FLOODING AND STORMWATER MANAGEMENT PLAN

APPENDIX P

Sydney Metro City & Southwest

Pitt Street South Over Station Development:

Flood Assessment and Stormwater Management Plan

Applicable to:	Sydney Metro City & Southwest
Author:	GHD Pty Ltd
Owner	Sydney Metro
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Executive summary

This report provides the technical content to support the concept SSD Application for the over station development at Pitt Street South Metro Station as either residential or commercial use.

The report discusses the flooding potential of the proposed site and the stormwater detention requirements.

The site is located near the corner of Bathurst Street and Pitt Street in the Sydney CBD. The maximum flood level reaches Bathurst Street, but does not influence the entry to the new site, thus flooding is expected to have no impact on the entry requirements of the development.

Due to the stormwater discharge volumes and detention requirements provided by Sydney Water, the proposed new development will require detention tanks. The existing stormwater system discharges to council's system at two different locations, one on Pitt Street and one on Bathurst Street. The proposed new stormwater system is required to connect to the same pits as in the original system, therefore the site consists of two sub-catchments

The stormwater detention calculations considered the two stages of the project. Firstly, the construction of the Metro station only, and secondly the complete development as a whole. The residential and commercial over station development (OSD) facades were considered equivalent for this purpose. The detention requirements for the first stage (station only) are calculated at approximately 42 m^3 for Pitt Street and 20 m^3 for Bathurst Street.

The detention requirements calculated for the complete development is substantially bigger, as it includes the vertical walls of the new building in the catchment area. Due to the height of the building, it was assumed that each sub-catchment will require two detention tanks, one for the top roof area and walls (Tank 1), and one for the bottom roof areas and walls (Tank 2).

The detention volumes calculated were approximately 120 m^3 (Tank 1) and 50 m^3 (Tank 2) for Pitt Street, and 130m^3 (Tank 1) and 50m^3 (Tank 2) for Bathurst Street.

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1.0 Purpose of this report

1.1. Background

This report supports a concept State Significant Development Application (concept SSD Application) submitted to the Department of Planning and Environment (DPE) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The concept SSD Application is made in accordance with Section 4.22 of the EP&A Act.

Sydney Metro is seeking to secure concept approval for a building envelope above the southern portal of Pitt Street Station, otherwise known as the over station development (OSD). The concept SSD Application seeks consent for a building envelope, maximum building height, land use options, pedestrian and vehicular access, circulation arrangements and associated car parking as well as the strategies and design parameters for the future detailed design of development.

Sydney Metro proposes to procure the construction of the OSD as part of an integrated station development package, which would result in the combined delivery of the station, OSD and public domain improvements. The station and public domain elements form part of a separate planning approval for Critical State Significant Infrastructure (CSSI) approved by DPE on 9 January 2017.

As the development is associated with railway infrastructure and is for residential or commercial premises with a Capital Investment Value of more than $30 million, the project is a State Significant Development (SSD) pursuant to Schedule 1, Clause 19(2)(a) of the *State Environmental Planning Policy (State and Regional Development) 2011* (SRD SEPP). The full extent of the proposed development can also be considered to be SSD by virtue of Clause 8(2) of the SRD SEPP.

This report has been prepared to specifically respond to the Secretary's Environmental Assessment Requirements (SEARs) issued for the concept SSD Application for Pitt Street South on 30th November 2017 which state that the Environmental Impact Statement (EIS) is to address the following requirements:

Flood Assessment and Stormwater Management Plan

1.2. Overview of the Sydney Metro in its context

The New South Wales (NSW) Government is implementing *Sydney's Rail Future*, a plan to transform and modernise Sydney's rail network so that it can grow with the city's population and meet the needs of customers in the future. Sydney Metro is a new standalone rail network identified in *Sydney's Rail Future*.

Sydney Metro is Australia's biggest public transport project, consisting of Sydney Metro Northwest, which is due for completion in 2019 and Sydney Metro City & Southwest, which is due for completion in 2024.

Sydney Metro West is expected to be operational in the late 2020s (refer to Error! Reference source not found.).

Figure 1: Sydney Metro alignment map

Sydney Metro City & Southwest includes the construction and operation of a new metro rail line from Chatswood, under Sydney Harbour through Sydney's Central Business District (CBD) to Sydenham and on to Bankstown through the conversion of the existing line to metro standards.

The project also involves the delivery of seven new metro stations, including at Pitt Street. Once completed, Sydney Metro will have capacity for 30 trains an hour (one every two minutes) through the CBD in each direction - a level of service never seen before in Sydney.

On 9 January 2017, the Minister for Planning approved the Sydney Metro City & Southwest - Chatswood to Sydenham application lodged as a Critical State Significant Infrastructure project (reference SSI 15_7400), hereafter referred to as the CSSI Approval.

The CSSI Approval includes all physical work required to construct the CSSI, including the demolition of existing buildings and structures on each site. Importantly, the CSSI Approval also includes provision for the construction of below and above-ground structures and other components of the future integrated station development (including building infrastructure and space for future lift cores, plant rooms, access, parking and building services, as relevant to each site). The rationale for this delivery approach, as identified within the CSSI

Application, is to enable the integrated station development to be more efficiently built and appropriately integrated into the metro station structure.

The EIS for the Chatswood to Sydenham component of the Sydney Metro City & Southwest project identified that the OSD would be subject to a separate assessment process.

Since the CSSI Approval was issued, Sydney Metro has lodged four modification applications to amend the CSSI Approval as outlined below:

- Modification 1- Victoria Cross and Artarmon Substation which involves relocation of the Victoria Cross northern services building from 194-196A Miller Street to 50 McLaren Street together with inclusion of a new station entrance at this location referred to as Victoria Cross North. 52 McLaren Street would also be used to support construction of these works. The modification also involves the relocation of the substation at Artarmon from Butchers Lane to 98 – 104 Reserve Road. This modification application was approved on 18 October 2017.
- Modification 2- Central Walk which involves additional works at Central Railway Station including construction of a new eastern concourse, a new eastern entry, and upgrades to suburban platforms. This modification application was approved on 21 December 2017.
- Modification 3 - Martin Place Station which involves changes to the Sydney Metro Martin Place Station to align with the Unsolicited Proposal by Macquarie Group Limited (Macquarie) for the development of the station precinct. The proposed modification involves a larger reconfigured station layout, provision of a new unpaid concourse link and retention of the existing MLC pedestrian link and works to connect into the Sydney Metro Martin Place Station. This modification application was approved on 22 March 2018.
- Modification 4 - Sydenham Station and Sydney Metro Trains Facility South which incorporated Sydenham Station and precinct works, the Sydney Metro Trains Facility South, works to Sydney Water's Sydenham Pit and Drainage Pumping Station and ancillary infrastructure and track and signalling works into the approved project. This modification application was approved on 13 December 2017.

Given the modifications, the CSSI Approval is now approved to operate to Sydenham Station and also includes the upgrade of Sydenham Station.

The remainder of the City & Southwest project (Sydenham to Bankstown) proposes the conversion of the existing heavy rail line and the upgrade of the existing railway stations along this alignment to metro standards. This portion of the project, referred to as the Sydenham to Bankstown Upgrade, is the subject of a separate CSSI Application (No. SSI 17_8256) for which an Environmental Impact Statement was exhibited between September and November 2017 and a Response to Submissions and Preferred Infrastructure Report was submitted to the NSW Department of Planning & Environment (DPE) in June 2018 for further exhibition and assessment.

1.3. Planning relationship between Pitt Street Station and the OSD

While the southern portal of Pitt Street Station and the OSD will form an integrated station development, the planning pathways under the *Environmental Planning and Assessment Act 1979* involve separate approval for each component of the development. In this regard, the approved station works (CSSI Approval) are subject to the provisions of Part 5.1 of the EP&A Act (now referred to as Division 5.2) and the OSD component is subject to the provisions of Part 4 of the EP&A Act.

For clarity, the approved station works under the CSSI Approval included the construction of below and above ground structures necessary for delivering the station and also enabling construction of the integrated OSD. This included but is not limited to:

- demolition of existing development
- excavation
- station structure including concourse and platforms
- lobbies
- retail spaces within the station building
- public domain improvements
- station portal link (between the northern and southern portals of Pitt Street Station)
- access arrangements including vertical transport such as escalators and lifts
- structural and service elements and the relevant space provisioning necessary for constructing OSD, such as columns and beams, space for lift cores, plant rooms, access, parking, retail and building services.

The vertical extent of the approved station works above ground level is defined by the 'transfer slab' level (which for Pitt Street South is defined by RL 58.25), above which would sit the OSD. This delineation is illustrated in Error! Reference source not found. below.

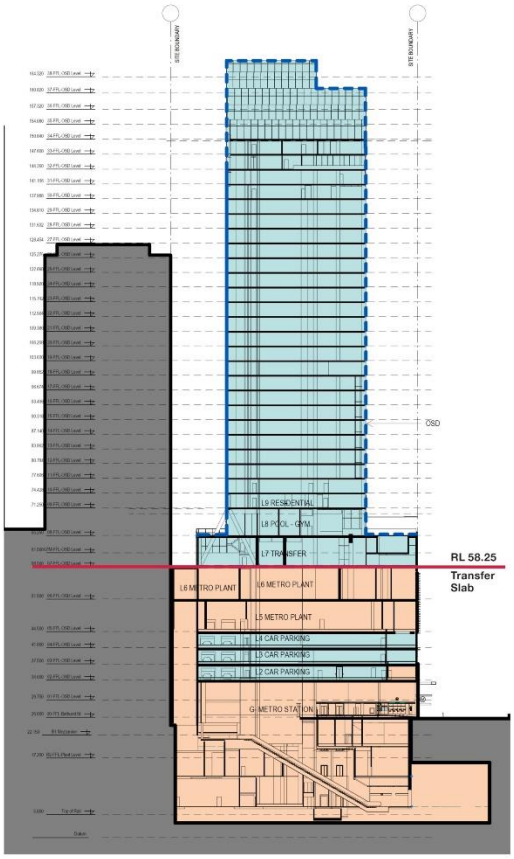

Figure 2: Delineation between station and OSD

The CSSI Approval also establishes the general concept for the ground plane of Pitt Street Station including access strategies for commuters and pedestrians. In this regard, pedestrian access to the station would be from Bathurst Street and the OSD lobby would be accessed from Pitt Street.

Since the issue of the CSSI Approval, Sydney Metro has undertaken sufficient design work to determine the space planning and general layout for the station and identification of those spaces within the station area that would be available for the OSD. In addition, design work has been undertaken to determine the technical requirements for the structural integration of the OSD with the station. This level of design work has informed the concept proposal for the OSD. It is noted that ongoing design development of the works to be delivered under the CSSI Approval would continue with a view to developing an Interchange Access Plan (IAP) and Station Design Precinct Plan (SDPP) for Pitt Street Station to satisfy Conditions E92 and E101 of the CSSI Approval.

The public domain improvement works around the site would be delivered as part of the CSSI Approval.

1.4. The Site

The Pitt Street South OSD site is located near the corner of Pitt Street and Bathurst Street, comprising four individual allotments but excluding the Edinburgh Castle Hotel, above the southern portal of the future Pitt Street Station. The context of the site is demonstrated at Error! Reference source not found. below.

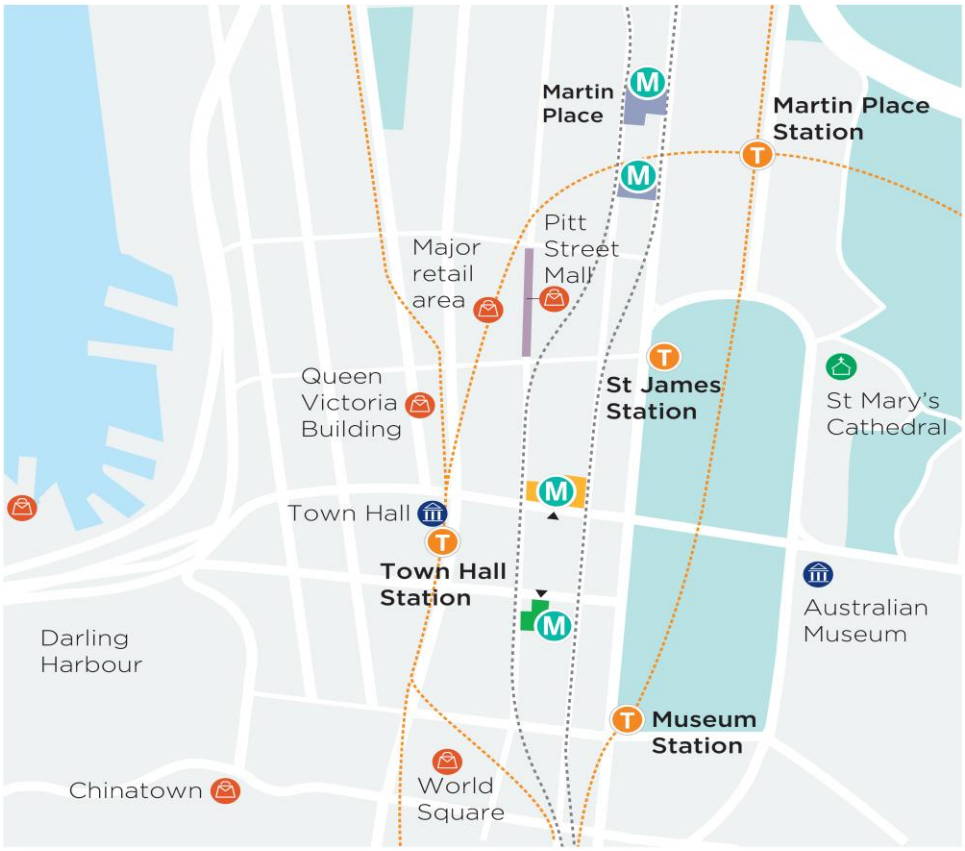

Figure 3: Pitt Street Station location plan

The site is located in the City of Sydney Local Government Area. The site (refer to **Figure 4** below) is irregular in shape, has a total area of approximately 1,708 square metres and has street frontages of approximately 32 metres to Pitt Street and 24 metres to Bathurst Street.

The Pitt Street South site comprises a number of individual properties which front Bathurst Street and Pitt Street. Specifically, the site comprises the following:

- 125-129 Bathurst Street, Sydney (Lot 1 in DP60293)
- 131-135 Bathurst Street, Sydney (Lot 1 in DP59101)
- 296-300 Pitt Street, Sydney (Lot 1 in DP436359)
- 302 Pitt Street, Sydney (Lot 1 in DP62668)

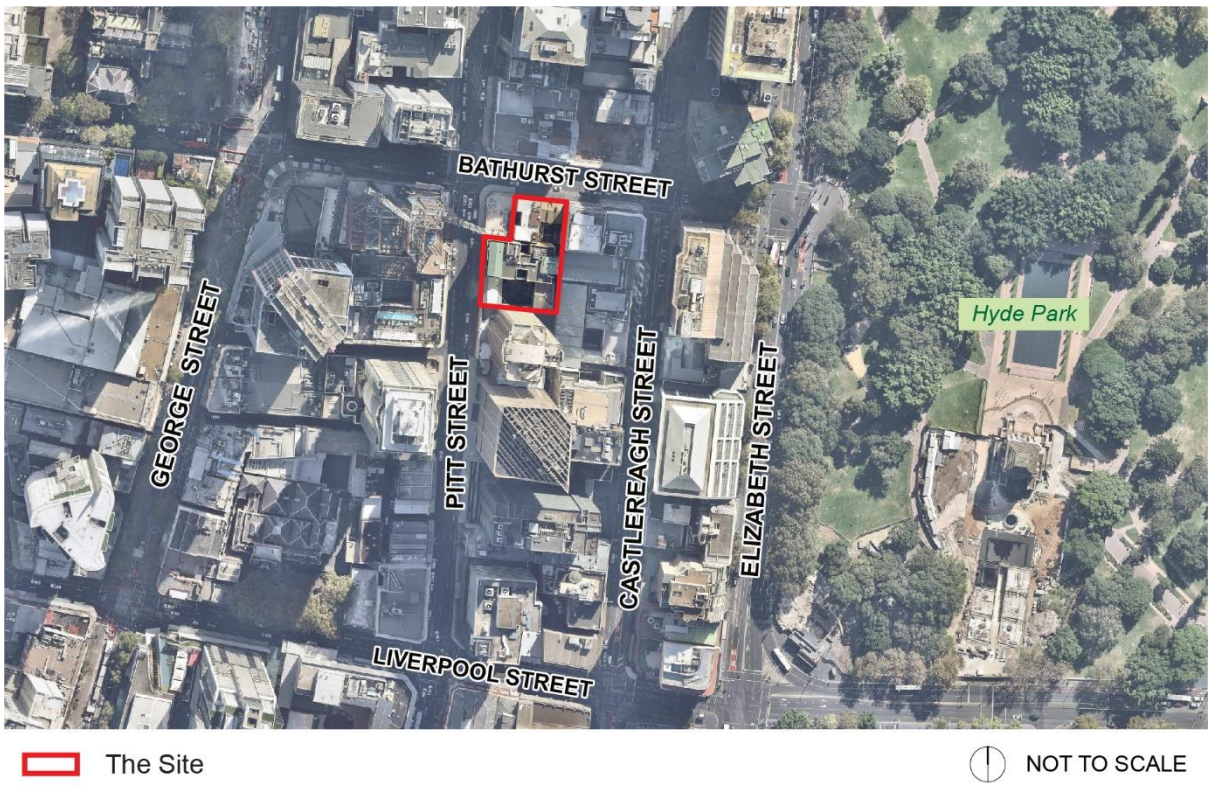

Figure 4: Aerial photo of Pitt Street South

1.5. Overview of the proposed development

This concept SSD Application comprises the first stage of the Pitt Street South OSD project. It will be followed by a detailed SSD Application for the design and construction of the OSD to be lodged by the successful contractor who is awarded the contract to deliver the integrated station development.

This concept SSD Application seeks approval for the planning and development framework and strategies to inform the future detailed design of the OSD. It specifically seeks approval for the following:

- a building envelope
- a maximum envelope height of Relative Level (RL 171.6) which equates to approximately 35 storeys, including the podium height of RL 71 which equates to approximately 8 storeys above ground
- use for the OSD component of the development for uses, subject to further detailed applications, which could include:
    - residential accommodation; or
    - commercial premises
    - use of the conceptual OSD space provisioning within the footprint of the CSSI Approval (both above and below ground), including the OSD lobby areas, podium car parking, storage facilities, services and back-of-house facilities

- car parking for a maximum of 34 spaces located across three levels of the podium
- loading, vehicular and pedestrian access arrangements from Pitt Street
- strategies for utilities and service provision
- strategies for the management of stormwater and drainage
- a strategy for the achievement of ecologically sustainable development
- indicative future signage
- a strategy for public art
- a design excellence framework
- the future subdivision of parts of the OSD footprint (if required)

As this concept SSD Application is a staged development pursuant to section 4.22 of the EP&A Act, future approval would be sought for detailed design and construction of the OSD. Concept indicative designs showing potential residential and commercial building form outcomes at the site have been provided as part of this concept SSD Application at Appendix E and Appendix F, respectively.

Pitt Street Station is to be a key station on the future Sydney Metro network, providing access to the Sydney CBD. The proposal combines the metro station with an OSD component. The OSD would assist in strengthening the role of Central Sydney as the key centre of business in Australia and would contribute to the diversity, amenity and sustainability of the CBD.

It is noted that Pitt Street Station northern portal OSD is subject to a separate application, and does not form part of this concept SSD Application.

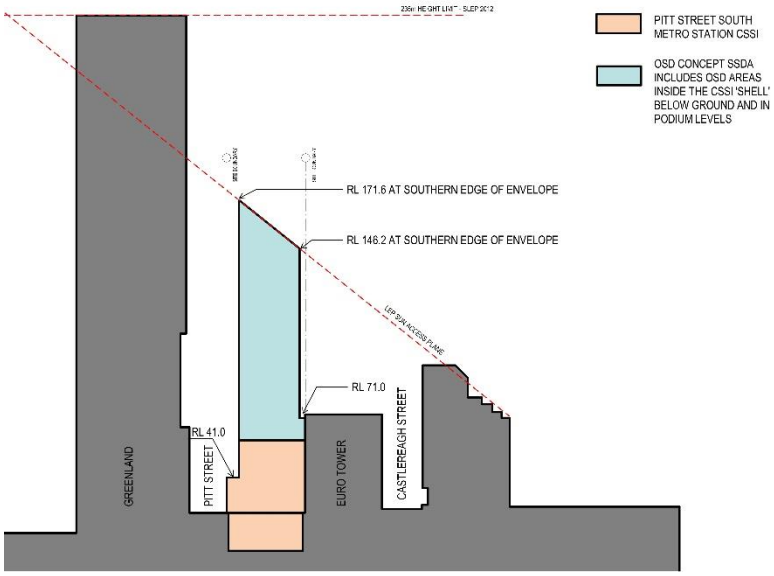

Figure 5: Pitt Street South OSD envelope, including OSD components (Blue) and station box (Orange)

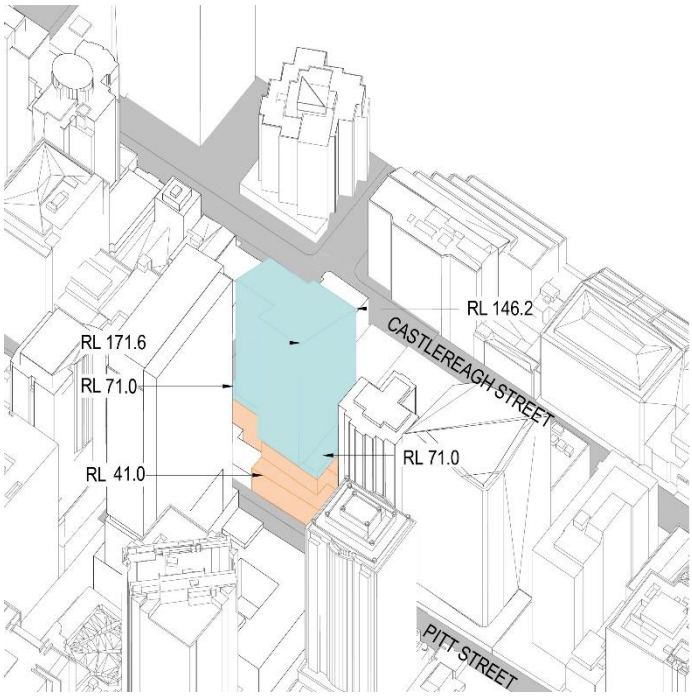

Figure 6: Pitt Street South OSD axonometric diagram, as seen from the south-west

1.6. Staging and framework for managing environmental impacts

Sydney Metro proposes to procure the delivery of the Pitt Street South integrated station development in one single package, which would entail the following works:

- station structure
- station fit-out, including mechanical and electrical
- OSD structure
- OSD fit-out, including mechanical and electrical.

Separate delivery packages are also proposed by Sydney Metro to deliver the excavation of the station boxes/shafts ahead of the integrated station development delivery package, and line-wide systems (e.g. track, power, ventilation) and operational readiness works prior to the Sydney Metro City & Southwest metro system being able to operate.

Three possible staging scenarios have been identified for delivery of the integrated station development:

1. Scenario 1 – the station and OSD are constructed concurrently by constructing the transfer slab first and then building in both directions. Both the station and OSD would be completed in 2024.
2. Scenario 2 – the station is constructed first and ready for operation in 2024. OSD construction may still be incomplete or soon ready to commence after station construction is completed. This means that some or all OSD construction is likely to still be underway upon opening of the station in 2024.
3. Scenario 3 – the station is constructed first and ready for operation in 2024. The OSD is built at a later stage, with timing yet to be determined. This creates two distinct construction periods for the station and OSD.

Scenario 1 represents Sydney Metro's preferred option as it would provide for completion of the full integrated station development and therefore the optimum public benefit at the site at the earliest date possible (i.e. on or near 2024 when the station is operational). However, given the delivery of the OSD could be influenced by property market forces, Scenarios 2 or 3 could also occur, where there is a lag between completion of the station component of the integrated station development (station open and operational), and a subsequent development.

The final staging for the delivery of the OSD would be resolved as part of the detailed SSD Application(s).

For the purposes of providing a high level assessment of the potential environmental impacts associated with construction, the following have been considered:

- Impacts directly associated with the OSD, the subject of this SSD Application
- Cumulative impacts of the construction of the OSD at the same time as the station works (subject of the CSSI Approval)

Given the integration of the delivery of the Sydney Metro City & Southwest metro station with an OSD development, Sydney Metro proposes the framework detailed in Error! Reference source not found. to manage the design and environmental impacts, consistent with the framework adopted for the CSSI Approval.

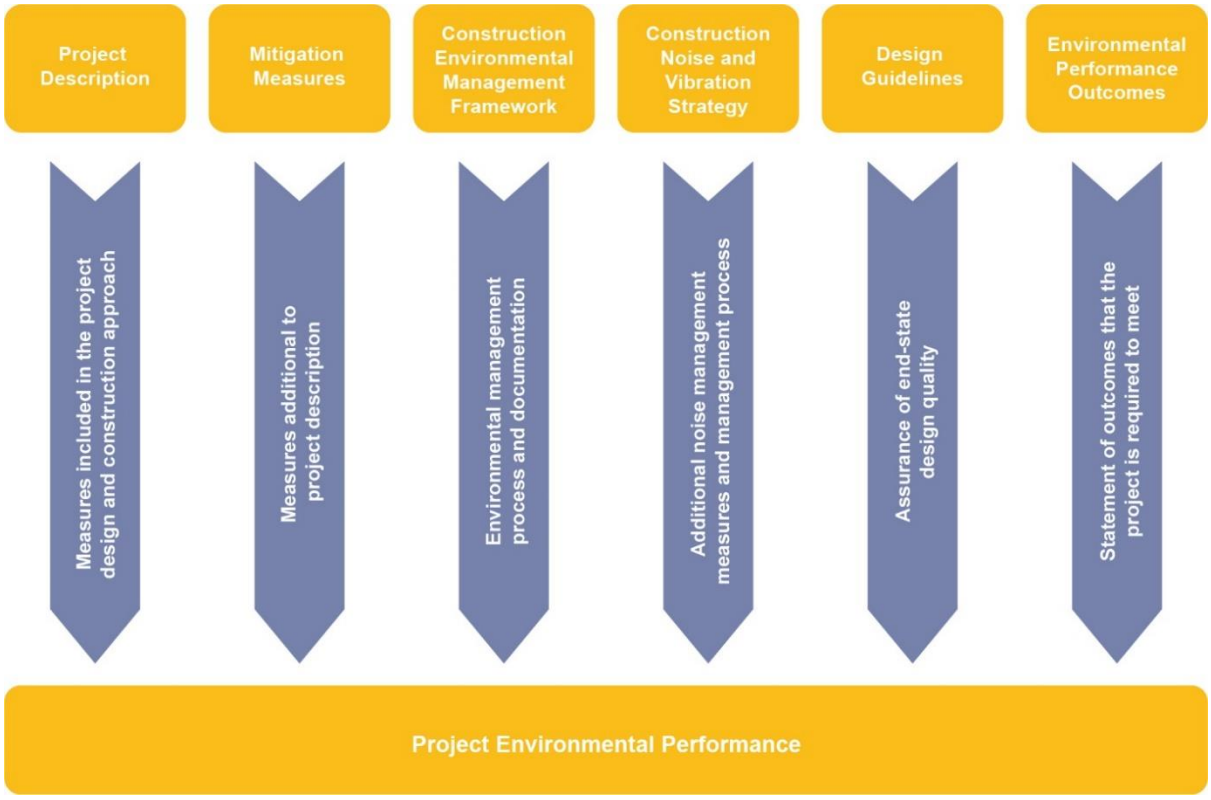

Figure 7: Project approach to environmental mitigation and management

Sydney Metro proposes to implement a similar environmental management framework where the integrated delivery of the CSSI station works and the OSD occur concurrently. This would ensure a consistent approach to management of design interface and construction-related issues.

Sydney Metro proposes this environmental management framework would apply to the OSD until completion of the station and public domain components of the integrated station development delivery contract (i.e. those works under the CSSI Approval). Should the OSD be constructed beyond the practical completion and opening of the station, standard practices for managing construction related environmental impacts would apply in accordance with the relevant guidelines and Conditions of Approval for the detailed SSD Application(s).

2.0 Site Catchment

The Sydney Metro Pitt Street South Station covers the following properties (as seen in **Figure 3**):

- 296 Pitt Street
- 302 Pitt Street
- 127 Bathurst Street
- 131 Bathurst Street.

The existing site area is approximately 1,708 $m^{3,}$ and consists of hotel, commercial and residential buildings prior to demolition.

The Metro Station and over station development is designed as an integrated building but may be built in two stages, with the station being built first and the residential or commercial building above being built once the station is in operation.

The existing site can be seen in **Figure 8**.

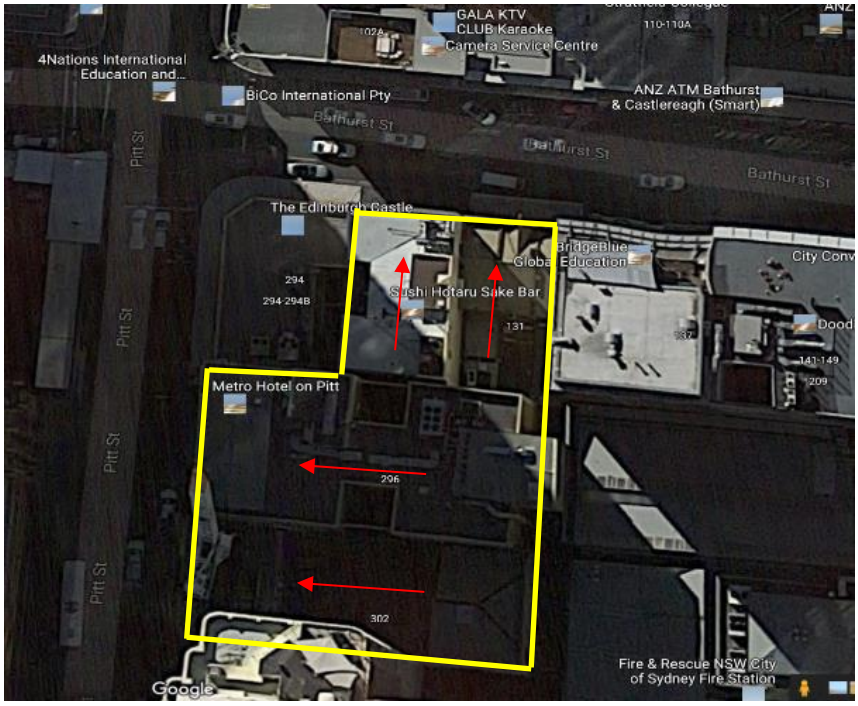

Figure 8: Pitt Street South Site Location

Based on information from the company 'Dial Before You Dig' (DBYD), the catchment area has one trunk drainage system, with the site draining into the trunk drainage at two separate locations. 127 and 131 Bathurst Street, with a combined catchment area of 520 m2, drain towards Bathurst Street, while the properties at 296 and 302 Pitt Street, with a combined area of 1,190 m2, drains towards Pitt Street.

3.0 Proposed Building Form

The Pitt Street South residential use indicative design is a tower with multiple upper terraces and a number of podium terraces as shown in **Figure 9** below. The commercial option will have a similar façade area and is considered equivalent for the purposes of this study.

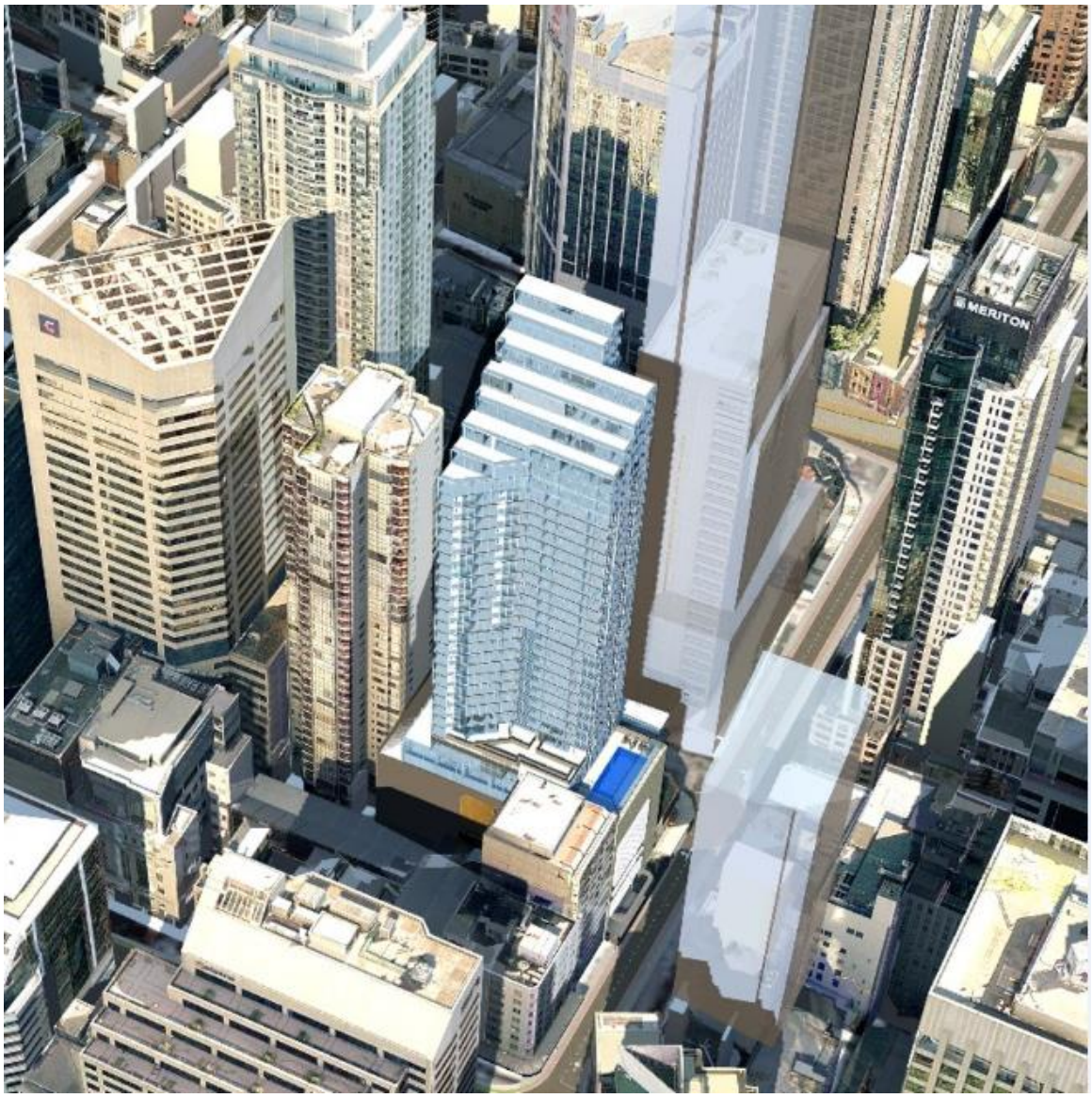

Figure 9: Proposed Residential Tower Design

4.0 Flood Impact Assessment

As per the project scope and performance requirements, the Sydney Metro station is to be designed to prevent flooding from the Probable Maximum Flood (PMF) event. With reference to the City Area Catchment Flood Study (CACFS), October 2014, the flood modelling predicted the flood extents for the site and surrounding area as presented in **Figure 10** and

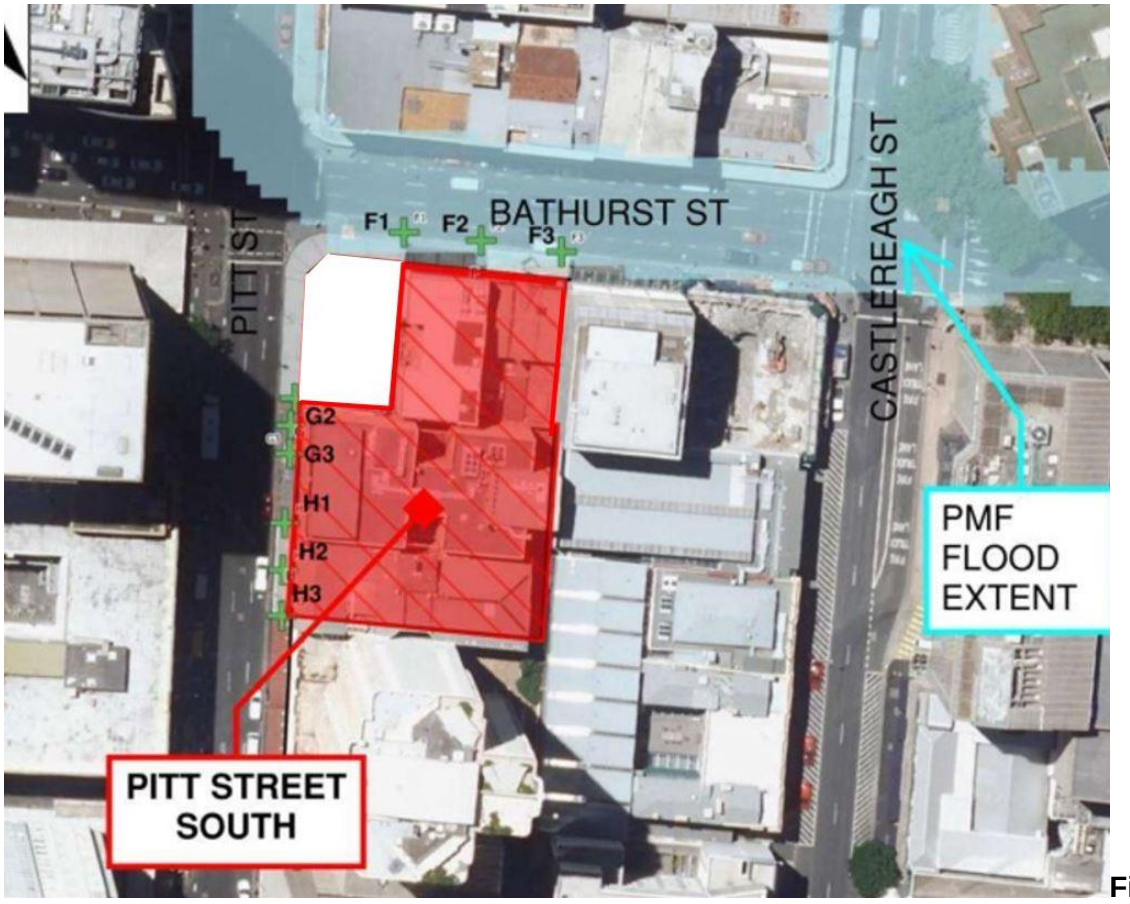

Figure 11.

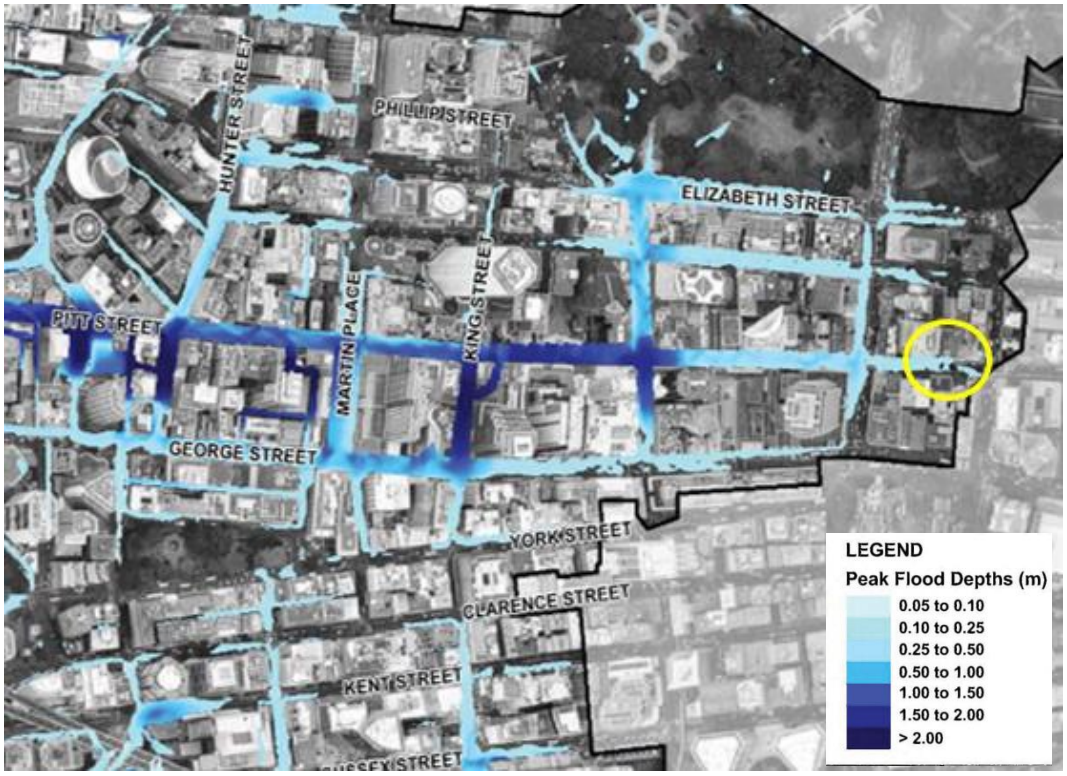

Figure 10: City of Sydney Probable Maximum Flood Map
Source: BMT WBM Pty Ltd, City Area catchment Flood Study, October 2014

Based on a review of the flood map for the PMF event, as shown in **Figure 10**, the following has been noted:

- The new development, on the corner of Pitt Street and Bathurst Street, looks to be at the end of the PMF extent with flood levels of between 0.05m and 0.025m. Up to 0.15m of the flood level will be captured in the kerb and gutter of the road, with only 0.1m affecting the building.

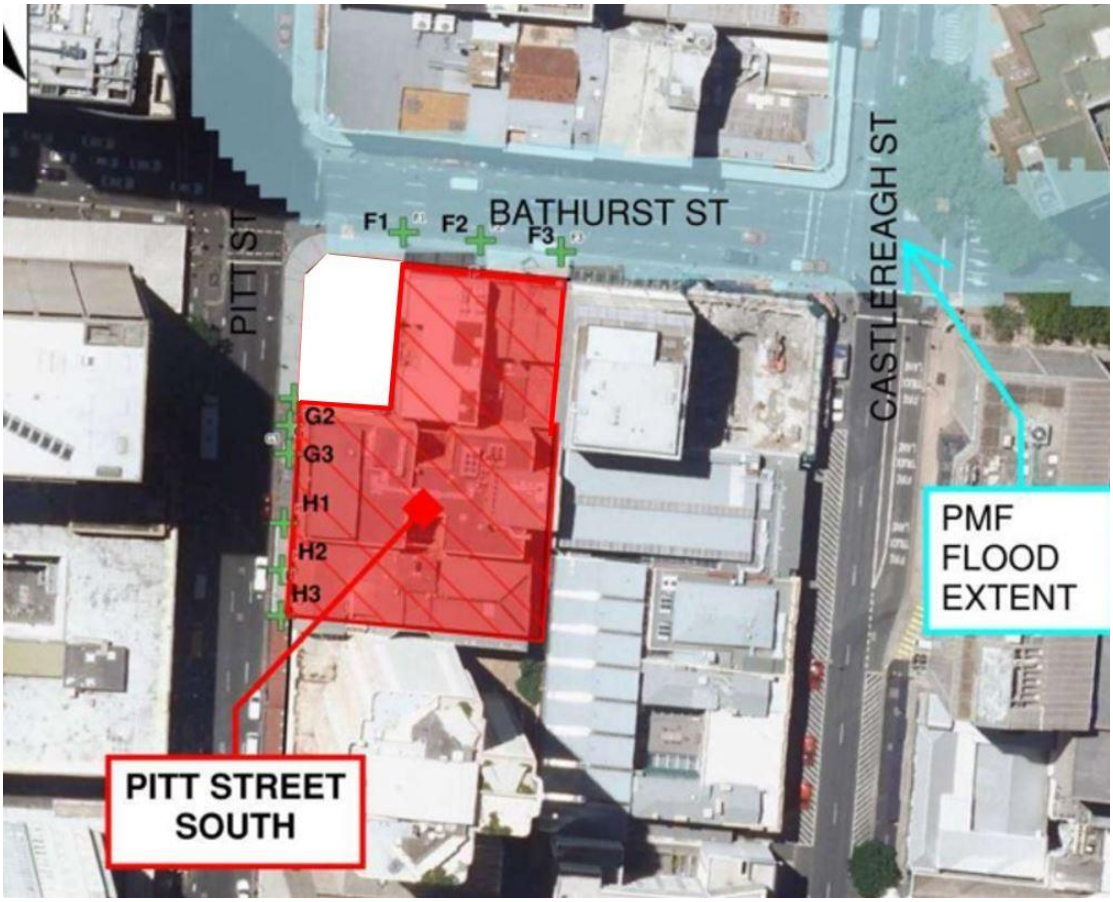

Figure 11 indicates that only Bathurst Street would be affected by the PMF event, and not Pitt Street.

- The site access will be from Pitt Street and not Bathurst Street, thus it is assumed that the PMF will not have an effect on the new development's flood protection requirements, except for potential OSD exits onto Bathurst Street which would require mitigation measures similar to that put in place for the station entry.

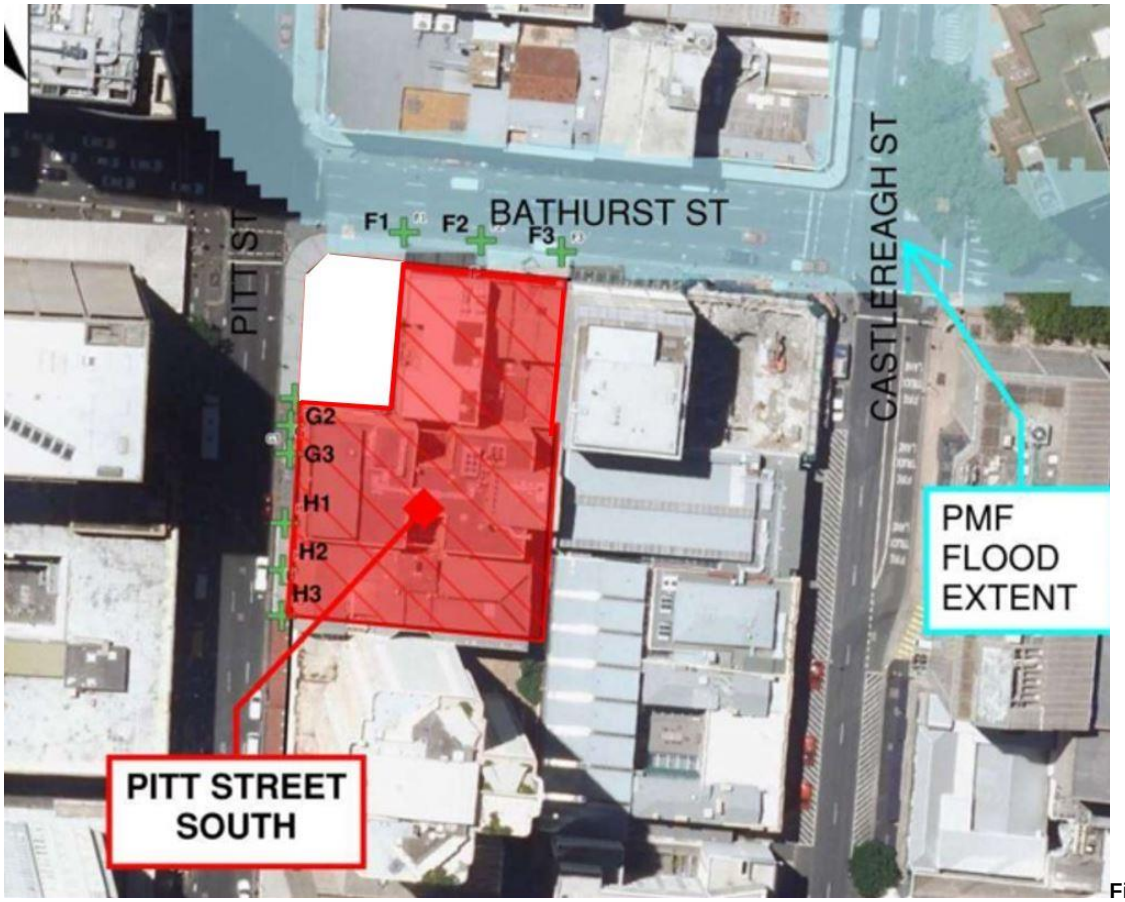

Figure 11: Extent of Probable Maximum Flood around Site Location

The following was identified considering the results predicted by the model for the PMF storm event:

- The new development, on the corner of Pitt Street and Bathurst Street, is on the edge of the PMF flood extent.

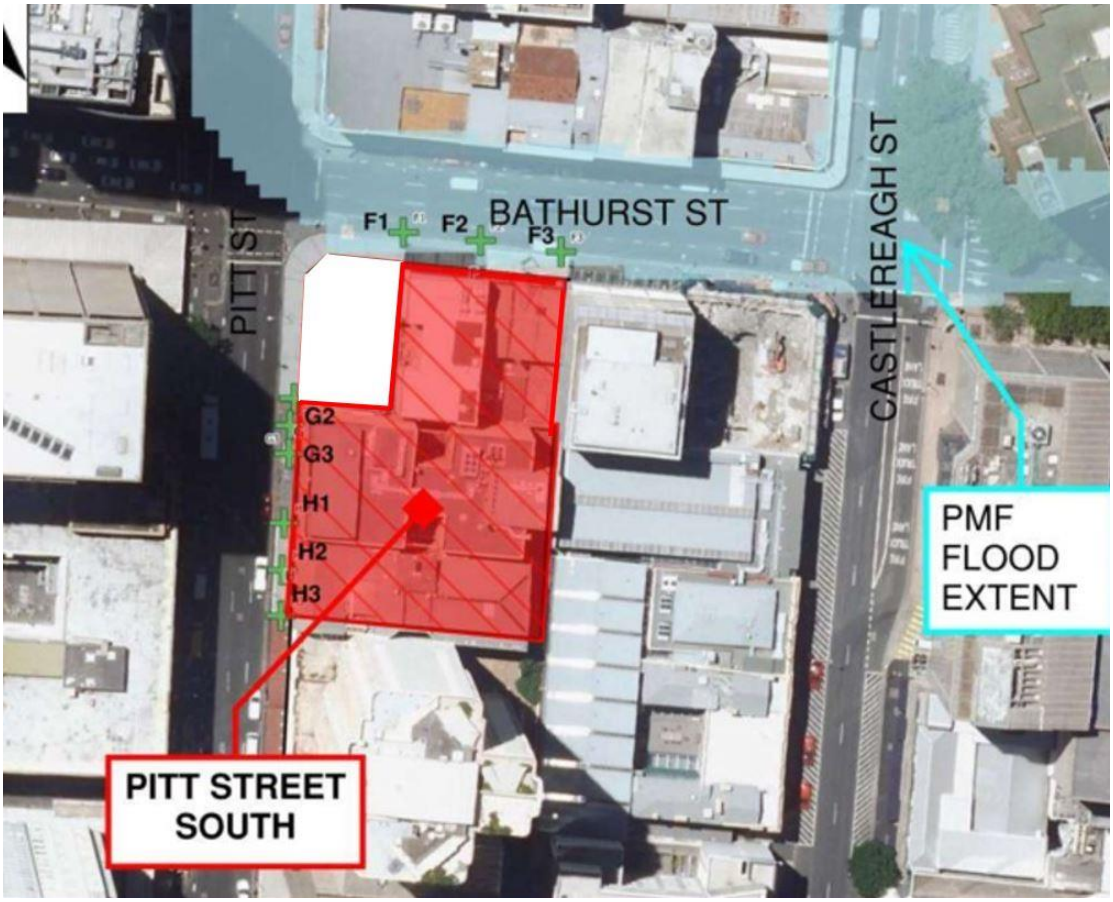

Figure 11 shows that Bathurst Street is predicted to be affected by the PMF storm event, with flood levels of up to 0.25m.

- As the site access will be from Pitt Street and not Bathurst Street, it is expected that the PMF will have negligible effect on the flood protection requirements of the new development except for potential OSD exits onto Bathurst Street which would require mitigation measures similar to that put in place for the station entry.

5.0 Stormwater Management

The scope of the stormwater design includes the design of On Site Stormwater Detention and pipe sizing. Design of the stormwater assets needs to comply with all City of Sydney and Sydney Water design requirements.

The design methodology for the stormwater infrastructure have been assessed in two construction stages, firstly the detention requirements for the Station roof area only, and secondly for the complete over station development.

Sydney Water has provided on-site stormwater detention and Permissible Site Discharge (PSD) requirements for the proposed Pitt Street South development, which can be seen in **Table 1**:

Table 1: Sydney Water Requirements for Full Catchment

Catchment	Site Area (m^2)	Permissible Site Discharge (L/s)	On-Site Detention (m^3)
Pitt Street South Development	1710	63 (0.063 m^3/s)	27

The existing site drainage connects into the Council trunk drainage system at two different pits along Pitt Street and Bathurst Street. The development requirements of the stormwater management assets for the site will therefore be separated into two catchment areas, as shown in **Table 2**:

Table 2: Sydney Water Requirements for Sub-Catchments

Sub Catchment	Site Area (m^2)	Permissible Site Discharge (L/s)	On-Site Detention (m^3)
Pitt Street	1200	44 (0.044m^3/s)	19
Bathurst Street	510	19 (0.019m^3/s)	8

According to Sydney Water, the required detention tank sizes for each sub catchment are 19 m^3 and 8m^3 for Pitt Street and Bathurst Street respectively.

5.1 Pre-development Flows

The pre-development flows for the existing site, along with the onsite detention requirements as per Sydney Water, were calculated using DRAINS. The results are presented in

Table 3.

Table 3: Pre-development Flows on Site

Sub Catchment	Site Area (m2)	Pre-development Flow (m^3/s)	Permissible Site Discharge requirement (m^3/s)	On-Site Detention Needed to comply (m^3/s)
Pitt Street	1200	0.085	0.044	0.041
Bathurst Street	510	0.037	0.019	0.018

The results in

Table 3 show that the existing site has a runoff volume of approximately 0.122 m^3/s. Sydney Water's requirements allow a discharge volume of 0.063 m^3/s, therefore, approximately 0.059 m^3/s is to be detained in an On Site Stormwater Detention system.

5.2 Post-development Flows – Station Only Stage

The post-development flows calculated for Stage 1, the construction of the station only, can be seen in **Table 4** .

Table 4: Post-development Flows and Storage for Station Only Stage

Sub Catchment	Permissible Site Discharge requirement (m^3/s)	Design Post-development Flow (m^3/s)	Detention Size (m^3)	Orifice Diameter (mm)	Pipe Size (mm)
Pitt Street	0.044	0.043	32	120	150
Bathurst Street	0.019	0.019	15	90	150

The results in **Table 4** show the post-development flows for each of the catchments can be achieved by introducing a detention tank of 32 m^3 for the Pitt Street sub-catchment and 15 m^3 for the Bathurst Street sub-catchment.

5.3 Post-Development flows – Over Station Development Stage

The complete post-development flows for the over station development includes the total site area, as well as the largest vertical face area of the new building, to determine the post development flows and detention tank requirements. **Table 5** presents the detention requirements for the complete development.

Table 5: Post-development Detention Requirements for Complete Development

Sub Catchment	Catchment Area Top (m^2)	Catchment Area Bottom (m^2)	Detention Tank 1 (Top) m^3	Detention Tank 2 (Bottom) m^3	Permissible Site Discharge requirement (m^3/s)	Post-development Flow (m^3/s)	Orifice Size
Pitt Street	1878	343	120	50	0.044	0.041	110/150

Sub Catchment	Catchment Area Top (m^2)	Catchment Area Bottom (m^2)	Detention Tank 1 (Top) m^3	Detention Tank 2 (Bottom) m^3	Permissible Site Discharge requirement (m^3/s)	Post-development Flow (m^3/s)	Orifice Size
Bathurst Street	1586	56	130	50	0.019	0.019	80/100

The results in **Table 5** show the catchment areas for each sub-catchment, including the area of the vertical façade of the building. As per AS 3500.3, the calculation used to ascertain the vertical catchment area is:

0.5 x Vertical Area.

The design for the management of stormwater for the complete development includes two detention tanks for each sub-catchment, with the top tank capturing all the building roof water and 50% of the vertical catchment. The bottom detention tank captures all roof water from the lower roof areas, as well as 50% of the vertical catchment runoff.

The design assumes that the water from the top detention tank will run into the bottom detention tank along with the building downpipes. The size of the detention tanks is directly proportionate to the allowed site discharge requirements received from Sydney Water. As there is an increase in the height of the building on this site from this proposed development, the catchment area has increased, and the allowable discharge volumes can only be achieved by using 100 mm or smaller orifice plates in the detention tanks.

6.0 Conclusion

The report discusses the flooding and stormwater requirements for the new over station development at Pitt Street South (near the corner of Pitt Street and Bathurst Street).

The maximum possible flood level shows that the proposed new development may be subject to flooding along Bathurst Street, but not along Pitt Street. The main entry to the site is along Pitt Street, outside the flood extent, therefore the building and underlying metro station are not at risk of flooding from Pitt Street. However, there is a potential exit from the OSD on Bathurst Street and flood mitigation measures as required for the station entry will be put in place for this exit.

The stormwater and detention requirements for the proposed development are split into two sections. The pre-development calculations showed that the site currently has a runoff volume of 0.122 m^3/s. Sydney Water's development requirements state that only 0.063 m^3/s is allowed to be discharged into Council's system. Therefore, a stormwater detention system is required to store approximately 0.059 m^3. This requirement is split into 0.041 m^3 for the Pitt Street Sub-catchment, and 0.018 m^3 for the Bathurst Street sub-catchment.

The stormwater detention needed was calculated for the two separate phases. The first phase, allowing only for water from the metro station temporary roof, resulted in two detention tanks of 42 m^3 and 20 m^3.

The second phase allowing the stormwater for the complete development was calculated and included the stormwater runoff for all top and bottom roof areas as well as the vertical walls of the building. The design proved that two detention tanks are needed for each sub-catchment, with calculations resulting in a tank of 120 m3 for Pitt Street's and 130 m3 for Bathurst Street's top runoff, and two tanks of approximately 50 m3 for the bottom runoff.

The calculations are based on the assumption that 50% of the buildings vertical wall area will contribute to the runoff volume of the site. The detention tank sizes calculated do not consider the effect of any building hydraulic rainwater tank. The detention tank sizes can be reduced depending on the size of the Hydraulic rainwater tanks.

The report comes to the conclusion that the proposed new over station development will not be affected by the probable maximum flood (PMF) event and neither will the developments increased stormwater run-off affect the council's stormwater system as long as the mitigation measures and design elements discussed in this report are implemented.