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STORMWATER MANAGEMENT PLAN AND REPORT FOR
HASTINGS ASSOCIATION FOR CHRISTIAN EDUCATION (HACE) LTD
&
GANTONS PTY LTD

PROPOSED REZONING OF LOT 2 DP 601094
& LOT 4 DP 825704 MUMFORD STREET, PORT MACQUARIE

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19 January 2018

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STORMWATER MANAGEMENT PLAN

Executive Summary

This Stormwater Management Plan is prepared in support of a rezoning application for Lot 2 DP 601094 & Lot 4 DP 825704 Mumford Street, Port Macquarie.

This Plan discusses issues related to development following the successful re-zoning and addresses those.

1. Receiving catchment will be protected from:
 - a. Filling works for any hardstand or carpark by Erosion and Sediment Controls to Council standard.
 - b. Long term carpark/hardstand runoff by a Bio Retention Basin.
 - c. Roofwater by detention tanks and scour/velocity outlets to Council standard.
 - d. Scour and particle loss of batters by concrete kerbs directing run-off to pits.

The sites appear adequately serviced by existing infrastructure, however any infrastructure required, as a result of the development, will be paid for by the developer. Any existing infrastructure upgrades, required as a result of the development, will also be funded by the developer.

Introduction

This Stormwater Management Plan is prepared in support of a rezoning application for Lot 2 DP 601094 & Lot 4 DP 825704 Mumford Street, Port Macquarie.

The site area of both lots is approximately 6 hectares. The land is bordered by Mumford Street to the north, residential properties to the east and south, and low lying land to the west.

The land is flood prone and fill is proposed to provide flood proof use of part of the land. A separate Report by Advisian (formerly Worley Parsons) is submitted as part of the Rezoning Application.

The total catchment being received by the low lying land to the west is approx. 85 hectares.

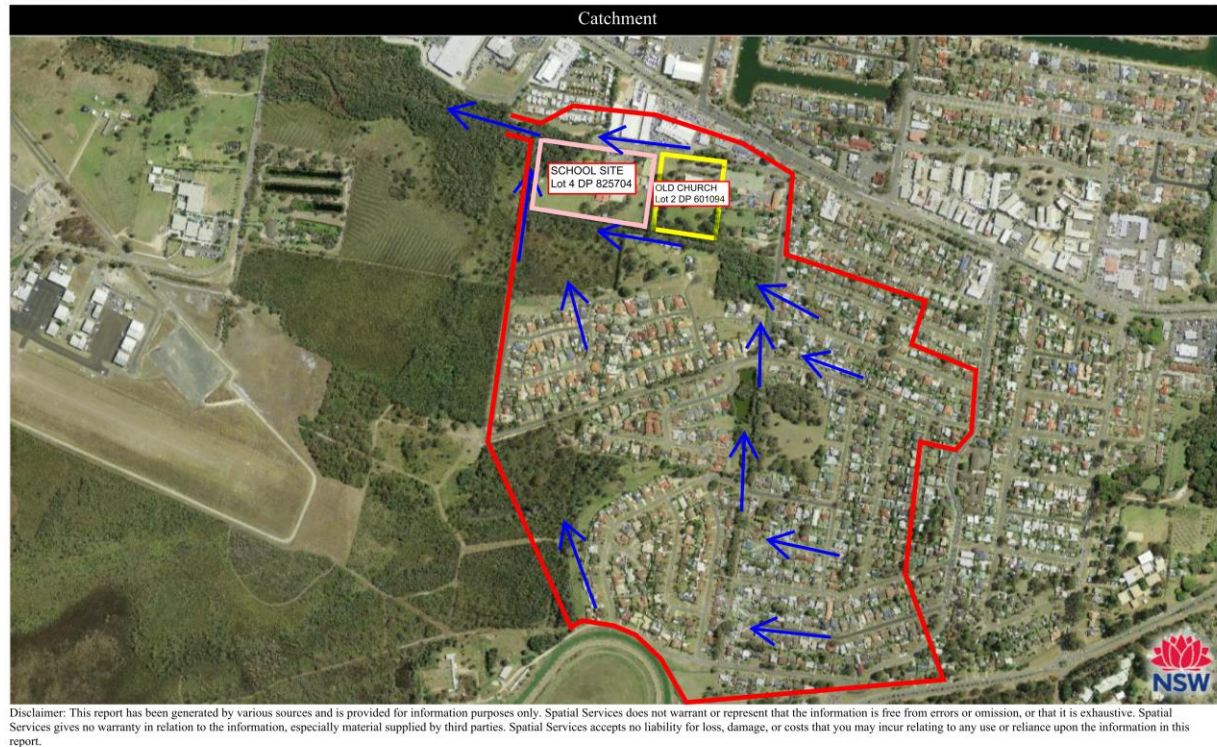


Figure 1: Location and Approximate Catchment Boundary

The above catchment was estimated by the author, using desk-top survey and some site investigation. The value is merely an estimate for the frequent local storm (not regional flood) to give an indication of the proportion of the total catchment that is occupied by the land, the subject of the rezoning. This proportion is about 7 - 10%.

The sites have been assessed in this report for their demand and suitability on servicing and infrastructure requirements and the likelihood that measures can be put in place to preserve the health of the receiving low lying land to the west as a consequence of their final developed form.

To quote Council's Development Control Plan – 2013 (DCP 2013) – *“The purpose ... is to achieve a balance between assisting in appropriate development whilst conserving the most important bio-diversity assets and maintaining the ecological processes that sustain them”*

Performance Criteria – PMHC – DCP 2013

In respect and relevant to stormwater management, (and this includes earthworks during the construction phase) Council's DCP 2013 has the following Performance Criteria:

2.3.3.1 - Cut and Fill - Regarding

To ensure that design of any building or structure integrates with the topography of the land to:

- *Minimise the extent of site disturbance caused by excessive cut and fill to the site.*
- *Ensure there is no damage or instability to adjoining properties caused by excavation or filling.*
- *Ensure that there is no adverse alteration to the drainage of adjoining properties.*
- *Ensure the privacy of adjoining dwelling and private open space are protected.*
- *Ensure that adequate stormwater drainage is provide around the perimeter of buildings and that overflow paths are provided.*

2.3.3.2 – Retaining Walls –

To ensure retaining walls are functional, safe and positively contribute to the development and/or the streetscape.

2.3.3.3 - Cut and Fill - Landform Change

To minimise the extent of landform change to render a site suitable for subdivision.

To minimise adverse impact on other land, persons or public infrastructure from landform change.

To preserve levels at site boundaries.

To preserve significant natural watercourses, riparian vegetation, environmental and topographical features.

To preserve the visual character of the landform as viewed from within and outside the land site.

To preserve cross boundary drainage conditions.

To ensure runoff from upstream or upslope land is not adversely impeded.

To ensure there are no adverse geotechnical consequences to the site or to other land.

To ensure there are no adverse consequences to public infrastructure.

2.3.3.4 – Environmental Management Areas and Buffers

To conserve biological diversity and promote ecologically sustainable development.

To prevent the extinction and promote the recovery of threatened species, populations and ecological communities.

To protect the habitat of threatened species, populations and ecological communities.

To eliminate or manage processes that threatens the survival or evolutionary development of threatened species, populations and ecological communities.

To ensure that the impact of any action affecting threatened species, populations and ecological communities is properly assessed.

To encourage the conservation of threatened species, populations and ecological communities by the adoption of measures involving co-operative management.

To mitigate against Key Threatening Process to Threatened Species and their Habitat.

2.3.3.5 - – Environmental Management Areas and Buffers

Environmental Areas are to be appropriately protected and managed.

2.3.3.6 – Waterways – Protect and Maintain

- a) *Water quality within waterways;*
- b) *Stability of the bed and banks of waterways;*
- c) *Aquatic and riparian habitats, and*
- d) *Ecological process within the waterways and riparian areas.*

Implementation Strategy - Proposed

The following outlines the strategy by the development to successfully implement the intent of Council's DCP 2013.

2.3.3.1 & 2.3.3.3: – Cut and Fill

Lot 2 proposes some 5,000 m³ of structural fill. This fill shape is finalised and identified in the flood report by Advisian to accompany the Rezoning application.

Risk of contamination of receiving land is greatest at periods of construction/placement. Any future DA submitted to Council, and Council's conditions of consent will cover the Erosion and Sediment Control (ESC) actions required during the fill placement work. At the least, the work will be in accordance with Landcom's "Managing Urban Stormwater: Soils and Construction" publication – (the Blue Book). These construction aspects are well documented, the local contractors have a good understanding of their importance and Council appears adequately resourced to enforce the requirements during construction.

At the completion of construction the batters would be maintained in a grassed, (or other surface) erosion stable state. A concrete kerb will have been placed at the top of all batters to catch and control stormwater into pits so that sheet flow is avoided. (Refer to Figure 5 Stormwater Management Site Plan).

During the life of the site, after construction, the batters will be maintained in a scour free state.

To manage kerb overflow in extreme storm events, the flow can be directed by overflow bypass structures that are scour protected (grassed, rip-rap, matting etc, - depending on volume and velocities) to facilitate an extreme storm without sediment relocation. Council's ASD 600 series of details provide solutions to the issue.

Implementation Strategy – Proposed (Ctd)

Regional floods will immerse the total area with back-up floodwater. This issue is addressed in the Advisian Report, as part of this re-zoning application.

Gross pollutant traps will be incorporated in either the pit structures, or within the Bio Retention Basin. The following two examples (Figure's 2 & 3) of Bio Retention Basins show Gross Traps within the structure.

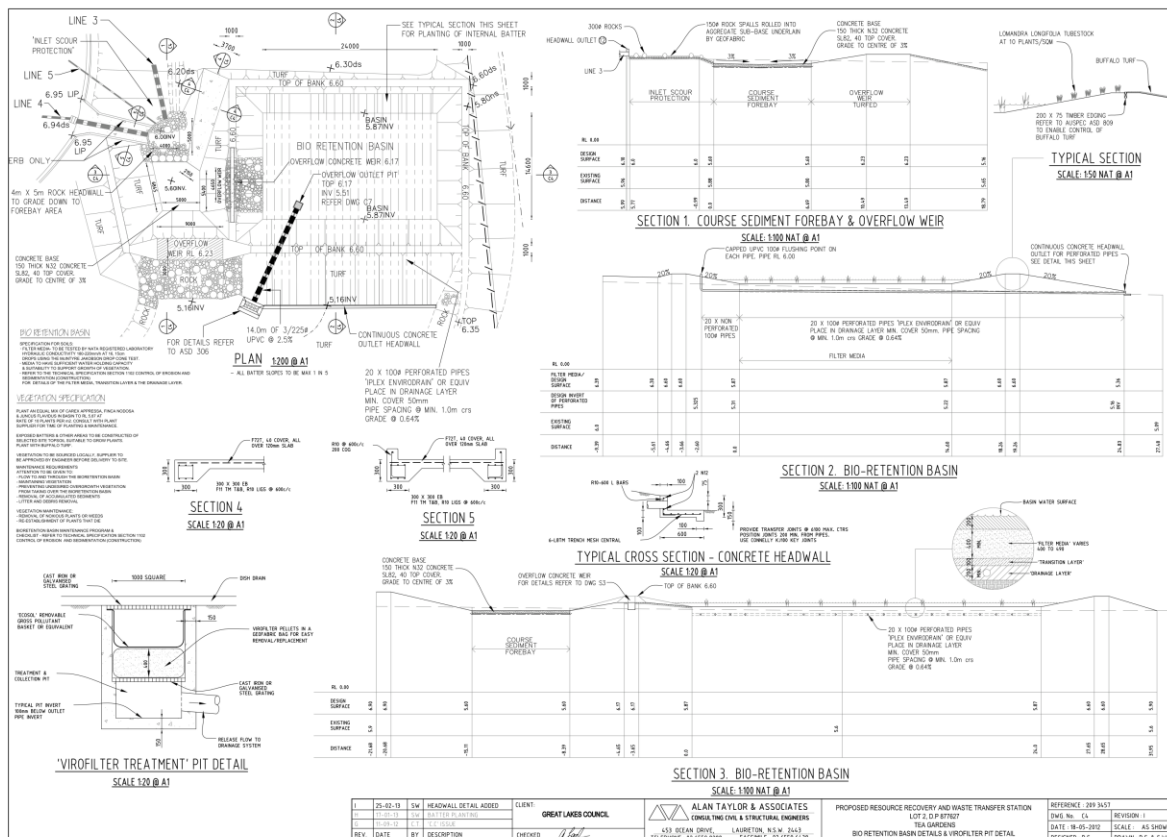


Figure 2: Bio Basin with Gross Pollution Trap

Note the above Basin has a “Course Forebay Area” for capture of Gross pollutants. Further, a “ViroFilter” to capture heavy metals and stabilise pH values. This structure is for a Regional Waste Transfer Station, and also deals with leachate. It’s basin area is about 350m², 60% of the size of the area quarantined for such a structure in Mumford Street, the subject of this re-zoning.

Implementation Strategy – Proposed (Ctd)

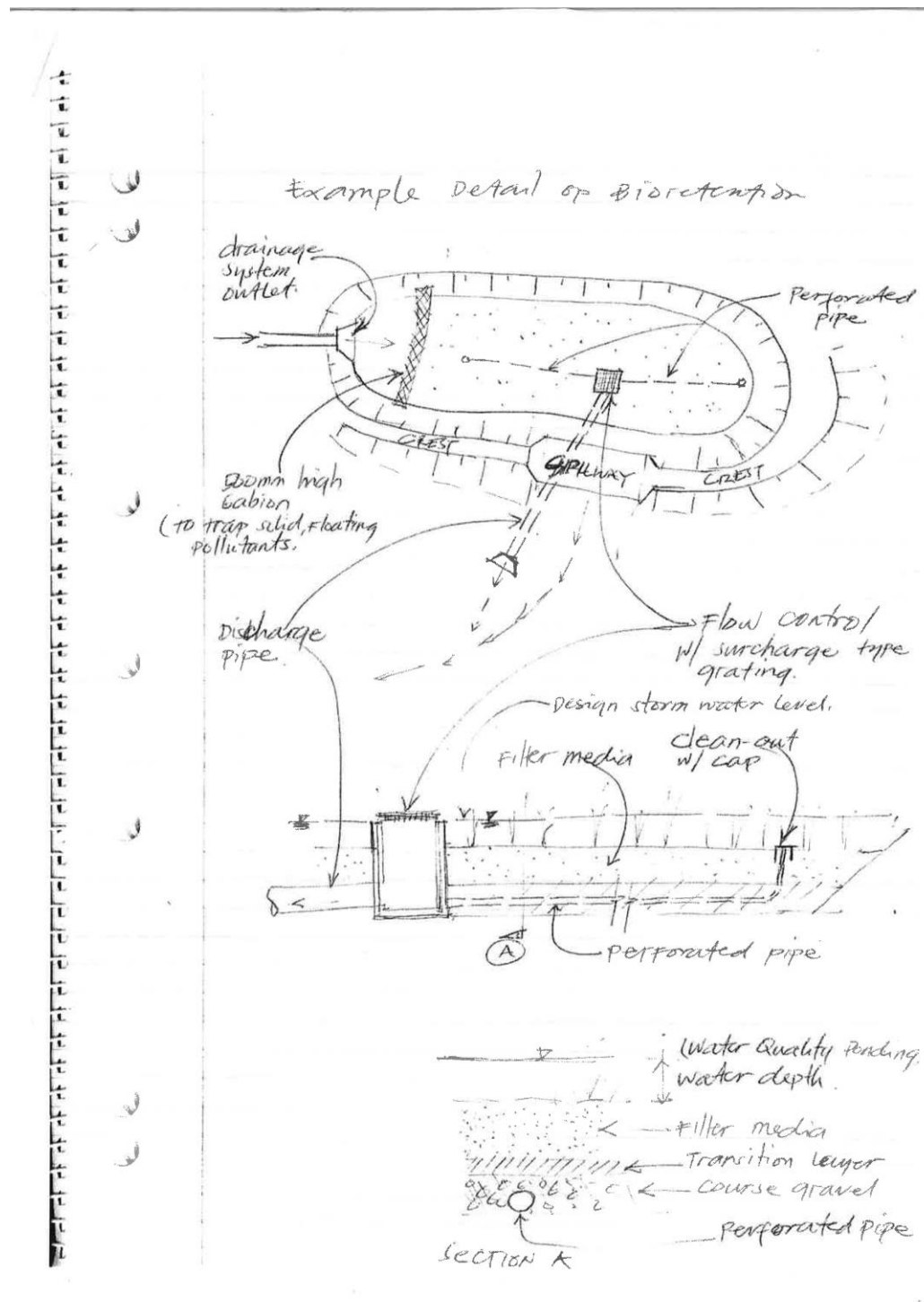


Figure 3: Bio Basin with Gross Pollution Trap

The above hand sketch (one of ours) shows a Bio Basin with adjoining/included GPT. These traps are effective as they are readily recognized/observed when cleaning is needed.

Implementation Strategy – Proposed (Ctd)

Lot 4 (the school) has some minor earthworks. However, any future DA to council for those works will carry with it actions required to satisfy ESC performance standards. The fill for the proposed carpark at the south west corner will have similar requirements and will be covered in the Council DA process. The proposed Bio Basin will receive stormwater from this carpark.

2.3.3.2 Retaining walls

The flood study by Advisian indicates the possibility of a retaining wall at the south east corner of Lot 2 – the old church site. (Refer to Advisian Report).

The wall, if constructed, will be about 0.8 – 1.0m high. It will not be part of the streetscape, and will overlook retained bushland and low lying land. The reason for it's inclusion is to open out a waterway to reduce backflow velocities, to match (or retain) Council's limits.

Construction material will be permanent, as the wall, if used, is to restrain fill for the site. A future DA to Council can satisfy these requirements.

2.3.3.4 & 2.3.3.5 Environmental Buffers are discussed in the Environmental Report of DarkHeart/Jason Berrigan to accompany the Rezoning Application, and will not be discussed here.

2.3.3.6 – Waterways

Lot 2 – Old Church Site - Gantons Pty Ltd

The site can be classified as follows:

1. Green field or natural bush
2. Carpark or hardstand
3. Building areas

We submit:

1. Run-off from greenfield or bushland will travel unhindered. There will be no attempt to reduce (detention structures) or re-direct (channels etc) discharge.
2. Run-off from the existing carpark will remain unchanged.

Run-off from the proposed carpark and hardstand (storage) areas will be directed by concrete kerbs into kerb inlet pits. The concrete kerb will border all carparks/hardstand against the top of batter (or retaining wall), thus protecting the batter from receiving overland flow.

Implementation Strategy – Proposed (Ctd)

The run-off is controlled to a pit, then either to a detention structure underground to maintain pre-development discharge, or to the Bio-Retention Basin (Bio Basin). This Bio basin treats the water through a filtration media and can provide stormflow detention. (Refer Figure 4). Gross pollutants will be trapped in pits or as part of the Bio-retention structure. (These traps are seen as part of the Bio Retention Basin in Figures 2 & 3). The overall management is seen in Figure 5.

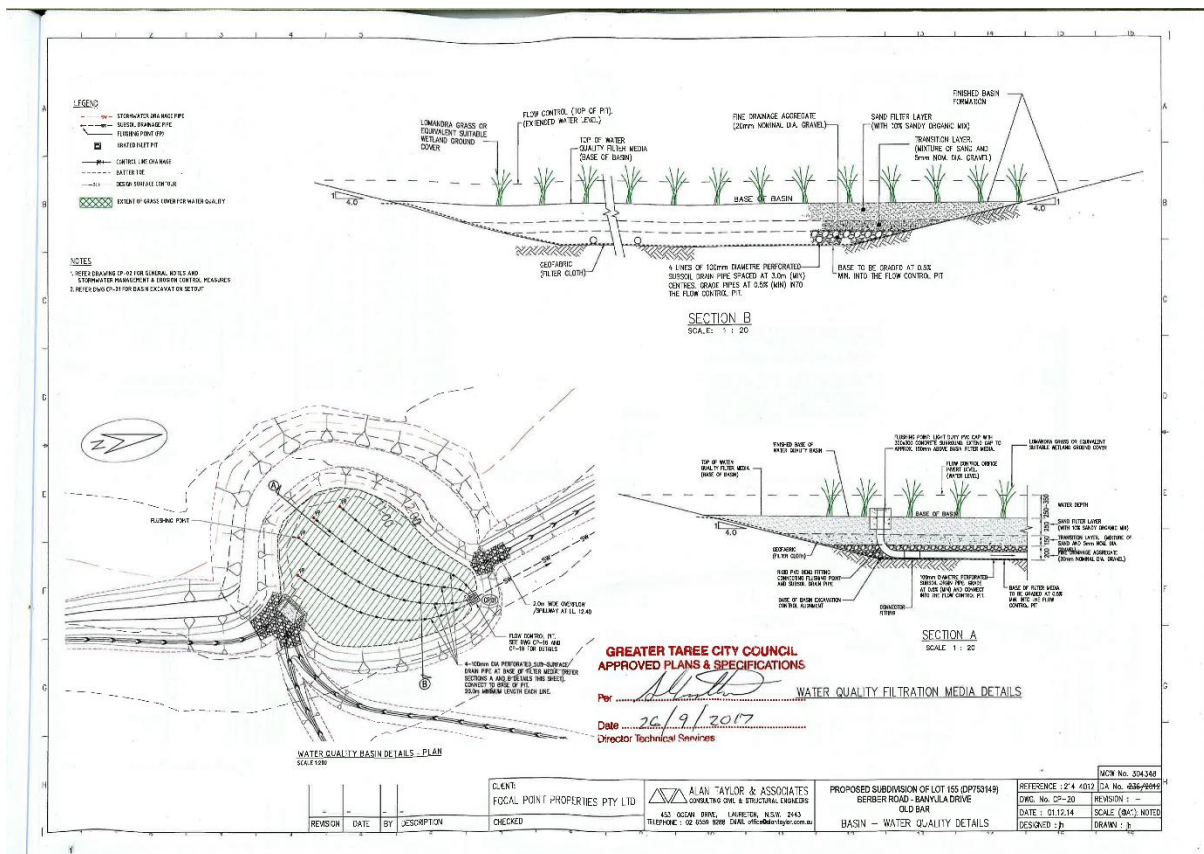


Figure 4: Bio Basin for 3 Ha Residential Catchment

The basin in the above example treats a residential catchment of some 3 hectares, whereas the hardstand site catchment for Lot 2 (and the proposed carpark for Lot 4) is approximately 1.5 hectares. (Refer Stormwater Management Site Plan – Figure 5) The area set aside for the Bio-retention basin on this re-zoning application is about 600m². The typical basin shown above is about 350m².

In summary, the Bio-retention basin area proposed is nearly double in size to a recently designed basin (see Figure 4), and caters for half the catchment. It is our opinion that the area proposed/set aside for the basin on Lot 2 & Lot 4 will be adequate for the developments purposes and can be final designed at the DA or CC stage for any proposed development.

Implementation Strategy – Proposed (Ctd)

After the basin, the flow will then slowly make its way via a broad crested weir to the vegetation corridor at the south boundary of the lots. From there, the water flows in an existing natural sandy channel to the west towards low lying Crown land.

The basin is contained on both lots, Lot 2 & Lot 4, as they both have proposed works that require its services. Lot 4 (the school) will be smaller scale, and as such, less of the Bio Basin is positioned within its boundary. A maintenance agreement will be established between the parties for the ongoing performance.

3. Buildings – roof water will be collected in above-ground water detention tanks. (Refer Stormwater Management Plan – Figure 5) The discharge is then reduced to pre-development flows before the water leaves the building footprint.

It can then be decided at DA stage whether the water is run through the bio-retention basin or, after velocities are reduced by a scour protection basin or weir, it makes its way to the south boundary. The south boundary has a well defined sand based overland flow channel making its way to the west, to join low lying Crown land.

This overland flow path will have “retained vegetation” which is dealt with in more detail by the environmental report of Darkheart. (Berrigan). Stormwater has been flowing in this channel for many years, draining both these sites and the subdivision to the south.

Lot 4 – Heritage Christian School

The site can be classified as follows:

1. Green field or natural bush
2. Carpark or hardstand
3. Building areas

We submit:

1. Run-off from greenfield or bushland will travel unhindered. There will be no attempt to reduce (detention structures) or re-direct (channels etc) discharge.
2. Runoff from the existing carpark will be unchanged.

The proposed carpark will be dealt with in the same way as Lot 2's carpark/storage hardstand, in collaboration with Lot 2. The Bio-retention basin will overlap both sites and a maintenance agreement established between the parties.

Implementation Strategy – Proposed (Ctd)

- Buildings. The building work for Lot 4 is a combination of extensions and new structures. To reduce peak discharge, above ground water detention tanks can be installed at each building location. (Refer Stormwater Management Plan – Figure 5) The discharge is then reduced before the water leaves the building footprint.

Scour and velocity protection will be provided at all roof downpipe/drainage outlets, with a rubble outlet adequate in size to disperse flow and reduce velocity to ensure the receiving bushland is not damaged. Council's ASD 600 series details provide guidance on suitable structures.

The existing roofwater outlets discharge into the bush, penetrating the bush by some 3-5m. This practice may be followed in the future DA proposal, or a scour/velocity structure may be established in the cleared “parkland” area before broad overland flow is resumed to the bush to the west.

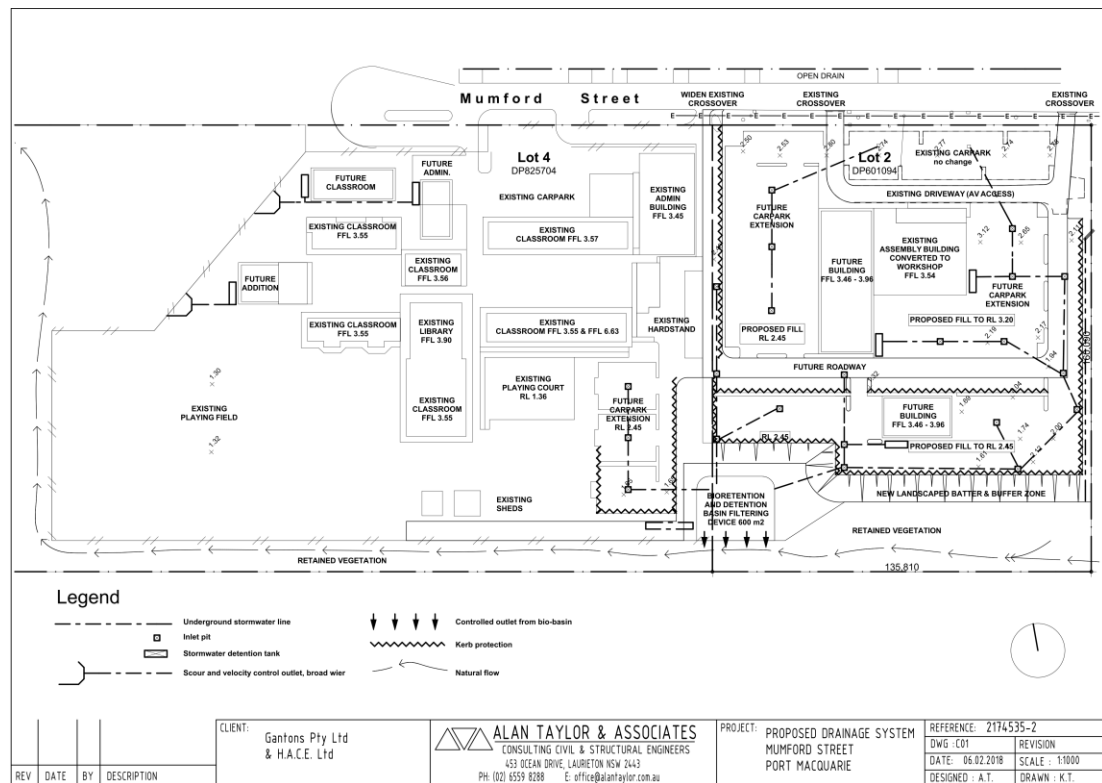


Figure 5: Stormwater Management Site Plan

No other environmental protection measures are proposed.

Servicing and Infrastructure

The intent of the future site applications remains clear.

Both properties are currently serviced by electricity, roads, sewer, water reticulation and data. Any future development, the subject of a Development Application, will recognize and agree with the need for (if required) the amplification of any infrastructure at the developer's cost. Also, contributions to Council for the upgrade of infrastructure due to the increased demands of the development will be addressed.

We trust the information in this report meets your requirements. Should you have any questions, please contact Alan Taylor at the office.

Yours faithfully
Alan Taylor & Associates

A handwritten signature in black ink, appearing to read 'A Taylor', written in a cursive style.

Alan Taylor