Amity College

C/- Gran Associates

Integrated Water Management Plan:

Lots 1 and 2 DP 525996, 85 Byron Road and 63 Ingleburn Road, Leppington, NSW

P1806493JR01V05

April 2020

Limitations Statement

The sole purpose of this report and the associated services performed by Martens & Associates Pty Ltd is to prepare a Stormwater Management Report in accordance with the scope of services set out in the contract / quotation between Martens & Associates Pty Ltd and Amity College (hereafter known as the Client). That scope of works and services were defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

Martens & Associates Pty Ltd derived the data in this report primarily from a number of sources which may include for example site inspections, correspondence regarding the proposal, examination of records in the public domain, interviews with individuals with information about the site or the project, and field explorations conducted on the dates indicated. The passage of time, manifestation of latent conditions or impacts of future events may require further examination / exploration of the site and subsequent data analyses, together with a re-evaluation of the findings, observations and conclusions expressed in this report.

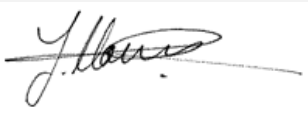
In preparing this report, Martens & Associates Pty Ltd may have relied upon and presumed accurate certain information (or absence thereof) relative to the site. Except as otherwise stated in the report, Martens & Associates Pty Ltd has not attempted to verify the accuracy of completeness of any such information (including for example survey data supplied by others).

The findings, observations and conclusions expressed by Martens & Associates Pty Ltd in this report are not, and should not be considered an opinion concerning the completeness and accuracy of information supplied by others. No warranty or guarantee, whether express or implied, is made with respect to the data reported or to the findings, observations and conclusions expressed in this report. Further, such data, findings and conclusions are based solely upon site conditions, information and drawings supplied by the Client *etc*. in existence at the time of the investigation.

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between Martens & Associates Pty Ltd and the Client. Martens & Associates Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

Head Office
Suite 201, 20 George Street
Hornsby, NSW 2077, Australia
ACN 070 240 890 ABN 85 070 240 890
Phone: +61-2-9476-9999
Fax: +61-2-9476-8767
Email: mail@martens.com.au
Web: www.martens.com.au

Document and Distribution Status

Author(s)	Reviewer(s)	Project Manager	Signature
Erica Zhu, Paul Dinh	Terry Harvey	Terry Harvey	

Revision No.	Description	Status	Release Date	Document Location			
				File Copy	Gran Associates		
1	For client review	Draft	02/07/2019	1E,1P	1P		
2	For submission	Final	16/07/2019	1E,1P	1P		
3	For submission	Final	15/11/2019	1E,1P	1P		
4	For submission	Final	04/12/2019	1E,1P	1P		
5	For submission	Final	24/04/2020	1E,1P	1P		

Distribution Types: F = Fax, H = hard copy, P = PDF document, E = Other electronic format. Digits indicate number of document copies.

All enquiries regarding this project are to be directed to the Project Manager.

Contents

1 Introduction

1.1 Overview

This stormwater management report has been prepared by Martens & Associates Pty Ltd (MA) to support a state significant development application (SSDA) for a proposed school at 85 Byron Road and 63 Ingleburn Road, Leppington, NSW (the 'site').

The school is proposed to be developed in 8 stages. The stormwater management report is designed to be compatible with this staged approach and should be read in conjunction with MA planset P1806493-PS01.

1.2 Project Scope and Aims

This report provides the following:

- Evidence of compliance with Secretary's Environmental Assessment Requirements (SEARs) SSD 9227 as they relate to stormwater management;
- Water quality assessment modelling and results using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) in accordance with Camden City Council Engineering Design Specification (2009).
- Drainage system concept design to cater for the minor system by way of pit and pipe and major system by way of pit and pipe and overflow paths.
- Documentation of water quantity requirements for the development in accordance with SEARs.
- Flooding assessment.
- Sediment and erosion control.
- Water assessment.
- Wastewater assessment.
- Groundwater assessment.

1.3 Relevant Planning Controls and Design Principles

The following planning and engineering controls and design principles have been considered:

- Camden City Council (CCC) (2009) – *Engineering Design Specification.*
- Camden City Council (CCC) (2013) – *Local Environmental Plan.*
- Camden City Council (CCC) (2015) – *Camden Growth Centre Precincts Development Control Plan.*
- Greater Sydney Local Land Services (GSLLS) (2015)– *NSW MUSIC Modelling Guidelines*.
- NSW Office of Environment & Heritage (NSW OEH) (2013) – *Guidelines for Development Adjoining Land and Water Managed by DECCW*.
- Parsons Brinckerhoff (2014) – Leppington Precinct Water Cycle Management Strategy.

2 Site Description

2.1 Location and existing land use

The site is approximately 2.3 ha per the Total Survey Solutions Plan no 191149-1, and located over Lots 1 and 2 DP 525996, 85 Byron Road and 63 Ingleburn Road, Leppington, NSW within the CCC Local Government Area (LGA). The rural site is predominantly open grasslands. The site is zoned SP2 -Infrastructure and R3 – Medium Density Residential.

The surrounding land uses are primarily rural and rural residential. Camden Valley Way is located approximately 550 m to the south-east.

2.2 Topography and Hydrology

Site elevation is approximately 93.75 m AHD to the site's north western boundary at the existing drainage depression, sloping up to 102.5 m AHD near the southern. There is a ridge running from the southeast to the northwest through the centre of the site. Existing site drainage is generally via overland flow paths to a natural drainage depression at the north eastern boundary for land west of the ridge, and to the northern corner of the lot for land east of the ridge.

3 Stormwater Quality Assessment

3.1 Water Quality Objective

CCC has provided the treatment objectives for pollutants in Council's Engineering Design Specification (2009). The following water quality objectives are to be achieved by the development when comparing the developed site with and without integration of water quality treatment measures:

- 85% reduction in total suspended solids (TSS).
- 65% reduction in total phosphorus (TP).
- 45% reduction in total nitrogen (TN).
- 90% reduction in gross pollutants (GP).
- The post development duration of stream forming flows shall be no greater than 5 times the pre developed duration of stream forming flows with a stretch target of 1.

3.2 Modelling Methodology

3.2.1 Overview

Model for Urban Stormwater Improvement Conceptualisation (*MUSIC*, Version 6.3) was used to evaluate treatment train effectiveness (TTE) and the Stream Erosion Index (SEI).

Modelling has been undertaken in accordance with Camden City Council requirements (MUSIC-link) and GSLLS (2015) guidelines with the developed site based on the proposed design for both stage 1 and the ultimate stage, including water quality treatment devices required to achieve adopted water quality objectives.

The MUSIC model layouts are provided in MA planset P1806493PS01-E700, E710 and E711.

3.2.2 Approach

An iterative approach was used to determine appropriate types, sizes and locations of stormwater treatment devices required to satisfy the adopted water quality objectives.

The MUSIC model includes all areas that are disturbed by the proposed development or drain to a treatment device. All other areas (i.e. where no development is proposed) have been excluded from the model.

3.2.3 Climate Data

MUSIC was run on a 6-minute timestep using the MUSIC-link function for Camden City Council data obtained from *ewater*.

3.2.4 Input Parameters

Input parameters for source and treatment nodes have been obtained via the MUSIC-link function for Camden City Council and are provided in MUSIC models P1806493MUS02V03 (stage 1) and P1806493MUS01V04 (ultimate stage).

3.2.5 Catchment Areas

Catchment delineation and impervious fractions are based on the proposed development and concept grading works. Refer to MA planset P1806493PS01-E700, E710 and E711 for catchment boundaries.

3.3 Water Sensitive Urban Design Measures

Water sensitive urban design (WSUD) measures are required to satisfy the water quality objectives in Section 3.1 in accordance with Council's Engineering Design Specification (2009) and Leppington Precinct Water Cycle Management Strategy (2014).

The stormwater treatment strategy for the site uses combination of 'at - source' and 'end - of - line' controls to ensure treatment objectives are satisfied. Individual WSUD measures are outlined in the following sections.

3.3.1 *Stage 1*

3.3.1.1 Swale

A vegetated swale has been proposed to provide conveyance of stormwater flows and some stormwater treatment. Swale locations proposed for treating stormwater quality are shown in MA planset P1806493PS01-E101.

Final sizing of all swales shall be confirmed at detailed design stage.

3.3.1.2 Stormwater360: Enviropod

Four Enviropods are proposed to treat gross pollutants in stormwater. The modelled treatment efficiency of the Enviropod is based on the manufacturer's specifications.

The location of the Enviropods shown on MA planset P1806493PS01-E101.

3.3.1.3 Stormwater360: Stormfilter Chamber

Stormfilter devices provide a reduction in nutrient pollutant loads through propriety media filtration. The following was included in modelling:

2 independent stormfilter chambers are proposed. Each with the following properties:

- Tank surface area: 2.2 m^2 (inclusive of cartridges)
- No. of cartridges: 2 x PSorb cartridges
- High flow bypass: 0.0018 L/s

3.3.2 *Ultimate Stage*

3.3.2.1 Rainwater Tank

Runoff from designated roof areas will be connected to one of seven rainwater tanks for reuse. The collected water will be reused for landscape irrigation. The following was modelled:

- 7 x 10 kL rainwater tank; four located next to the primary hall and three next to the secondary hall.
- An average internal daily reuse rate of 1 kL/day was applied.
- An annual external reuse rate of 450 kL/year (0.4 kL/m^2/year) was applied and scaled by potential evapotranspiration variations.

3.3.2.2 Stormwater360: Enviropod

Only certain areas which are nominated in MA planset P1806493PS01-E710 will be diverted to Enviropods to capture gross pollutants. The modelled treatment efficiency of the Enviropod is based on the manufacturer's specifications.

The location of the Enviropod is shown on MA planset P1806493PS01-E100.

3.3.2.3 Stormwater360: Stormfilter Chamber

Stormwater runoff from the areas nominated in MA planset P1806493PS01-E710 will be treated by stormfilter devices. The following was included in modelling:

Two stormfilter chambers located in the OSD tank with the following combined properties:

- Tank surface area: 18.7 m^2 (inclusive of cartridges)
- No. of cartridges: 25 x PSorb cartridges
- High flow bypass: 0.0225 L/s

1 stormfilter chamber housed in a standalone tank:

- Tank surface area: 2.2 m^2 (inclusive of cartridges)
- No. of cartridges: 2 x PSorb cartridges
- High flow bypass: 0.0018 L/s

3.3.2.4 Bioretention Basins

Stormwater runoff from areas nominated in MA planset P1806493PS01-E710 shall be conveyed by way of pit and pipe to either of two bioretention basins. The bioretention basins provide treatment through filtration, evapotranspiration and detention. The bioretention systems were modelled in accordance with the below parameters and are subject to detailed design:

- Extended detention depth: 0.3 m
- Filter area: 20 m^2 for the total site, basins shown in planset P1806493PS01-E100.
- Filter depth: 0.50 m.
- Saturated Hydraulic Conductivity: 100 mm/hr.
- Total Nitrogen Content: 750mg/kg

- Total Orthophosphate Content: 40 mg/kg

3.4 MUSIC Results

MUSIC modelling results for stage 1 (P1806493MUS02V03) and the ultimate stage (P1806493MUS01V04) are provided in Table 1 and Table 2.

Table 1: *MUSIC TTE results: stage 1.*

Parameter	Sources	Residual Load	Achieved Reduction	Required Reduction	Complies (Y/N)
TSS (kg/year)	532	70.8	86.7%	85%	Y
TP (kg/year)	1.09	0.362	66.9%	65%	Y
TN (kg/year)	7.08	3.9	45%	45%	Y
Gross Pollutants (kg/year)	56.7	1.17	97.9%	90%	Y

Table 2: *MUSIC results: ultimate stage.*

Parameter	Sources	Residual Load	Achieved Reduction	Required Reduction	Complies (Y/N)
TSS (kg/year)	1740	255	85.3%	85%	Y
TP (kg/year)	4.17	1.46	65%	65%	Y
TN (kg/year)	36.2	17.8	50.7%	45%	Y
Gross Pollutants (kg/year)	411	1.04	99.7%	90%	Y

3.5 SEI calculations and results

The probabilistic rational method was used to calculate the 1 in 2 years ARI pre-development flow outlined in GSLLS (2015) guidelines. The critical flow was calculated to be 0.042 m³/s (stage 1) and 0.12 m³/s (ultimate stage). This flow was then applied to a generic treatment node to transform flows less than critical flow to 0 m³/s and evaluate stream forming flows. Table 3 yields stream forming flows for pre-development and post development scenarios with an SEI value less than 5.

Table 3: MUSIC stream erosion index results.

Parameter	Pre Sources	Post Sources	SEI	Complies (Y/N)
SEI (ML/yr) Stage 1	3.25	2.83	0.87	Y
SEI (ML/yr) Ultimate Stage	39.6	115	2.90	Y

3.6 Conclusion

The modelling results indicate that the water quality objectives will be met by the proposed WSUD measures for both stage 1 and the ultimate

stage. The proposed management system is consistent with the principles of Water Sensitive Urban Design as the proposed treatment strategy utilises 'at - source' controls rather than relying solely on end - of - line structures. This approach is considered the most appropriate for the site and will provide an appropriate outcome for receiving environments.

4 Stormwater Quantity Assessment

4.1 Objectives

Water quantity objectives are to comply with CCC Engineering Design Specification (2009). Site stormwater management has been designed to comply with the objectives of CCC Engineering Design Specification (2009) as follows:

- Drainage system to carry all flows during minor storm events, up to the 5 year ARI event, by way of pit and pipe.
- Drainage system to carry all flows during major storm events, up to the 100 year ARI event, by way of pit and pipe and overland flow.
- Providing stormwater quantity devices outlets outside of preliminary 1% AEP flood extent so as to not be drowned outlets.

4.2 Overview

The DRAINS software package (version 2019.091 – 5 December 2019) was used with the ILSAX hydrological engine to satisfy the OSD criteria nominated in Section 4.1. A conceptual pit and pipe network is provided in MA planset P1806493PS01 drawings E100, E101 & E110 with hydraulic analysis to be completed at detailed design stage.

4.3 Modelling Methodology

Parameters used in the model are consistent with *Australian Rainfall and Runoff (AR&R)* 1987 procedure. Modelling assumptions are derived from the following sources:

- Intensity Frequency Duration (IFD) coefficients were based on the Institution of Engineers *AR&R* (1987).
- ILSAX parameters for all catchments were based on Council's Engineering Design Specifications (2009) as shown in Table 4.
- Catchment delineation was developed using site survey data, LIDAR data and the proposed drainage system. Layouts and tables of the catchment assessments have been provided in MA planset P1806493PS01 drawings E610 and E611.

- Post-development catchment impervious areas were determined based on development layout design.

Table 4: ILSAX hydrology details used in DRAINS modelling.

Parameter	Element	Value
ILSAX parameters [1]	Impervious area depression storage (mm)	1.0
	Supplementary area depression storage (mm)	1.0
	Grassed area depression storage (mm)	5.0
	Soil type	3

Notes

1. Camden City Council's Engineering Design Specifications.

4.4 Site Drainage

The proposed concept pit and pipe network for the ultimate stage and stage 1 is provided in MA planset P1806493PS01-E100 and P1806493PS01-E101, and uses the following system to manage runoff:

- Development run-off shall be captured by the proposed pit and pipe network and conveyed to a water quality treatment or OSD system prior to discharging offsite.

- Hydraulic modelling shall be completed at detailed design stage to comply with Camden City Council Engineering Design Specifications (2009) and AS 3500.3.

4.5 OSD

OSD storage has been designed for the proposed development to satisfy the objectives in Section 4.1. Further details for OSD for Stages 1-4 and the ultimate stage are provided in MA planset P1806493PS01 E610 and E611 with a summary of key components provided in Table 5 and Table 6.

Table 5: Summary of OSD basin for stage 1-4.

Volume (m^3)	Primary orifice (mm)	Primary Orifice Centre Elevation (mAHD)	Primary Weir (mAHD)	Primary Weir Crest Length (m)
510	200	94.40	95.50	20

Table 6: Summary of OSD tank for ultimate stage.

Volume (m^3)	Primary orifice (mm)	Primary Orifice Centre Elevation (mAHD)	Primary Weir (mAHD)	Primary Weir Crest Length (m)
630	170	94.59	96.33	3.6

4.6 DRAINS Results

A summary of the critical storm runoff results from DRAINS models (P1806493DRN01V08 {ultimate design} & P1806493DRN01V09 {stages 1-4}) for the 2, 5, 10, 20, 50 and 100 year ARI storm events are provided in Table 7 and Table 8 and MA planset P1806493PS01-E610 and MA planset P1806493PS01-E611.

Table 7: Summary of OSD results for stage 1-4.

Storm Event	Pre Development Peak flow (L/s)	Post Development Peak Flow (L/s)	Post < Pre
2	0.197	0.165	Yes
5	0.346	0.240	Yes
10	0.421	0.276	Yes
20	0.532	0.324	Yes
50	0.610	0.356	Yes
100	0.710	0.400	Yes

Table 8: Summary of OSD results for ultimate stage.

Storm Event	Pre Development Peak flow (L/s)	Post Development Peak Flow (L/s)	Post < Pre
2	0.197	0.194	Yes
5	0.346	0.252	Yes
10	0.421	0.284	Yes
20	0.532	0.328	Yes
50	0.610	0.417	Yes
100	0.710	0.658	Yes

4.7 Conclusion

The proposed drainage system has been designed to capture and convey site stormwater for stage 1 and the ultimate stage. Hydraulic modelling shall be completed at detailed design stage to comply with Camden City Council Engineering Design Specification (2009) and AS 3500.3. The OSD and water quality (WSUD) elements have been designed to comply with the SEAR's requirements, with further details provided at the detailed design stage.

5 Flooding

The current site is partially affected by the 1% Annual Exceedance Probability (AEP) event as shown in Council's mapping in Camden Growth Centre Precincts DCP Schedule 5 – Leppington Priority Precinct (2015), also refer to MA planset P1806493PS01-E100. A compliance assessment demonstrates the development complies with Council's flood requirements, refer to Attachment A: Flood Report.

The proposed flood characteristics are expected to be consistent with the existing conditions, with a very minor loss of flood storage as a result of filling at the site. As the site is to be raised above the flood planning level and the PMF level, the developed site is not considered flood affected. Council's flood mapping suggest that the flood affectation is likely due to the downstream dam (likely to be filled as part of future development). The loss of flood storage is considered to be of immaterial significance as the development occurs on the outer extent of the flood fringe.

6 Erosion and Sediment Control Plan

6.1 Overview

This section details the erosion and sediment controls proposed for the construction phase of the works at the site. To eliminate the discharge of sediment from the site, temporary sediment and erosion controls are to be constructed prior to commencement of any work. The controls are to be installed in accordance with the Sediment and Erosion Control Plans prepared by MA and the requirements of Landcom (2004).

6.2 Sedimentation Basin

Based on the methods provided in the Blue Book, a 180m^3 sedimentation basin is required for the construction phase of the development. The OSD is proposed to be used as the temporary sedimentation basin. Refer to MA planset P1806493PS01-B305 for further details of the calculations.

6.3 Erosion and Sediment Control Measures

The following sediment and erosion control measures are proposed to prevent the pollutants generated from construction activities from adversely affecting the water quality of the receiving environment.

- Sediment fencing shall be used at the downslope end of the site for the duration of all earthworks.
- Proposed site clearance and bulk earthworks shall be undertaken following the implementation of site sediment control fences.
- Stormwater inlets shall be protected by geotextile sediment barriers at all times during work on site.
- All site stockpile areas shall have sediment fencing downslope of them.
- Stabilised site access is to be used at all times during the construction phase.
- Rock check dams is to be used within concentrated flow channels.

7 Water Management

The site's water supply comes from two sources: roofwater reuse and town water. Despite roofwater being captured and reused on site, town water is the main water supply for the site.

The site water management and reuse system is summarised as follows:

- Rainwater from the building roofs is to be collected and stored in rainwater tanks and used for outdoor irrigation.
- Town water will be used for amenities, potable uses and to supplement other supplies as required.

For more information on water supply to the site refer to Section 2 of the Infrastructure & Services Report prepared by Erbas.

We recommend that the following water conservation strategies to be investigated at detailed design stage to further reduce the site's town water demands:

- Use of smart water meters;
- Use of flow limited taps and showers;
- Use of drip irrigation; and
- Use of water efficient applications such as dual flushing toilet and waterless urinals.

8 Wastewater Management

The site will be connected to Sydney Water sewer main in Ingleburn Road for sewage disposal. No onsite treatment, reuse or disposal is proposed. The connection will require extension of the sewer main in accordance with the Infrastructure & Services Report prepared by Erbas.

We recommend that the following wastewater load reduction strategies to be investigated at detailed design stage:

- Graywater reuse;
- Use of water efficient applications which contribute to wastewater loads.

9 Groundwater Assessment

The Geotechnical and Salinity Investigation Report prepared by GeoEnviro Consultancy indicates that all boreholes were dry during and shortly after completion of drilling. Therefore, regular encounters with groundwater during construction are not expected.

10 Water Cycle Management Strategy Compliance Checklist

Water cycle management strategy to be used for the development are provided in Table 9.

Table 9: Water Cycle Management Strategy Compliance Checklist (Parson Brinckerhoff, 2014)

Water Cycle Management Objectives	Section of Report	Compliance (Y/N)
1. Stormwater Quantity		
1) Harvest rainwater from roof areas for non-potable internal and external demands.	Section 3.3.2.1	Y
2) Harvest stormwater to reduce the demand for potable water for nonpotable demands as much as possible.	-	N
3) Minimise changes in hydraulic regime to protect stability of waterways and ecosystems within waterways in accordance with requirements for erosion control ratio in the Camden Growth Centres DCP.	Section 4.6	Y
4) Adopt best practice erosion and sediment control techniques during construction.	Section 6	Y
2. Stormwater Quality		
1) Reduce load of urban stormwater pollutants from site to best practice criteria.	Sections 3.4	Y
2) Adopt WSUD elements in the stormwater management system to protect and enhance natural water systems, to reduce stormwater runoff and peak flows, to meet water quality objectives through quality improvement measures.	Section 3.3, 3.4 & 3.5	Y
3. Water Supply		
1) Provide a safe and reliable supply of water.	Section 7	Y
2) Minimise potable water consumption by limiting potable water supply to demands that require potable water.	Sections 3.3.2.1 & 7	Y
3) Maximise re-use of stormwater in urban areas	Section 7	Y
4) Encourage the use of recycled water for non-contact uses.	Section 8	Y
4. Wastewater		
1) Provide appropriate wastewater collection and conveyance system in accordance with Sydney Water Corporation strategy and receiving environment.	Section 8	Y
2) Minimise the generation of wastewater.	Section 8	Y
5. Groundwater		
1) Minimise the impacts of development to groundwater quality and quantity.	Section 9	Y

Water Cycle Management Objectives	Section of Report	Compliance (Y/N)
2) Maintain or restore hydrological regimes to specific groundwater dependant ecosystems.	Section 9	Y
3) To manage and mitigate the impacts of salinity on existing and proposed infrastructure and vegetation.	Section 9	Y
4) Reduce any increase in salt loads to existing watercourses, to prevent degradation of the existing soil and groundwater environment.	Section 9	Y
6. Flooding		
Attenuate stormwater runoff up to the 1% AEP event.	Section 5	Y
Maintain safe flood conveyance through the site for events greater than the 1% AEP.	Section 5	Y
7. Riparian Corridors	-	-
1) Maintain riparian buffer between development and waterways.		
2) Rehabilitate degraded waterways.		
3) Minimise any changes to flow frequency and magnitude.		

11 References

Camden City Council (2009) – *Engineering Design Specification*.

Camden City Council (2013) – *Local Environmental Plan.*

Camden City Council (2015) – *Camden Growth Centre Precincts Development Control Plan.*

DRAINS (2019) – *DRAINS content menu.*

Erbas (2019) – Infrastructure & Services Report.

Greater Sydney Local Land Services (GSLLS) (2015) – *NSW MUSIC Modelling Guidelines*.

GeoEnviro Consultancy (2019) – Geotechnical and Salinity Investigation.Institution of Engineers, Australia (2006) – *Australian Rainfall and Runoff.*

Land and Property Information NSW (2016) – *SIX Maps Viewer.*

Martens & Associates (2019), *Flood Engineering Works for State Significant Development Applications: 85 Byron Road, Leppington, NSW.* (P1806493JC06).

Nearmaps Site Aerial (2017) – *Nearmaps.*

NSW Office of Environment & Heritage (NSW OEH) (2013) – *Guidelines for Development Adjoining Land and Water Managed by DECCW*.

Parsons Brinckerhoff (2014) – Leppington Precinct Water Cycle Management Strategy.

12 Attachment A – Flood Report