WATER CYCLE MANAGEMENT PLAN STRATEGY:

GOSFORD RSL REDEVELOPMENT

Project No.00011955

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Prepared for:
APP Corporation

Member of:
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Client: APP Corporation
Project: Gosford RSL Redevelopment
Project No: 00011955

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Contents

1. Background Information

This Water Cycle Management Plan Strategy (Strategy) accompanies the DA Civil Drawings developed by Lindsay Dynan Consulting Engineers Pty Ltd (LD), namely;

- 11955-DA-0001_A
- 11955-DA-0002_A
- 11955-DA-0003_A
- 11955-DA-0004_D
- 11955-DA-0005_D
- 11955-DA-0006_E
- 11955-DA-0007_B

As the site is currently a developed site it is considered to align with Section 10.3.2 of Council's Civil Works Specifications "Redevelopment of Existing Developed sites".

2. Site Context

The proposed development address is 2-20 Yallambee Avenue, West Gosford. The site is bordered along the northern extents by Central Coast Highway, west and south by Yallambee Avenue and Narara Creek along the eastern boundary. The lot comprises Gosford RSL Club and external carparking along the western portion, with Galaxy Motel in the north eastern corner. The site is accessed via Yallambee Avenue via three driveway access points, one located north of the current RSL building and two to the south. The location of the site is shown in Figure 1 below.

Figure 1 - Locality Map (Source: maps.six.nsw.gov.au, accessed 15/01/2018)

3. Proposed Development

The proposed development upon completion of all works will consist of a new Gosford RSL building with covered and uncovered parking, with the existing Galaxy Motel to remain as is. The staging of the development works to allow this to occur generally include:

- Construction of the proposed Gosford RSL building within the existing northern external car parking footprint, with limited connectivity to the existing building.
- Incorporation of undercover parking within the proposed Gosford RSL building footprint.
- Demolition of the current Gosford RSL building.
- Construction of external car parking within the footprint of the original Gosford RSL building, providing continuation of the current southern car parking allocation.
- Associated landscaping for the development.

4. Water Cycle Management Objectives

In accordance with the Central Coast Council Development Control Plan (DCP) 6.7 Section 6.7.6.3, the proposed development is classified as "Type 2 – Significant Development" as it comprises of an industrial/commercial developments that exceeds 2000m^2 of land.

In consideration of the above classification and in accordance with Section 10.3.2 of Councils Civil Works Specifications "Redevelopment of Existing Developed sites", we understand that the following considerations are to be addressed:

(i) On site detention to meet any increase in impervious areas
(ii) Stormwater retention measures to retain existing runoff losses
(iii) Stormwater quality devices to achieve the intent of Section 6.7.7.3 of DCP 6.7 where reduction in water quality is anticipated due to the development.
(iv) Ensure stormwater local overland drainage in accordance with Section 6.7.7.5 of DCP 6.7.
(v) Address flooding concerns, specifically those identified within the Narara Creek and Brisbane Waters flooding studies, noting Brisbane Water study prevails as per direction from CCC (Meeting Minutes dated 11.05.2017)

The design methods for meeting these objectives and rationalisation of proposed works are highlighted in the following chapters.

5. Constraints and Opportunities

The following constraints and opportunities relating to stormwater management have been identified in preparing this submission.

Constraints

- Existing services within the site are to remain operational during construction.
- Potential flooding issues during the 100 year ARI storm.
- Portions of the site located within a flood fringe.
- Existing levels within the site and surrounds will limit ability to grade out drainage networks.

Opportunities

- Introduction of undercover parking and new uncovered parking can improve water quality by implementation of Water Sensitive Urban Design (WSUD) principles
- Increased landscaping can assist to improve water quality and retention
- Reuse within the building for toilets and irrigation can assist to increase retention

6. Water Conservation

It is proposed that water conservation measures will be achieved through the inclusion of stormwater harvesting and re-use tanks connected to toilets and irrigation. Water saving devices will be included within the development reducing the demand on the mains water. The specifics of these devices are anticipated to be provided during the detailed design stage.

7. Stormwater Management

As identified in Section 4 of this report, stormwater management from the proposed development has considered the following five key design objectives:

(i) Stormwater Detention

It is not anticipated that on-site detention will be required for this project. Justification for its removal is based on the following key considerations:

CCC Engineering Guidelines state *"…post-redevelopment peak flow from the outlet point(s) of the redevelopment site to the existing downstream public drainage system or receiving water shall not exceed the pre-redevelopment flow for both the minor and major system ARI."*

The current site is primarily sealed car parking and roofed areas, the proposed layout will introduce additional landscaping, extended detention infiltration pits within the new car parking and retain roof water to re-use tanks. Therefore, post development impervious areas have increased from the existing developed site.

In addition to achieving the above pre to post discharge intent, the existing site levels and subsequent invert of stormwater pipes at the boundary currently sit at or near RL0.00, hence any OSD device will not function during regular/large storm events or during high tidal influences.

(ii) Stormwater Retention

The existing site is heavily developed and has limited retention capacity. Currently carparks grade to stormwater pits for discharge directly offsite, there is limited external landscaping throughout the central portions of the site. The primary form of retention is through collection of rainwater and re-use throughout the building and landscaping as well as a portion of grassed area immediately south of the existing Galaxy Motel.

The proposed works will achieve an improvement for stormwater retention via the following inclusions:

- Re-use tanks for toilets and landscaping harvesting all roof water. As the development is unique in nature and does not fit the typical DCP reuse targets, it is proposed to size the tank based on site specific re-use demands for landscaping and internal usage. These specific values will

be determined during the detailed design stage via advice from appointed landscape consultants, hydraulic engineers and architects.

- Increasing percentage of pervious areas via inclusion of landscaping around the buildings and entry passages. Where there is potential to grade footpaths to landscaped areas, this will also be adopted.
- Introduction of rain gardens throughout the new uncovered carparking area. The layout will be based on maximising the capture of new carparking lots and grading towards these raingardens with extended detention potential.
- Retaining the existing grassed areas south of the Galaxy Motel.

(iii) Stormwater Quality

In accordance with Section 6.7.7.2 of DCP 6.7, stormwater treatment has been provided for the proposed development. The existing areas of the site not proposed to be developed will remain as is, i.e. the Galaxy Motel and south most car parking areas. The following inclusions are proposed for areas were works are to be undertaken:

- The new Gosford RSL roof design shall aim to capture and direct water to rainwater tanks, via the use of a first flush system, for re-use on site. As discussed in Section 7 (ii) (Retention), it is proposed that further reuse investigation be undertake during the detailed design phase to appropriately size the rainwater tank and reuse system.
- Raingardens will be strategically placed throughout the new car parking footprint to maximise capture of untreated car parking runoff. These raingardens will include appropriate filter media and collection systems in line with current WSUD practices.
- Overall, water quality will be improved by:
    - Introduction of covered carparking
    - Increase the net amount of pervious area on the site
    - Treating runoff from new car parking areas

(iv) Stormwater Local Overland Drainage

Overland flow paths will be provided to account for the 100 year major storm event, to address blockage of the minor stormwater drainage network. These flow paths are designed to mimic the existing conditions via discharging the 100 year storm events into the same catchment locations as currently identified. They will also be designed to accommodate the higher flows encountered during the 100 year major storm events whilst maintaining adequate freeboard distances to habitable and non-habitable floor areas.

(v) Flooding

The flooding risks and design components to address within this proposed development are discussed in Chapter 8.

8. Flooding Management

The proposed works fall within an area identified as being impacted by flooding. Flooding analysis has previously been undertaken on behalf of CCC to identify specific flood scenarios and flood behaviour in the Brisbane Water Foreshore region. Available documents include:

- Narara Creek Flood Study (Golders, 2013)
- Updated Narara Creek Flood Study (Golders, 2018)
- Brisbane Water Foreshore Flood Study (Cardno Lawson Treloar, 2013)
- Brisbane Water Foreshore Floodplain Risk Management Plan (Cardno, 2015) (Cardno BWFRMP)

The reports identified above provide conflicting information regarding flooding levels and flooding behaviour within the area of development. Based on received meeting minutes (meeting held 11.05.17, 2:30-4:00 pm at Level 5, 49 Mann St, Gosford) CCC provided advice that the Brisbane Water flood planning level, as defined in the Cardno BWFRMP, would prevail over data within the Narara Creek Flood Study report. However, the minutes also noted that data from the Narara Creek Flood Study should be considered. Subsequent to the submission of the DA, Golders issued the *Updated Narara Creek Flood Study* and the information relating to flood depth within this revised flood study was required to be incorporated.

(i) Cardno BWFRMP

On review of the Cardno BWFRMP, we note the following key definitions that are relevant to the proposed development:

Flood Planning Area - The area of land below the flood planning level and thus subject to flood related development controls." We note that the subject site sits within the Flood Planning Area and therefore triggers the need to consider levels of key site infrastructure.

Flood Planning Level (FPL) - Flood levels selected for planning purposes, as determined in floodplain management studies and incorporated in floodplain management plans. Selection should be based on an understanding of the full range of flood behaviour and the associated flood risk. It should also take into account the social, economic and ecological consequences associated with floods of different severities. Different FPLs may be appropriate for different categories of land use and for different flood plains. As FPLs do not necessarily extend to the limits of flood prone land (as defined by the probable maximum flood), floodplain management plans may apply to flood prone land beyond the defined FPLs.

In relation to the Cardno BWFRMP, CCC has advised the following for the proposed development:

- The FPL is defined as 2.75m AHD (being 1% AEP flood level (1.85m) + 2050 Sea Level Rise (SLR) (0.4m) + 0.5 m Freeboard)
- NOTE: The FPL has been updated to reflect the increase of the 1% AEP flood level from 1.85m to an estimated 1.90m as derived from data within the "Updated Narara Creek Flood Study". i.e. FPL increased to 2.80m AHD
- The Probable Maximum Flood (PMF) is defined as 2.4 m AHD.
- The Site Classification is considered to be High Intensity Use, based on the definition contained within Appendix A of the Cardno BMFRMP.

On review of the above, it is proposed to address flood planning requirements as follows:

- The upper levels of the development site are located above the FPL.
- The entry level foyer will sit below the FPL (but at the 1% AEP flood level) and therefore should be void of infrastructure prone to damage from flood waters.
- Habitable areas within the ground floor (staff offices, cellar, cool rooms etc) are proposed to sit below the FPL (but above the PMF level), with any electrical or other sensitive infrastructure to be located above the FPL.
- Car parking levels shall generally reflect existing site levels to retain overland flow paths.

To support the intended approach for compliance with the Cardno BWFRMP, Lindsay Dynan has reviewed the Floodplain Risk Management Matrix contained in Appendix A of the Cardno BWFRMP and provided commentary on how the flooding controls will be addressed. This commentary is provided below in Table 1 – Floodplain Risk Management Matrix:

Table 1 – Floodplain Risk Management Matrix

Item	Planning Control	Proposed Compliance
New Development/ Redevelopment (1)	New developments not suitable. Controls in this matrix apply to redevelopment and replacement only.	Proposal is for site redevelopment
New Development/ Redevelopment (3)	Where redevelopment may extend the design life of the structure / facility, this may be considered on a merits basis. However, relocation to an area outside of the floodplain should be considered as a priority	Nominated location (adjacent to Central Coast Highway) agreed with CCC and supports required egress patterns (towards Central Coast Highway)
Floor Level (2)	Habitable floor levels to be equal to or greater than the PMF or FPL (whichever is higher)	In consideration of the refuge available within the primary levels of the RSL being well above the FPL it is proposed to provide ground floor habitable areas above the PMF level, with entry foyer above at the 1% AEP (1.90m AHD), proposed floor level is 1.90m AHD.
Building Components (2)	All structures to have flood compatible building components below or at the PMF or FPL (whichever is higher).	To be addressed during detailed design via architectural documentation.
Structural Soundness (2)	All structures must be designed and constructed to ensure structural integrity for immersion and impact of velocity and debris up to the level of the PMF (including wave run up and over topping).	To be addressed during detailed design via architectural documentation.
Flood Affectation (2)	The impact of the development on flooding elsewhere to be considered	Key items as discussed above indicate the site sits on the flood fringe, with limited impact to floodway or flood storage.
Flood Affectation (3)	Filling that impacts on active flow areas in the stream networks feeding Brisbane Water is not permitted. Filling operations must include adequate provision for drainage of surface water erosion and siltation control and be so placed and graded as to prevent the shedding of surface water direct to adjoining properties.	The subject site is not located in a stream network feeding Brisbane Water. It is proposed to retain existing clear flow paths and grade out to Narara Creek. Stabilisation of unsealed areas (via vegetation) to reduce erosion and siltation (note anticipated flood velocities are less than 0.5 m/s).

Emergency Management (1)	Pedestrian access is required at or above the FPL from habitable floors to a suitable area of refuge above the PMF level or FPL (whichever is higher), either on site (e.g. second storey) or off site.	Proposed design includes secondary levels above the FPL. Refer to Architectural plans for additional pedestrian movements. The pedestrian walkway through the carpark will be raised to approximately RL 1.80m where possible. It is noted that a key overland flow path is still required, located along the main access roadway.
Emergency Management (3)	Reliable vehicle access is required during a PMF event	Proposed works on site are intended to either retain or increase existing surface levels. Therefore, no net reduction to existing vehicle access is anticipated. Egress from the site is via Yallambee Ave, with an existing level at the driveway crossing of approximate RL 1.60m. Vehicle access at the site boundary will be below the PMF regardless of internal works, so reliable PMF access is not possible without raising Yallambee Avenue (this is not considered practical). To align with the external access constraints, all revised carparking areas will be designed to have a minimum level of RL 1.60m. This will achieve a maximum depth of 300 mm, achieving H1 classification, as defined in Table 2, Guideline 7-3 Flood Hazard, Australian Disaster Resilience Handbook Collection.
Emergency Management (4)	A site emergency response plan (approved by Council) is required	To be addressed during detailed design via architectural documentation.
Emergency Management (5)	The development is to be consistent with the site emergency response plan	To be addressed during detailed design via architectural documentation.
Car Parking (2)	Covered basement car parking: all possible water entry points (e.g. access and ventilation) shall be above the FPL or PMF (whichever is higher). Pedestrian access (separate to vehicle access) shall be provided via a low flood hazard area to a 'safe haven' above the FPL.	No basement is proposed. The site is currently notated as low flood hazard and will provide pedestrian access to upper floors of the building.
Car Parking (3)	Open car park areas (including covered car park areas) and carports: floor levels to be at the 100 Year ARI level or 300mm above the ground level, whichever is higher.	It is proposed to generally aim for carpark levels of RL1.60 (i.e. 300 mm flood depth for 1%AEP flood level). These may fluctuate in specific areas to suit localised site falls for ensuring runoff of day to day rainfall events. Additional key reduction to levels will be to provide a robust overland flow path to suit the tie in levels to Yallambee Avenue (Approx RL1.60).

		It is also proposed to grade the covered portion of the carpark towards the proposed primary overland flow route between the new works and existing motel and between the new works and existing RSL towards Yallambee Avenue. This overland flow path will also aim to maintain minimum levels above RL 1.60m. This will result in regrading of the carparking right up to the existing motel.
Management & Design (4)	Applicant to demonstrate that area is available to store goods above the FPL or PMF level (whichever is higher)	To be addressed during detailed design via architectural documentation.
Management & Design (5)	No external storage of materials below the design floor level which may cause pollution or be hazardous during any flood	To be addressed during detailed design via architectural documentation.
Management & Design (7)	All electrical equipment, wiring, fuel lines or any other service pipes and connections must be waterproofed to the FPL or PMF (whichever is higher)	To be addressed during detailed design via architectural documentation.
Management & Design (9)	Sewer and water services within the site should be designed to have continued function up to the FPL or PMF (whichever is higher).	To be addressed during detailed design via architectural documentation.
Management & Design (10)	Internal storage of materials that may cause pollution or be hazardous during any flood to be waterproofed to the FPL or PMF or located above the FPL or PMF (whichever is the higher).	To be addressed during detailed design via architectural documentation.
Wave Impacts (1)	Wave run-up (as calculated in the Flood Study, Cardno 2013) should be managed if development is within 20m of the foreshore for most locations and within 40m of the foreshore for some locations near the entrance to Brisbane Water. This may be done through foreshore management (i.e. wave dissipation devices) or construction management (i.e. floor levels, structural soundness). All designs should be prepared in accordance with Council's relevant guidelines.	Not applicable (reserve along Narara Creek frontage exceeds 20 m)

(ii) Narara Creek Flood Study

The following key items were noted in relation to the Narara Creek Flood Study:

- The area of the proposed development was identified as a flood velocity of <0.4m/s for the 1% AEP (Figure 51B), with a depth of around 20 to 40 cm, corresponding to approximately RL 1.8 m AHD (Figure 50B).
    - This low depth/flow velocity, in conjunction with the Low Flood Hazard rating for the 1% AEP (Figure 52B) indicates low risk in regards to evacuation during a flooding event up to the 1% AEP. It should also be noted that the central isolated pocket of deeper flood waters correlates to the depression within the carpark intended to be filled as part of these development works.
- The area of the proposed development was primarily identified as a Flood Fringe, as opposed to Floodway or Flood storage (Figure 53B).
    - It is therefore considered that changes to the structures or landscaping within the site would have negligible alterations to the flooding storage or floodway behaviour surrounding the development.

9. Operation and Maintenance Plan

The stormwater design incorporates features that will require maintenance in order to remain serviceable over time. Advice on the operation and maintenance of these features are provided below:

(i) Site pit and pipe network – Inspected monthly, with maintenance to remove sediment build-up/debris blockage as required based on results of visual inspection. The downpipes and floor grates should be inspected for blockages as part of these works.

(ii) Overland flow paths – The overland flow paths should be regularly maintained including the following management measures:

a. Inspection every six months to ensure outdoor open space drainage pits are clear of debris and in good condition, flow paths are free of obstruction, pipes are flushed/inspected

Should you require any further advice or clarification of any of the above, please do not hesitate to contact us.

Yours faithfully
LINDSAY DYNAN
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