Our Reference: SY10 0450

4th October 2011

Tanner Architects Pty Ltd
52 Albion Street
SURRY HILLS NSW 2010

Attention: Mr George Phillips

Dear George,

Re: Graythwaite Sydney Church of England Grammar School
Addendum 1 to Integrated Water Management Plan Concept Application

Please accept this letter and attached revised plan, number SY100450-C1.02 - Rev. H, as an Addendum to our original report of 6th October 2010 (as updated on 26th November 2010) titled "Integrated Water Management Plan…… To The Concept Application (Stage 1, 2, & 3)".

This addendum has been prepared in response to recent issues raised by North Sydney Council consequent to various responses received by Council from referral authorities and third parties to the development proposal.

The issues raised by Council generally relate to the proposed stormwater management system at the site and the perceived impacts upon the existing surface and ground water regimes surrounding Graythwaite House, several existing springs, and existing ground water flows downstream of the site.

It should be noted that this addendum report is submitted in support of the proposed stormwater management concept which remains subject to detailed design and input from the project arborist, geotechnical engineer and landscape architect.

In considering the revised stormwater management plan it must be borne in mind that the overall stormwater catchment has been substantially altered through considerable urban development over the years and that, consequently, attempts to mimic or replicate the original pristine conditions of the catchment are not considered viable or feasible within the site sub-catchment.

Notwithstanding this, to address the recent concerns raised the revised stormwater management plan now incorporates a portion of ground water replenishment through an infiltration system and minimised ground water drainage in the vicinity of identified springs, as a qualitative drainage strategy.

It should be noted that surface water and ground water discharging from the site, particularly in lower areas along the western boundary, is considered a potential nuisance and hazard to property and buildings of the neighbouring properties immediately downstream of the development site.

The following three discrete elements of the development proposal are presented in terms of the issues raised by Council and the subsequent stormwater management plan revisions:

- Graythwaite House, Tom O'Neill Centre & the Coach House
- Existing ephemeral springs
- Existing ground water regime

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Graythwaite House, Tom O'Neill Centre, & the Coach House

Council has indicated that the roof and subsoil stormwater drains proposed to Graythwaite House, Tom O'Neill Centre and the Coach House are not supported by Council and should therefore be deleted from the proposed development proposal.

However, we understand that these recognised historic buildings currently suffer from groundwater ingress into the building fabric and main basement and that the impact of this compromises the longer term structural integrity, general condition and amenity of these existing buildings.

We therefore reaffirm our recommendation to incorporate roof stormwater capture and transport away from these buildings and a groundwater intercept drain system (subsoil drain) to specific building curtilage areas as proposed in the stormwater management plan.

The revised concept stormwater management plan provides for the removal of existing building roof water and diversion of groundwater flows around the heritage buildings to facilitate and ensure the longer term function and protection of these historically valuable buildings.

The stormwater management protective measures proposed for the heritage buildings will, of necessity, be achieved in liaison with the building architect, landscape architect, and structural engineer in order to minimise detrimental impacts upon the building curtilage areas as a result of the current uncontrolled stormwater/groundwater ingress.

Reinstatement of the existing building curtilage areas as a heritage relic would be undertaken in a manner that protects and retains the elemental relic value and the general heritage value of these curtilage areas while achieving the primary objective of protecting the existing buildings.

With regard to Council request for the incorporation of current water sensitive urban design principles to the existing heritage buildings refurbishment, we reaffirm that we do not recommend retrospective installation of stormwater retention systems to the existing buildings due to the inherently marginal benefits expected when considered against the substantial additional construction impacts induced and associated risks imparted to the buildings and their respective curtilage areas.

Stormwater retention and recycling is, under the revised stormwater management plan, readily and efficiently achieved during the subsequent stages of the development through incorporation of retention/recycle mechanisms into the proposed new buildings designs.

Existing ephemeral springs

Council has suggested that several identified ephemeral springs on the site should be retained and possibly adapted for creation of artificial ephemeral wetlands as part of the landscape plan for the site.

It is our opinion that creation of artificial wetlands is neither technically viable nor sustainable due to the:

- inherent ephemeral nature of the springs at the site
- unknown flow characteristics of these springs
- topography of the site, particularly in the vicinity of the springs
- relatively small (previous) catchment area contributing to the springs
- changed character of the overall upstream catchment, being primarily urbanised

Coupled with this, and subject to an ecological specialist's opinion, we believe that introduction of artificially introduced ecosystems at the site will naturally impart unnecessary and unacceptable impacts upon the existing balance of the existing ecosystem/s and their consequent sustainability.

The revised stormwater management plan therefore incorporates high level subsoil drainage of these springs and other waterlogged zones to a nominal maximum depth of 500mm.

This proposed 'shallow zone' sub-surface drainage concept will facilitate proposed use of the grounds for the school while minimising interception of the deeper ground water flows, thus maintaining the operation and amenity of the site as a safe active/passive school ground recreational area, consistent with the zoning and purpose of the site.

Existing Stormwater Regime

Council has indicated that the perceived loss of ground water flows caused by interception of the proposed new building structures cannot be supported due to the impact upon the pristine catchment conditions enjoyed over the past 150 years.

However, the massive extent of urban development within the general catchment area, in particular the area upstream of the subject site, has in our opinion unequivocally and permanently altered the catchment surface water flows (increased) and ground water flows (decreased) over the past two centuries of human development.

It is therefore in our opinion erroneous and unreasonable to consider the site as a pristine catchment in isolation of the overall catchment character and thus disregard the urbanised nature of the catchment, with the intrinsic expectation that the site should be generally maintained as pristine.

In the absence of a water balance model and any detailed hydro/geological and geomorphic data, the expected rainfall infiltration rates envisaged are generally limited to the actual development site area since the majority of the remaining overall catchment area has been fully urbanised resulting in maximum impervious surfaces formed by building roofs, pavements and the like.

Notwithstanding the above, and in response to concerns relating to reduced ground water flows along the western boundary of the site, the revised stormwater management plan in liaison with the project arborist now incorporates a strategic section of ground water infiltration in the proposed Stage 3 area of the project in order to minimise the perceived impact of reduced ground water flows to the existing tree line at this location.

Conclusions

From the above considerations in response to the particular issues raised by Council we are of the opinion that the revised stormwater management plan as depicted on the attached drawing (no. SY100450 - C1.02 - Rev. H) addresses and satisfies Council's concerns relating to the following matters:

1. Roof stormwater and ground water flows in the area of the existing heritage buildings should be controlled with a system of roof, surface and sub-surface drains to prevent continued ingress of water into these historic buildings

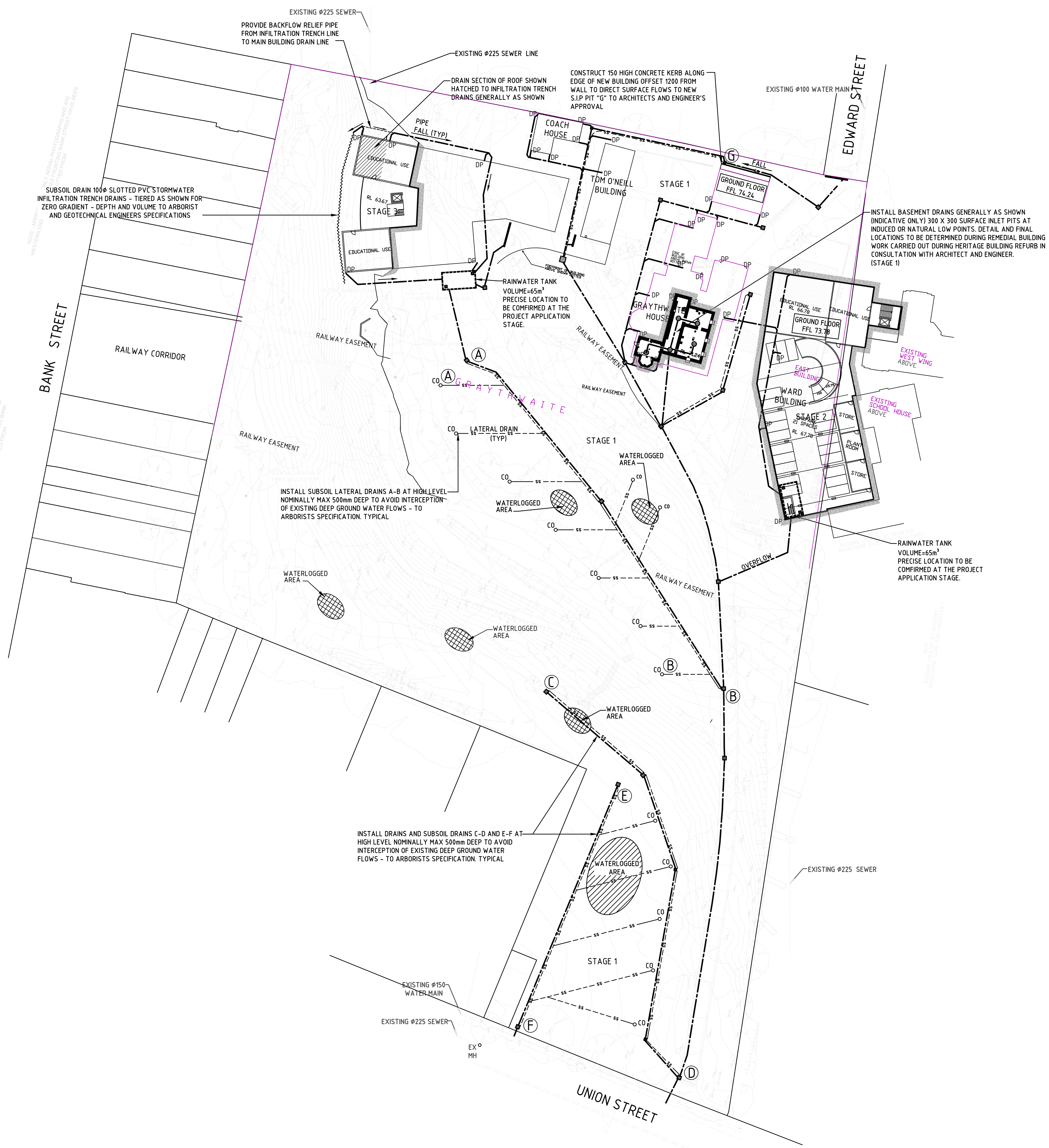
2. Stormwater from future proposed buildings shall incorporate water harvesting principles with reuse to landscape areas and toilet flushing

3. Installation of shallow subsoil drains within open areas identified as waterlogged or springs shall be limited to upper level ground water interception and drainage i.e. <500mm deep, thus ensuring that the deeper ground water flows remain generally unimpeded while facilitating the safe use and maintenance of the grounds

4. A portion of roof stormwater emanating from the proposed Stage 3 building shall be drained into a new ground infiltration trench drain located immediately to the west of the new building to provide for reintroduction of ground water within the 'groundwater shadow line' of the building footprint

Yours sincerely,
ACOR Consultants Pty Ltd

Ray Engelbrecht
Associate, Senior Civil Engineer



CIVIL LEGEND PROPOSED

- WATER LOGGED AREA
- NATURAL SPRING LOCATION, IDENTIFIED BY ANECDOTAL EVIDENCE ONLY, TO BE CONFIRMED
- FFL 71.23 — FINISHED FLOOR LEVEL
- GRATED DRAIN
- FLOW ARROW
- OVERFLOW
- DP — DOWNPIPE CONNECTION Ø100 UNO
- PIT: GRATED COVER, SOLID COVER
- GP 450x450, CL 18.80, IL 18.25 — GRATED PIT AND SIZE, PIT COVER LEVEL, PIT INVERT LEVEL
- Ø225 RCP — GRAVITY STORMWATER DRAINAGE WITH SIZE AND PIPE MATERIAL
- CO, SS — SUBSOIL DRAIN Ø100 UNO WITH CLEANOUT POINT
- +71.23 — PROPOSED SURFACE LEVEL
- CATCHMENT BOUNDARY
- STORMWATER INFILTRATION TRENCH TO ARBORISTS AND GEOTECHNICAL ENGINEERS DESIGN TO REPLENISH GROUND WATER BELOW PROPOSED STAGE 3 BUILDING - CONSTRUCT AT ZERO GRADIENT GENERALLY AS SHOWN

NOTE:

FINAL LOCATION OF PIPES AND PITS TO BE COORDINATED WITH THE LANDSCAPE ARCHITECT AND THE ARBORIST DURING THE PROJECT APPLICATION STAGES OF EACH PROJECT TO ENSURE MINIMUM IMPACT TO EXISTING TREES TO BE RETAINED

SUBSOIL DRAINS SHALL BE INSTALLED TO ALL RETAINING WALLS IN ACCORDANCE WITH STRUCTURAL ENGINEERS SPECIFICATIONS - NOT SHOWN

WATERLOGGED AREAS SHOWN INDICATE APPROXIMATE LOCATIONS ONLY T.B.C ON SITE.

CONCEPT APPLICATION

Issue	Description	Date	Drawn	Chkd
G	RE-ISSUE FOR CONCEPT APPLICATION	21.09.11	VC	RE
F	RE-ISSUE FOR CONCEPT APPLICATION	20.06.11	AM	RE
E	RE-ISSUE FOR CONCEPT APPLICATION	17.06.11	AM	RE
D	RE-ISSUE FOR CONCEPT APPLICATION	06.10.10	RG	GK
C	RE-ISSUE FOR CONCEPT APPLICATION	28.09.10	AM	GK
B	RE-ISSUE FOR CONCEPT APPLICATION	27.09.10	AM	GK
H	RE-ISSUE FOR CONCEPT APPLICATION	04.10.11	ZS	RGE

North

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Project
SHORE GRAYTHWAITE PROJECT

Drawing Title
CONCEPT STORMWATER MANAGEMENT PLAN

Drawn	Date	Scale B1	Q.A. Check	Date
AM	AUG 10	1:500		

Designed	Project No.	Dwg. No.	Rev.
GK	SY100450	C1.02	H