60% of the site area.

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- Paved areas and roof areas are serviced via an underground pipe and pit system for frequent storm events. The pipe system discharges to an existing stormwater basin on the north-western corner of the site. The outlet of the basin does not appear functional.
- Once the capacity of the pipe system is exceeded stormwater will flow overland towards the stormwater basin.
- Stormwater from external properties does not appear to enter the site. Stormwater within the site is restricted to rainfall falling directly over the site.



Figure 1 – Site area

2 PROPOSED DEVELOPMENT

The concept proposal involves alterations and additions to an existing education establishment. This strategy and associated civil works drawings have been prepared to support the development application for Stage 1. The Stage 1 DA involves components A, G, H and R from the concept proposal as summarised below:

- Construction of a new 2-storey administration building with a height of 7.8m comprising meeting rooms, amenities, reception, executive offices, sick bay and staff common room; and
- Ancillary site works including:
 - i) Demolition of the existing demountable buildings/reception and excavation;
 - ii) Removal of 32 x trees including Tree Nos. 29-48 (inclusive), 62-64 (inclusive) and 107-115 (inclusive);
 - iii) Landscaping including new pedestrian pathways and replacement planting of local endemic species;

- iv) 10 additional car parking spaces located adjacent to the existing bus manoeuvring bay at the front of the site and conversion of existing parking spaces to provide 2 accessible parking spaces; and
- v) Drainage to the rear of the site including enlargement of an existing detention basin adjacent to the northern side boundary; and
- vi) Building identification signage.

3 STORMWATER MANAGEMENT STRATEGY

The proposed stormwater management strategy is documented in the BG&E Civil Works drawings and summarised as follows:

- New stormwater pits and pipes to collect and convey stormwater flows from the new car parking areas and administration building.
- Upgrade of the existing OSD basin.
- Construction of water quality treatment measures.

4 STORMWATER QUANTITY

4.1 Pre-development

The existing stormwater network was modelled using the DRAINS software package. The following model parameters were adopted:

- Catchment areas to each inlet pit estimated based on field survey topography data (refer catchment plan in civil drawings).
- Catchment impervious fraction estimated based on aerial photography.
- 5 minute and 10 minute time of concentration to inlets adopted for impervious and pervious areas respectively.
- Pipe and pit details based on field survey data where available.

The existing basin has minimal storage volume and the outlet does not appear to currently be functioning and as such no allowance for stormwater detention was included in the pre-development model.

4.2 Post-development

The DRAINS model was updated to reflect the proposed upgrade works for Stage 1 and the concept proposal. The upgrade works represent an increase in impervious area of less than 10% of the site area. The following changes were made to the model;

- Proposed inlets pits and pipes incorporated into the model for Stage 1 works.
- Catchment nodes updated to reflect Stage 1 and concept proposal works.
- OSD basin incorporated at the downstream end of the model.

It was agreed with Council that the OSD basin should be sized to ensure post-development peak flows from the developed site (including Stage 1 and the concept proposal) are equal to or less than pre-development (current scenario) peak flows for all storm events up to and including the 100 year ARI event. Design peak flows are summarised in Table 1.

	2yr ARI	5yr ARI	10yr ARI	20yr ARI	50yr ARI	100yr ARI
Pre-dev	0.58	0.71	0.83	0.93	0.10	1.11
Post-dev	0.34	0.37	0.40	0.43	0.46	0.49

Table 1 – OSD Peak flows (m³/s)

The volume and outlet configuration for the basin has been selected to contain the 50 year ARI flood event without overtopping the high level weir. The DRAINS model shows a significant reduction in peak flows. A review of the basin will be carried out during detailed design to investigate whether a smaller basin which overtops during more frequent storm events (say the 20 year ARI event) would be acceptable.

5 STORMWATER QUALITY

It was agreed with Council that the site should only be required to maintain or improve the existing stormwater quality, ie. post-development stormwater quality should be equal to or better than pre-development. This decision was made on the following basis:

- Upgrades to the school are minimal and limited to the demolition and construction of 1 new building and small extension of the existing concrete carpark;
- Existing stormwater quality infrastructure is non-existent, the introduction of infrastructure to comply with original requirements would be financial unfeasible and would likely affect the potential development of the school.

5.1 Pre-development

Water quality modelling for the site was undertaken using the MUSIC software. The site was divided into 4 types of catchments. Catchment parameters were adopted in accordance with the NSW Draft Music Modelling Guideline:

- Roof - 100% Impervious
- Road - 100% Impervious
- Permeable (soft landscaping and grass areas) - 100% Pervious
- Landscape (hardstand landscaping such as concrete and paved footpaths) - 100% Impervious

5.2 Post-development

The MUSIC model was updated to reflect the proposed upgrade works for Stage 1 only. The following changes were made to the model:

- Catchment areas updated to reflect proposed pavement and building works.

- Additional node to represent primary treatment via Enviropod pit inserts to existing and proposed stormwater pits. Node data was provided by the supplier Stormwater360.
- Additional node to represent treatment via Humeceptor installed on-line to existing stormwater pipe prior to discharge to OSD basin. Node data was provided by supplier Humes.

The MUSIC model demonstrates the development would have a neutral or beneficial effect to water quality. Results are summarised in Table 2.

	Pre-development	Post-development
Flow (ML/yr)	12.7	14.9
Total Suspended Solids (kg/yr)	1740	723
Total Phosphorus (kg/yr)	3.65	3.14
Total Nitrogen (kg/yr)	27.2	27.1
Gross Pollutants (kg/yr)	293	266

Table 2 – Water quality results

6 CLOSING

The stormwater strategy has been prepared to address the following:

- Inclusion of additional stormwater pits and pipes to collect runoff from new paved and building areas associated with the Stage 1 development during frequent storm events;
- The proposed OSD basin ensures post-development peak flows from the developed site (including Stage 1 and the concept proposal) are equal to or less than pre-development peak flows for all storm events up to and including the 100 year ARI event.
- Inclusion of water quality treatment measures to ensure the development (Stage 1) would have a neutral or beneficial effect to water quality. Further treatment measures may be required for subsequent stages comprising the concept proposal.

Yours faithfully
for BG&E Pty Limited

BRETT STINTON
Principal Water Engineer