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WATER CYCLE MANAGEMENT PLAN

for

RESIDENTIAL DEVELOPMENT

at

26-30 MANN STREET, GOSFORD

Job No: SY202243
Revision: B
Date: 18/08/2021

	BY	DATE
Prepared	RS	18/08/21
Checked	DH	18/08/21
Admin	LE	18/08/21

1. INTRODUCTION

Northrop Consulting Engineers Pty Ltd has been engaged to undertake conceptual stormwater management design for the proposed residential development at 26-30 Mann St, Gosford. This report accompanies, and should be read in conjunction with, drawings SY202243 C1.1 to C4.2.

The purpose of this report is to summarise the proposed design solutions for the Water Cycle Management Plan for a Development Application submission to The Department of Planning, Industry and Environment. We note the information contained in this report is not intended to present detailed design solutions but rather provide solutions commensurate with a conceptual design suitable for Development Application assessment.

2. SITE DESCRIPTION

The subject site is bounded to the north and east by commercial buildings, to the south by vacant land from a previous school site and park land to the west. The site is near flat in topography, with levels ranging from RL2.9 to RL2.6 AHD.

Figure 1 shows an aerial image of the site reflecting its current state.

Figure 1: Aerial Image of Site Location

The site in its current state does not contain any existing structures.

3. PROPOSED DEVELOPMENT

The proposed development consists of a multi-story mixed use commercial and residential building with 3 levels of carparking, vehicle access from the existing access driveway from Baker Street.

The layout for the development can be seen within drawings SY202243 C1.1 to C4.2.

4. PROPOSED STORMWATER MANAGEMENT STRATEGY

4.1 GENERAL STRATEGY

The onsite stormwater management system has been designed to replicate the processes which would occur naturally on site. The proposed development will incorporate a number of devices and measures aimed at providing adequate and responsible management of stormwater runoff for minor and major storm events.

In line with Chapter 6.7 of Central Coast Council DCP 2013, the conceptual stormwater management strategy has considered the following items which will be discussed in the following sections of this report:

- Stormwater capture and disposal;
- Water conservation;
- Stormwater retention;
- Stormwater quality;
- Onsite detention;
- Local overland drainage;
- Flooding.

4.2 STORMWATER CAPTURE AND DISPOSAL

Concept stormwater management plans have been prepared for the proposed development and are appended to the rear of this report. The majority of the development area is of a suspended structure built form. The methods of stormwater capture and disposal are outlined below and are to be designed in accordance with AS3500.3 and Central Coast Council Engineering Guidelines:

- Runoff from the roof of the residential tower will be captured via a conventional roof drainage system. Once the roof runoff is captured, it will then be conveyed to the rainwater harvesting tank.
- The rainwater harvesting will have a high-level overflow to the stormwater system.
- Runoff from the balcony and podium areas will also be captured by conventional drainage systems and conveyed to the stormwater system on the south western side of the development, bypassing the rainwater tank.
- Runoff from the extension of the vehicular access road on the eastern side of the site will be captured and conveyed to a stormwater pump out pit. The captured runoff will then be pumped via a rising main to the stormwater system on the south western side of the development. In additional to the requirements of AS3500.3, the pump out pit is proposed to be equipped with a backup power source to operate in the event of a power outage.

- A stormwater system will be installed on the southern side of the development and will drain via gravity to the Baker St frontage. It is proposed to install a new drainage connection from the development site to the existing stormwater pit located on Baker Street.

4.3 WATER CONSERVATION

The water conservation objective for the proposed development is to reduce potable water demand by 40% using the provisions nominated within the BASIX report. In summary, it is proposed that the redevelopment will incorporate the following water saving measures:

- Using water efficient fixtures for shower heads, toilet cisterns, toilet taps and kitchen taps including undertaking regular maintenance of these fixtures;
- The use of water efficient dishwashers;
- Landscaping with plant species that require minimal watering and irrigation with appropriate systems to minimise water loss and evaporation. This includes native plant species, using mulch around garden beds, avoiding watering when it's windy, watering during the coolest parts of the day and using drip irrigation;
- Harvested rainwater from part of the roof is proposed to be collected and reused for hardstand washdown, carwash bay and irrigation of landscaping areas.

It is our opinion that the measures outlined above will provide adequate reduction in potable demand to meet the intent of the water conservation target. For detailed assessment of the proposed water conservation initiatives proposed for the development, refer to the project specific BASIX report.

4.4 RETENTION

The intent of water retention targets in Chapter 6.7 of DCP 2013 is to mimic the natural catchment hydrology from all development sites, in terms of:

- Quantity - the annual volume of stormwater reaching natural creeks and waterways;
- Rate - the peak flow rates leaving the site; and
- Response - the time it takes for rain to runoff the site.

Runoff from the roof will be captured and harvested in the rainwater tank located below the ground floor carpark. This process involves the collection, storage and re-use of rainwater from the roof areas of the development for internal and external uses.

The stormwater retention volume (SRV) has been determined in accordance with Section 6.7.7.2.4 of Chapter 6.7 of GCC DCP 2013. The SRV calculation is shown below:

$$SRV = 0.01 \times A \times (0.02 \times F)^2$$

where: SRV = *stormwater retention volume* (m^3)

A = *site area* (m^2)

F = *fraction impervious (%)*

$$= 0.01 \times 3314 \times (0.02 \times 77)^2$$

$$= 76m^3$$

The entire retention volume will be provided by a single 76kL rainwater tank.

Adequate draw down will be provided via reuse for hardstand washdown, car wash bay and irrigation of the landscape areas on the ground floor and level 4 podium.

4.5 STORMWATER QUALITY

In order to minimise any adverse impacts upon the ecology of downstream watercourses, stormwater treatment devices have been incorporated into the design of the development. The adopted stormwater quality targets were as specified in Central Coast Councils Engineering Guidelines and are summarised in Table 3:

Table 3 – Required Water Quality Reductions

Pollutant Criteria	Required Reduction Target (%)
Total Suspended Solids (TSS)	80
Total Phosphorous (TP)	45
Total Nitrogen (TN)	45
Gross Pollutants	90

The performance of the proposed stormwater management strategy was assessed against these targets using the conceptual design software MUSIC (Version 6). The MUSIC model was developed using parameters recommended in the document "NSW MUSIC Modelling Guidelines" (WBM, 2015) and Central Coast Council MUSIC Link.

The total catchment area was split into sub-catchments representing the areas draining to the different treatment devices. A schematic of the MUSIC model is provided in Figure 2.

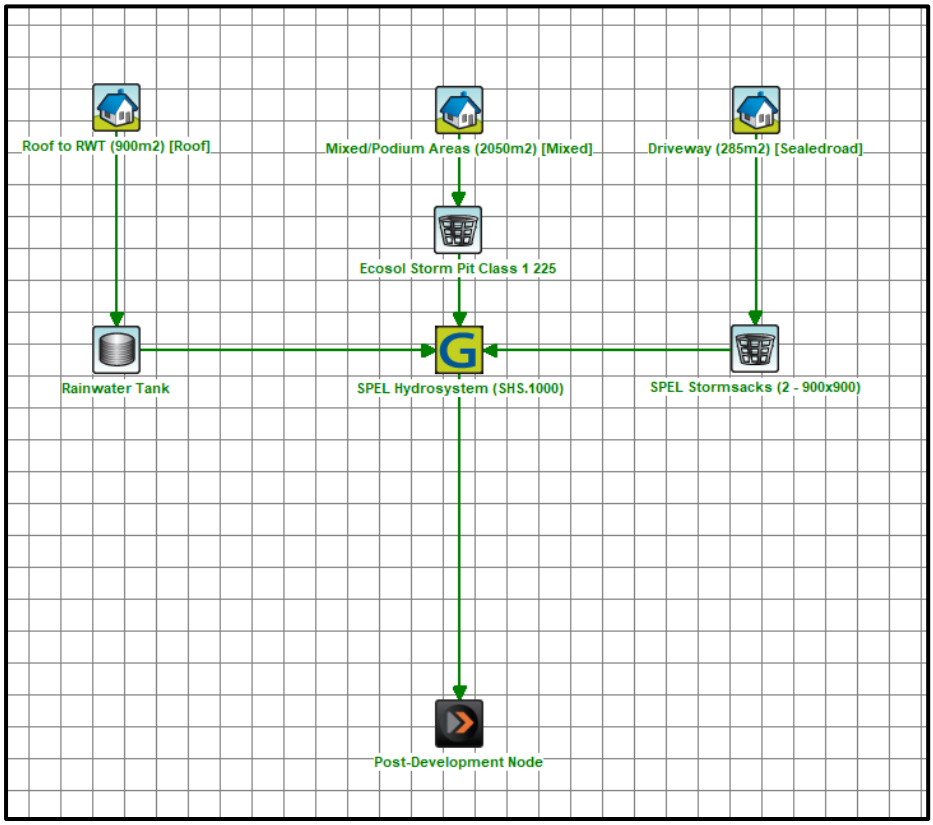

Figure 2 – MUSIC Model Schematic

A number of factors were identified in order to select the most appropriate stormwater quality improvement devices (SQUIDs). The proposed development footprint and usage was considered especially significant to this design which eliminated a number of effective treatment options. In addition to the practical constraints, maintenance, operability and aesthetics were considered.

The proposed treatment train incorporates:

- Primary treatment via a proprietary sediment trap and GPT devices, rainwater harvesting tank and proprietary pit filter inserts; and

- Secondary treatment via a proprietary SPEL Hydrosystem device.

The following is a summary of the water quality treatment devices that have been utilised in the proposed treatment train. The modelling parameters used can be found in the MUSIC Link report appended to the rear of this report.

- **Rainwater Harvesting Tank** – Runoff from roof areas is to be directed to a below-ground rainwater harvesting tank. The tank is to be fitted with a proprietary first-flush device which will effectively remove dead insects, bird and animal droppings and concentrated tannic acids from the stormwater system. The rainwater tank will also provide secondary treatment by acting as an initial sediment trap, collecting suspended solids and nutrients attached to those sediments. The volume collected in the harvesting tank is to be reused as described previously in this report.
- **SPEL Stormsack –** Pit filter inserts are proposed to provide primary treatment for the ground floor on grade carparking area. The filter inserts will prevent ingress of gross pollutants into the stormwater system.
- **SPEL Hydrosystem device** – Overflow from the rainwater tank and runoff from the podium areas will pass through a proprietary filter device which is designed to remove hydrocarbons, fine suspended solids and nutrients from entering downstream water ways.
- **Ecosol Storm Pit Type 1 device –** Runoff from the podium areas will pass through a proprietary device designed to capture gross pollutants and suspended solids.

Source node have been adopted from the NSW MUSIC Modelling Guideline (BMT WBM, 2010) along with Appendix D - Water Sensitive Urban Design – Concept Design Tools from the Central Coast Councils Civil Works Design Guidelines. Treatment nodes have been adopted from SPEL Environmental and Ecosol. The MUSIC modelling results for the above-mentioned treatment strategy are shown below in Table 4.

Table 4 – MUSIC Modelling Results

Pollutant Criteria	Reduction Target (%)	Sources (kg/yr)	Residual Load (kg/yr)	Achieved Reduction (%)
Total Suspended Solids (TSS)	80	391	58.4	85.1
Total Phosphorous (TP)	45	0.784	0.148	81.1
Total Nitrogen (TN)	45	6.37	2.42	62
Gross Pollutants	90	74.6	0.165	99.8

Note: The MUSIC model can be provided to Council upon request.

Table 4 shows that the proposed stormwater quality management strategy will achieve the required load reduction targets. A copy of the MUSIC Link report has been appended to the rear of this report.

4.6 ONSITE DETENTION

It is proposed the stormwater runoff from the development site to connect to the existing Council drainage network approximately 200m upstream of its outlet the Brisbane Water. Location of the site is within the lower extremities of the much larger upstream catchment. The peak discharge from the site will occur much sooner than the peak discharge from the upstream catchment. For this development, providing OSD will have negligible impact on reducing peak discharge in the stormwater system and as such is not proposed for this development.

4.7 LOCAL OVERLAND DRAINAGE

The subject site is not impacted by local overland drainage from upstream.

4.8 FLOODING

Central Coast Council has prepared detailed flood studies for the subject site area, including the Brisbane Water Foreshore Flood Risk Management Study (2013) and the Gosford CBD Local Overland Flow Flood Study (2013). The studies investigate the flood behaviour of the subject site and investigates both flooding as a result of local overland runoff as well as the Brisbane Water foreshore flooding. Both studies included consideration for the potential impacts of climate change, by assessing an increase to rainfall intensity as well as a rise in sea levels.

Upon review of these flood studies, it was concluded that the site was not impacted by local overland flow and as such will have no impact on the flood behaviour of this type of flood event. The flooding generated by the Brisbane Water foreshore flood event contains a volume of flood water that is several magnitudes higher than any potential fill or lost flood storage as a result from the proposed development, and as such it is considered that the development would have no measurable impact to the flood behaviour.

A number of flood requirements and planning controls are still required to satisfy the intent of the NSW Floodplain Development Manual (2005) and Central Coast Council's DCP Requirements. Central Coast Council has previously provided correspondence relating to the required Flood Planning Level for the development.

Central Coast Council – Sears DA Requirements – (19.07.20)

Central Coast Council provided advice in response to the SEARs request dated 19/07/20 which included a number of matters to be taken into consideration for the proposed masterplan. The following advice was provided in relation to flooding:

- *A minimum floor level of RL 3.0m AHD for all habitable areas including commercial areas.*
- *The crest in the existing/proposed access in the right of way to basement car parks is to be at RL 3.0m AHD. If the existing right of way does not achieve this level then flood gates to achieve a raised height of RL 3.0m AHD could be considered.*
- *Flood compatible materials are to be used below RL 3.0m AHD.*

Central Coast Council – Response to Preliminary Flood Assessment prepared by Northrop – (17.11.20)

The ground floor ought to be considered as part of the whole building for flood planning purpose, which in this case should mean that it has an 80-year design life. Separating the ground floor from the rest of the building is not only impractical from an approval's perspective, but it also places a burden on the property owner and the relative planning authority in 40 years' time to ensure that the ground floor is repurposed and the floor level raised. It is not even known whether such a renovation would be possible at that time.

For the reasons stated above, it is recommended that the flood planning level be set according to an 80-year design life.

- **Sea Level Rise**

Figure 3 presents the sea level rise projection adopted by Central Coast Council for the purposes of flood planning requirements.

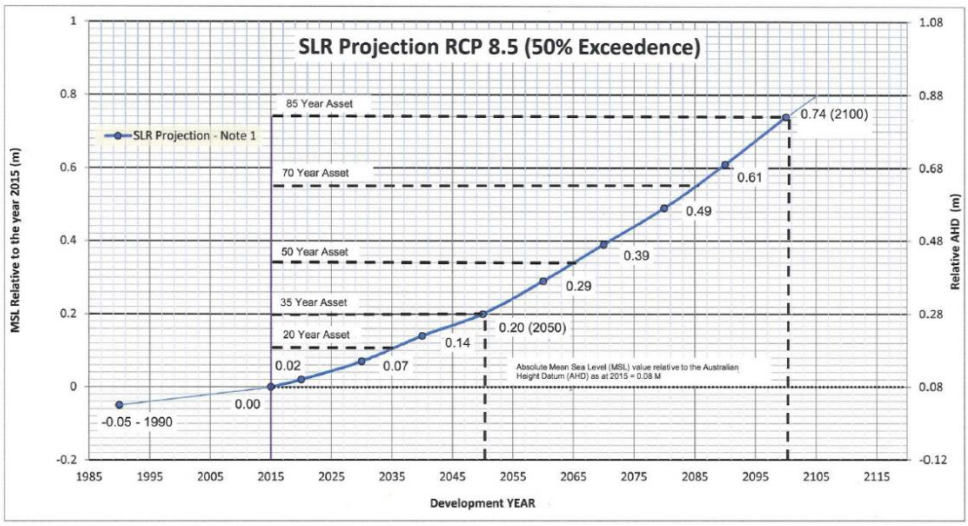

Figure 1- Sea Level Rise Projection RCP 8.5

[1] Extracted from Table 1 p26 Gosford City Council Sea Level Rise Benchmarks Discussion Paper Whitehead & Associates Environmental/Coastal Environment (Feb, 2015)
Intermediate values obtain Table 10 South Coast Regional Sea Level Rise Policy and Planning Framework – Whitehead & Associates Environmental/Coastal Environment (2014)

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Figure 3 – Sea Level Rise Projection – Central Coast Council Planning Requirements.

The amount of sea level rise adopted is dependent on the design life of the development. Thus, it can be observed that an increase to the design life of the development will result in an increase in the expected sea level rise.

Northrop originally questioned the reasoning or justification for the increased flood level between the Pre-DA advice and the SEARs response and it was advised by Council's Development Assessment Engineering Team that the increase was due to an increase in the sea level rise component of the Flood Planning Level, resulting from a reclassification of the expected design life of the development. The design life for the development was nominated as 80 years corresponding to a sea level rise of +0.76m, an increase from the previously advised +0.49m.

Based on the information presented above, the minimum floor level of the ground floor units is proposed to be RL 3.00m. It is also noted that the existing right of way does not achieve the required level, as the crest has been constructed at RL 2.71m AHD. As such, flood gates will be required to be installed to achieve flood protection to at least RL 3.00m AHD.

5. CONCLUSION

The proposed stormwater management design presented above has been prepared to comply with Central Coast DCP Chapter 6.7 as well as industry best practice. The design philosophy is based on the principle of at source treatment, to reduce conveyance infrastructure and manage water quantity and quality aspects.

At a concept level the system has been designed to cater for frequent and infrequent storm events.

Based on the above, our investigation and concept designs indicate the proposed development can adequately managed and address all items surrounding stormwater runoff. Should you have any queries, please feel free to contact the undersigned on (02) 4365 1668.

Robert Suckling
Civil Engineer

Daniel Holland
Civil Engineer

References:

Central Coast Council, Civil Works Design Guideline – Volume 1, August 2013

BMT WBM Pty Ltd, New South Wales MUSIC Modelling Guidelines, August 2015

Engineers Australia, Australian Runoff Quality – A Guide to Water Sensitive Urban Design, 2006

Central Coast Council, Water Sensitive Urban Design – Technical Guideline No 3. – Device Selection Guide, November 2010.

Limitation Statement

Northrop Consulting Engineers Pty Ltd (Northrop) has been retained to prepare this report based on specific instructions, scope of work and purpose pursuant to a contract with its client. It has been prepared in accordance with the usual care and thoroughness of the consulting profession for the use by St Hilliers. The report is based on generally accepted practices and standards applicable to the scope of work at the time it was prepared. No other warranty, express or implied, is made as to the professional advice included in this report.

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APPENDIX A – SUPPLEMENTARY INFORMATION

- MUSIC Link Report
- Concept Engineering Plans

MUSIC-*link* Report

Project Details		Company Details	
Project:	SY292243	**Company:**	Northrop Engineering
Report Export Date:	19/03/2021	**Contact:**	
Catchment Name:	SY202243_DA	**Address:**	26-30 Mann St Gosford
Catchment Area:	0.323ha	**Phone:**	
Impervious Area*:	68.26%	**Email:**	
Rainfall Station:	66062 SYDNEY		
Modelling Time-step:	6 Minutes		
Modelling Period:	1/01/1974 - 31/12/1993 11:54:00 PM		
Mean Annual Rainfall:	1297mm		
Evapotranspiration:	1261mm		
MUSIC Version:	6.2.1		
MUSIC-link data Version:	6.22		
Study Area:	Lowland		
Scenario:	Wyong Development		

* takes into account area from all source nodes that link to the chosen reporting node, excluding Import Data Nodes

Treatment Train Effectiveness

Node: Post-Development Node	Reduction
Flow	22.2%
TSS	85.5%
TP	80.9%
TN	62%
GP	99.8%

Treatment Nodes

Node Type	Number
Rain Water Tank Node	1
Generic Node	1
GPT Node	2

Source Nodes

Node Type	Number
Urban Source Node	3

Comments

Passing Parameters

Node Type	Node Name	Parameter	Min	Max	Actual
GPT	Ecosol Storm Pit Class 1 225	Hi-flow bypass rate (cum/sec)	None	99	0.014
GPT	SPEL Stormsacks (2 - 900x900)	Hi-flow bypass rate (cum/sec)	None	99	0.03
Post	Post-Development Node	% Load Reduction	None	None	22.2
Post	Post-Development Node	GP % Load Reduction	90	None	99.8
Post	Post-Development Node	TN % Load Reduction	45	None	62
Post	Post-Development Node	TP % Load Reduction	45	None	80.9
Post	Post-Development Node	TSS % Load Reduction	80	None	85.5
Urban	Driveway (285m2)	Baseflow Total Nitrogen Mean (log mg/L)	0.11	0.11	0.11
Urban	Driveway (285m2)	Baseflow Total Phosphorus Mean (log mg/L)	-0.85	-0.85	-0.85
Urban	Driveway (285m2)	Baseflow Total Suspended Solids Mean (log mg/L)	1.2	1.2	1.2
Urban	Driveway (285m2)	Stormflow Total Nitrogen Mean (log mg/L)	0.34	0.34	0.34
Urban	Driveway (285m2)	Stormflow Total Phosphorus Mean (log mg/L)	-0.3	-0.3	-0.3
Urban	Driveway (285m2)	Stormflow Total Suspended Solids Mean (log mg/L)	2.43	2.43	2.43
Urban	Mixed/Podium Areas (2050m2)	Baseflow Total Nitrogen Mean (log mg/L)	0.11	0.11	0.11
Urban	Mixed/Podium Areas (2050m2)	Baseflow Total Phosphorus Mean (log mg/L)	-0.85	-0.85	-0.85
Urban	Mixed/Podium Areas (2050m2)	Baseflow Total Suspended Solids Mean (log mg/L)	1.2	1.2	1.2
Urban	Mixed/Podium Areas (2050m2)	Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3
Urban	Mixed/Podium Areas (2050m2)	Stormflow Total Phosphorus Mean (log mg/L)	-0.6	-0.6	-0.6
Urban	Mixed/Podium Areas (2050m2)	Stormflow Total Suspended Solids Mean (log mg/L)	2.15	2.15	2.15
Urban	Roof to RWT (900m2)	Baseflow Total Nitrogen Mean (log mg/L)	0.32	0.32	0.32
Urban	Roof to RWT (900m2)	Baseflow Total Phosphorus Mean (log mg/L)	-0.82	-0.82	-0.82
Urban	Roof to RWT (900m2)	Baseflow Total Suspended Solids Mean (log mg/L)	1.1	1.1	1.1
Urban	Roof to RWT (900m2)	Stormflow Total Nitrogen Mean (log mg/L)	0.3	0.3	0.3
Urban	Roof to RWT (900m2)	Stormflow Total Phosphorus Mean (log mg/L)	-0.89	-0.89	-0.89
Urban	Roof to RWT (900m2)	Stormflow Total Suspended Solids Mean (log mg/L)	1.3	1.3	1.3

Only certain parameters are reported when they pass validation

APPENDIX B – SEARS REQUIREMENTS & RESPONSE

Requirement / comment	Response / where addressed.
Address the following flooding, stormwater and hydrology matters as per the Future Environment Assessment Requirements SSD Concept Approval SSD-10114 and requirements of the Bio Diversity and Conservation Division (BCD) of the Environment, Energy and Science (EES) branch of the Department Including: a) Assess and map the potential flooding impacts associated with the development and consider the relevant provision of the NSW Floodplain Development Manual (2005), including the Potential impacts of Climate Change, Sea Level Rise and Increase in Rainfall intensity	The subject site has already been assessed and is detailed in the Flood Studies prepared by Central Coast Council as Discussed in Section 4.8. The existing flood studies address the relevant provisions of the NSW Floodplain Development Manual and includes assessment of potential climate change impacts such as increasing rainfall intensity and sea level rise. A detailed review of the Flood Studies and a qualitative review of potential flood impacts concludes that the proposed development will have no significant flooding impacts.
b) Prepare a stormwater management report demonstrating how stormwater would be appropriately managed in accordance with Council's requirements	This has been addressed by Section 4 of this report.
c) Described flood assessment and modelling undertaken in determining the design flood levels for events, including a maximum of the 1 in 10 year, 1 in 100 year flood levels and the probable maximum flood, or an equivalent extreme event	Detailed flood assessment and modelling has been undertaken by Flood Studies prepared by Central Coast Council. More detailed information can be obtained in the Brisbane Water Foreshore Flood Study (2013) and the Gosford CBD Local Overland Flow Flood Study (2013).
d) Model the effect of the proposed development (including fill) on the flood behaviour under the following scenarios: Current flood behaviour for a range of design events as identified in 11 above. This includes the 1 in 200 and 1 in 500 year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change	As outlined in Section 4.8 of this report, the site is not impacted by overland flow flooding and is only impacted by the Brisbane Water foreshore Flooding (+Sea Level Rise). During the foreshore flooding event the volume of water inundation is order of magnitudes higher than the potential fill footprint for the development. As such a desktop review of the flood behaviour would yield that there would be very minor impacts, likely to be outside of a measurable range from modelling.
Modelling in the EIS must consider and document: a) The impact on existing flood behaviour for a full range of flood events including up to the probably maximum flood	See above comment. – No significant adverse impacts are anticipated.

Requirement / comment	Response / where addressed.
b) Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazards and hydraulic categories	See above comment. – No significant adverse impacts are anticipated.
c) Relevant provisions of the NSW Flood plain development manual	Planning controls are incorporated to the proposed development to meet the relevant provisions of the NSW Floodplain Development Manual & Council's DCP Requirements.
Assess the impacts on the proposed development on flood behaviour including: a) Any detrimental increases in potential flood affectation of other properties, assets and infrastructure.	See above comment. – No significant adverse impacts are anticipated.
b) Consistency with Council floodplain risk management plans	Information was obtained from Council Floodplain risk management plans & flood studies. Proposed development is consistent with the outcomes of the risk management plans.
c) Compatibility with the flood hazard of the land.	The nature of the proposed development is compatible with the flood hazard of the land, as the relevant planning requirements are met (i.e. minimum floor levels).
d) Compatibility with the hydraulic functions of flow conveyance in floodway's and storage in flood storage areas of the land.	Site is not impacted by flow conveyance of a floodway. No flood storage areas are utilised on the site and the loss of potential flood storage in the foreshore flooding event would be negligible.
e) Any adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.	Due to the location and nature of the flood behaviour identified by the two Council Flood Studies, it can be concluded that there will be no adverse impact to the floodplain environment or to adjacent or downstream areas.
f) Any direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses	Not Applicable for this development.

Requirement / comment	Response / where addressed.
g) Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the SES and Council	It is anticipated that any required flood emergency response will likely utilise a shelter in place arrangement, as the habitable spaces will be above any expected flood level, and the flood event relatively short. Details of the flood emergency response plan or flood evacuation plan will be provided during detailed design.
h) Emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the SES	See above comment.
i) Any impacts the development may have on the social and economic costs to the community as consequence of flooding.	No impact to the social or economic costs to the community is likely to occur as a consequence of flooding.
Assess water quality and hydrology impacts of the development, including: a) Water balance including quantity, quality and source	All water demand for the proposed development will be provided by either potable water, or rainwater reuse and waste water will be discharged to the authority sewer. There is minimal benefit to performing a detailed water balance assessment for the site. The stormwater runoff quality, quantity and source has been detailed in Section 4.5 of this report.
b) Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas	Not applicable for this development.
c) Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems	Not applicable for this development.

Requirement / comment	Response / where addressed.
d) Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge.	Not applicable for this development.
e) Changes to environmental water availability, both regulated/licensed and unregulated/rules based sources of such water	Not applicable for this development.
f) Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options	Management of stormwater and rainwater re-use options are outlined in Section 4 of this report. A soil and water management plan during construction has been provided in the concept engineering plans.
g) Identification of proposed monitoring of hydrological attributes	Not applicable for this development.
h) The assessment must specifically demonstrate that the development ill not adversely impact water quality in Brisbane Water in the vicinity of the inlet to Gosford Tidal Terrace during construction or operation	Sediment and erosion control measures are detailed on the concept engineering plans for effective management of stormwater quality for runoff that discharges to Brisbane Water. During operation, effective treatment devices will be implemented to treat stormwater runoff to acceptable standards in line with Council DCP requirements as outlined in Section 4.5 of this report.
The EIS must describe the potential effects of coastal processes and hazards (within the meaning of the Coastal Management Act 2016), including sea level rise and climate change: a) On the proposed development. b) Arising from the proposed development	Sea level rise from climate change has been addressed in the existing Flood Studies provided by Central Coast Council. This report discusses the relevant controls to be implemented with the development to address sea level rise and climate change.
The EIS/EA must consider have regard to any certified Coastal Management Program (or Coastal Zone Management Plan) and be consistent with the management objectives described in the Coastal Management Act 2016 and development controls for coastal management areas mapped under the State Environment Planning Policy (Coastal Management) 2018	The relevant Coastal Management Program for the site is the Coastal Zone Management Plan for Brisbane Water. The only identified remediation works is to upgrade the seawall along the edge of the Central Coast Highway to the southwest of the subject site. These works are not proposed for the subject site, and is otherwise consistent with the management objectives outlined in the management plan.