

Technical Note

Project title	Cooks Cove Planning Proposal
Job number	252942
File reference	
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Subject	Geotechnical Desktop Review - Summary

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1. Introduction

This report has been prepared, on behalf of Cook Cove Inlet Pty Ltd, to support the public exhibition and assessment of the Cooks Cove Planning Proposal (PP-2022-1748), which was issued a Gateway Determination by the Department of Planning and Environment on 5 August 2022. The proposal seeks to amend Bayside Local Environmental Plan 2021 (BLEP 2021) to rezone and insert planning controls for certain land known as Cooks Cove within the BLEP 2021.

The Cooks Cove Planning Proposal aims to facilitate the long-planned transformation of 36.2ha of underutilised and strategically important land at Arncliffe, located to the north of the M5 Motorway and adjacent the western foreshore of the Cooks River. The project seeks a renewed focus on delivering a contemporary logistics and warehousing precinct within a well-connected location, surrounded by enhanced open space provisions. The site forms part of the broader Bayside West 2036 Precincts and generally comprises the footprint of the former Kogarah Golf Club, now in part occupied by a temporary M6 Stage 1 construction compound.

This Technical Note summarises the Geotechnical Desktop Study for the development, identifies key interfaces with Third Party assets and presents a high level approach to managing these.

1.1 Cooks Cove Master Plan 2022

The Cooks Cove Master Plan 2022, as prepared by Hassell, represents an optimised and refined reference scheme, to guide best practice design and the preparation of detailed planning controls to achieve an attractive precinct with high amenity. Key features of the Cooks Cove Master Plan are:

- A net development zone of approximately 15.3ha with up to 343,250m² Gross Floor Area (GFA) comprising:
 - 290,000m² of multi-level logistics and warehousing
 - 20,000m² for hotel and visitor accommodation uses

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- 22,350m² for commercial office uses
- 10,900m² of retail uses.
- Multi-level logistics with building heights generally up to 5 storeys (approx. 48m)
- A retail podium with commercial office and hotel above, up to a total of 12 storeys (approx. 51m);
- Built form of a scale and composition which caters for the generation of approximately 3,300 new jobs;
- A surrounding open space precinct including:
 - A highly activated waterfront including the Fig Tree Grove outdoor dining and urban park precinct;
 - An extension to the regional Bay to Bay cycle link, ‘Foreshore Walk’, including active and passive recreational uses, together with environmental enhancements
 - Master planned and Council-owned ‘Pemulwuy Park’ – with an agreed embellishment outcome of passive open space and environmental enhancements to be delivered in stages post construction of the M6 Stage 1 Motorway
 - Complementary on and off-site infrastructure to be delivered by way of State and Local Planning Agreements.

Refer to Figure 1 for a plan of the proposed Cooks Cove Master Plan 2022, which was prepared by Hassell and support by engineering and advisory services by Arup and other consultants.

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Figure 1 Proposed Cooks Cove Master Plan 2022 – Source: Hassell

1.1.1 Proposed Planning Controls

The Planning Proposal Justification Report, as prepared by Ethos Urban, details the intention to insert new planning provisions covering the Cooks Cove development zone and adjoining lands, through the amendment of the BLEP 2021, accordingly removing this same area from State Environmental Planning Policy (Precincts – Eastern Harbour City) 2021 (formerly Sydney Regional Environmental Plan No. 33 – Cooks Cove).

Specifically, the Planning Proposal will:

- Seek new land use zones within the development zone, including a primary SP4 Enterprise zone across the majority of the Kogarah Golf Course freehold land, RE1 Public Recreation foreshore and passive open space zones and elements of SP2 Infrastructure.

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- Impose an overall maximum building height of RL51m with appropriate transitions to respond to aviation controls within limited sections of the site.
- Limit gross floor area (GFA) to the south of Marsh Street to 340,000m², with a further 1.25:1 Floor Space Ratio (circa 3,243m² of GFA) to the north of Marsh Street, to achieve the overall intended logistics, commercial, retail and short-term accommodation land uses.
- Other additional permitted uses and site-specific planning provisions.
- Reclassification of Lot 14 DP213314 and Lot 1 DP108492 (Council owned and the subject of Charitable Trusts), initially from ‘community’ to ‘operational’ to ensure appropriate access, improve utility of public open space and to create contiguous boundaries. Following rezoning and subdivision it is subsequently intended that Council reclassify residue RE1 parcels as ‘community’ by resolution.

Refer to Figure 2 for the proposed Draft Bayside LEP 2021 Zoning Map.

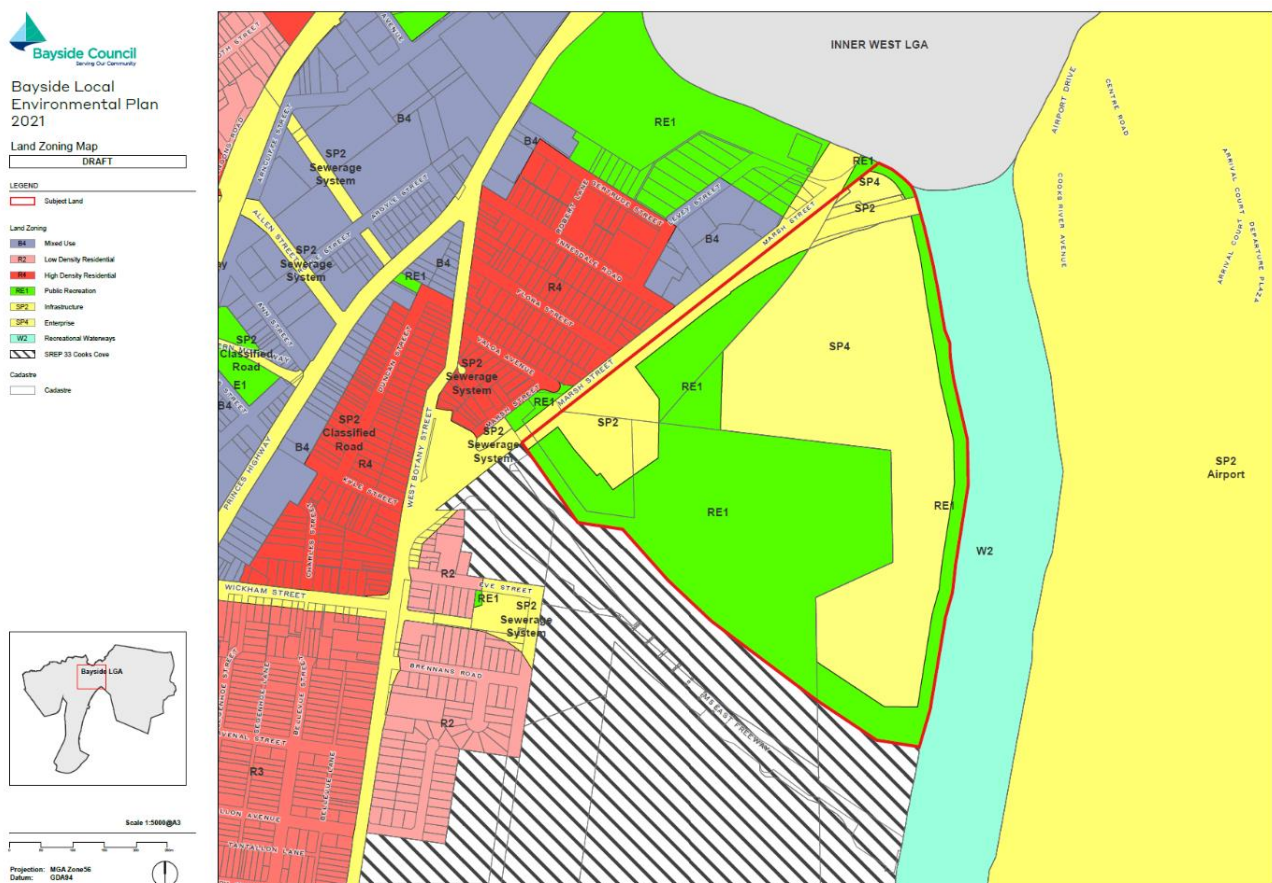


Figure 2 Proposed Draft Bayside LEP 2021 Zoning Map – Source: Ethos Urban

The proposal is in response to Bayside West Precincts 2036 – Arncliffe, Banksia and Cooks Cove (released August 2018) and the subsequent Ministerial Directions under s9.1 of the EP&A Act,

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being Local Planning Directions 1.11 Implementation of Bayside West Precincts 2036 Plan and 1.12 Implementation of Planning Principles for the Cooks Cove Precinct.

1.2 Site Description

Cooks Cove is located in the suburb of Arncliffe within the Bayside Council Local Government Area (LGA). The site is located to the west of the Cooks River, approximately 10km south of the Sydney Central Business District (CBD). The site enjoys adjacency to key trade-related infrastructure being immediately west of Sydney Kingsford Smith International Airport and approximately 6km west of Port Botany.

Cooks Cove is strategically located within close proximity to a number of railway stations including Banksia, Arncliffe, Wolli Creek and the International Airport Terminal, which vary in distance from the site between 700m and 1.1km. The M5 Motorway, providing regional connectivity to the Sydney Metropolitan area, runs in an east-west direction immediately to the south of the site. The M8 and M6 Motorways are, and will be, constructed in tunnels approximately 60 metres beneath the adjoining Bayside Council 'Trust' lands. The Sydney Gateway project, presently under construction to the immediate north of Cooks Cove and Sydney Airport, will substantially improve future accessibility to the St. Peters interchange and the wider M4/M5 WestConnex network, via toll free connections, as well as the Domestic Airport and Port Botany.

The Cooks Cove Development Zone is located to the north of the Southern and Western Suburbs Ocean Outfall Sewer (SWSOOS), and is generally bound by the Cooks River to the east and Marsh Street to the north and west. The site is approximately 36.2ha and is owned and managed by a number of landowners, both public and private. Surrounding development includes the Sydney Airport International Terminal precinct, Mercure Sydney Airport, an area of low density dwellings presently transitioning to medium-high density residential flat buildings, recreation and open space facilities and road and airport related infrastructure.

Kogarah Golf Club

Kogarah Golf Club was established in 1928, with the Club occupying the land subject to the Planning Proposal boundary since 1955. At this time, the Cooks River was reconfigured to its current alignment to accommodate the expansion of Sydney Airport. The land presents a highly modified environment, with relatively flat topography, gently moulded fairways and greens, separated by strips of vegetation and man-made water bodies. The golf course clubhouse, car park and maintenance facilities are located in the northern corner of the site, adjacent the Cooks River. Access is provided via Levey Street. The members of Kogarah Golf Club will relocate from the site in May 2024 to new playing facilities.

Arncliffe Motorway Operations Complex

The temporary construction compound for the WestConnex M8 and M6 Stage 1 Motorway tunnelling works was originally established in June 2016. The temporary construction facility occupies approximately 7.5ha and is expected to remain until 2025. At this time the facility will reduce to 1.5ha to accommodate the permanent Arncliffe Motorway Operations Complex, located

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in the western corner of the site, adjacent Marsh Street. The complex will house ventilation and water treatment plant and maintenance equipment for both the M6 and M8 sub-grade motorways.

Easements and Affectations

The Sydney Desalination Plant pipeline runs through the development zone, north-south adjacent the Cooks River. The pipe has a diameter of 1.8m and sits within an easement of 6-9m in width. From south to north the pipeline is constructed in a combination of trench and above ground with mounded cover and then transitions to micro-tunnel with a typical depth of circa 11m. The Moomba to Sydney Pipeline, containing ethane gas, follows a similar general alignment north-south adjacent the Cooks River. The pipe has a nominal 225mm diameter, within an easement generally 5m wide and with the pipe located at a depth of 1.2m-2.3m.

2. Ground Conditions

2.1 Published Geomorphology and Geology

The Site is situated in the Botany Basin, a sub-basin of the Greater Sydney Basin. Botany Basin is characterised by Triassic-aged sedimentary rocks overlain by a complex series of Quaternary-aged sediments. Fluctuating sea levels have played a significant role in shaping the basin and have resulted in the development of deep incisions (paleo channels) within the Triassic-aged rock forged by ancient river systems. These incisions were subsequently infilled by a variety of Quaternary-aged sediments.

2.2 Ground Model

A ground model for the Site has been developed. Figure 3 shows a schematic of the ground model developed for the Site and described herein: Anthropogenic Fill over Undifferentiated Alluvial Sediments over Hawkesbury Sandstone, which has a significantly variable rock head level across the Site.

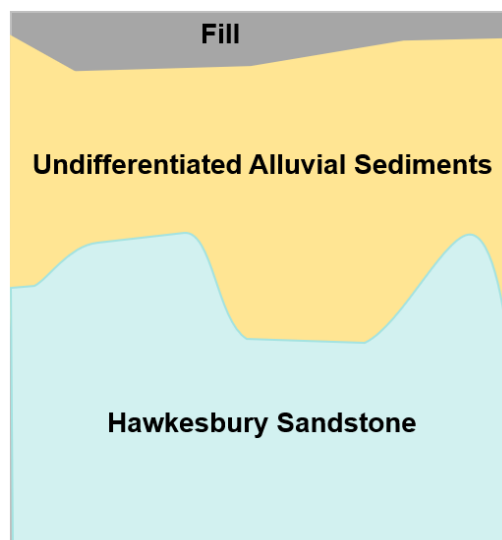


Figure 3 Site Ground Model

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Geological features are present around the Site. Poorer quality rock mass may be encountered generated by sheared zones, dykes and faults surrounding the Site. Joint Swarms have been inferred to the west side of Block 2 by Coffey (2022, Geotechnical Interpretive Report Arncliffe Motorway Control Centre - MOC1, FINAL, M6S1-CGU-SWMOC1-GE-RPT-255150).

It is unlikely that the Blocks have a uniform geological profile and rock head. For the purposes of developing the design approach at this early stage in the design process, the Site ground model has been split into three ground profile zones.

3. Infrastructure around and within the Site

Infrastructure and utilities networks, some of which are major assets, are noted within and in the vicinity of the Site. This Section discusses the networks and major assets and their key known features and relationship to the proposed works.

Figure 4 and Figure 5 show the indicative relationship between the infrastructure and the proposed development.

Key Third Party assets can be summarised as follows:

- Sydney Desalination Pipeline
- Moomba-Sydney Pipeline
- M8 Tunnels
- M6 Tunnels and Temporary Works dive structure and adits
- M5 East
- TfNSW Arncliffe Maintenance and Operations Compound.

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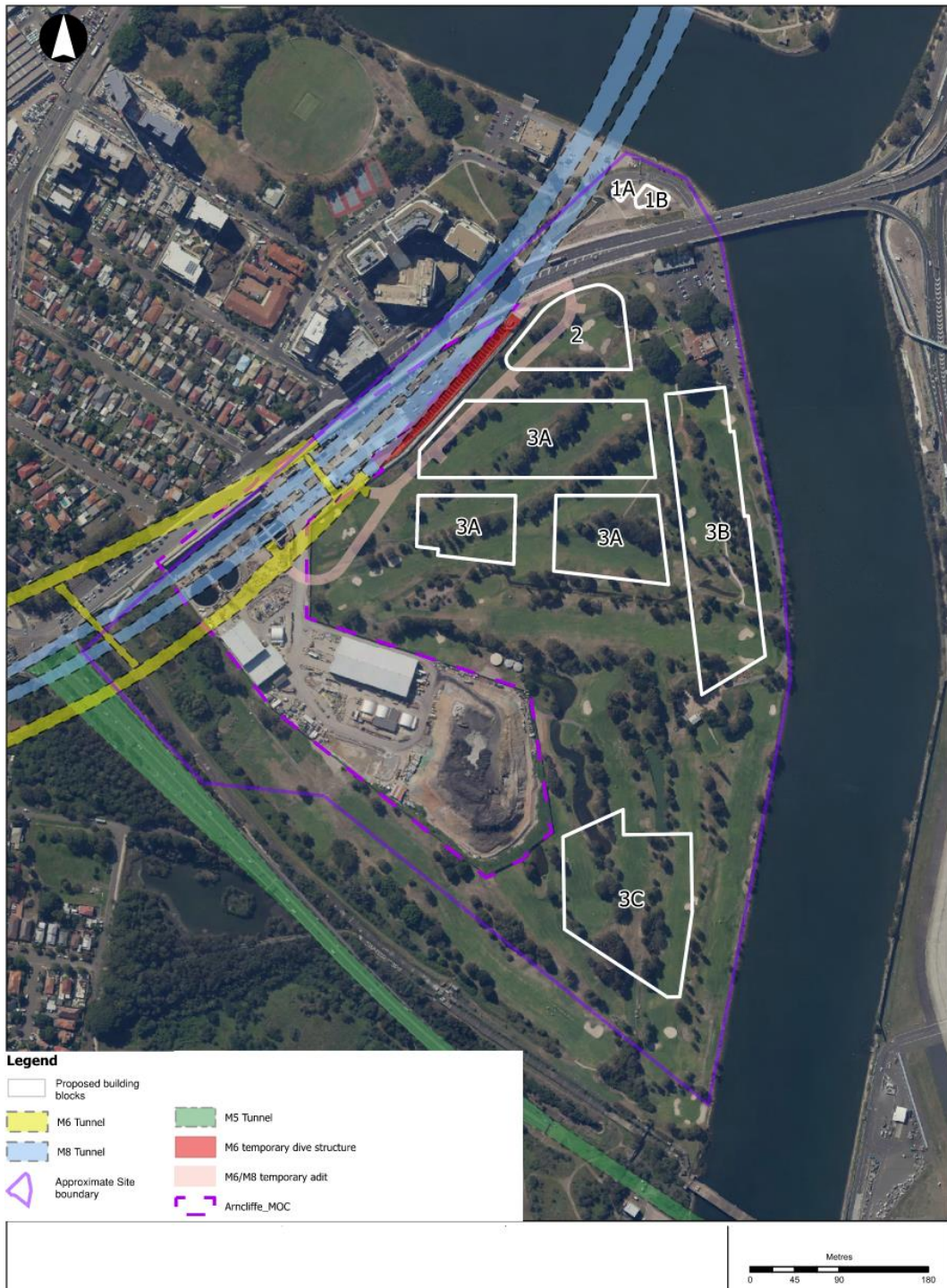


Figure 4 Indicative Plan showing major infrastructure including temporary works for its construction relative to the proposed development

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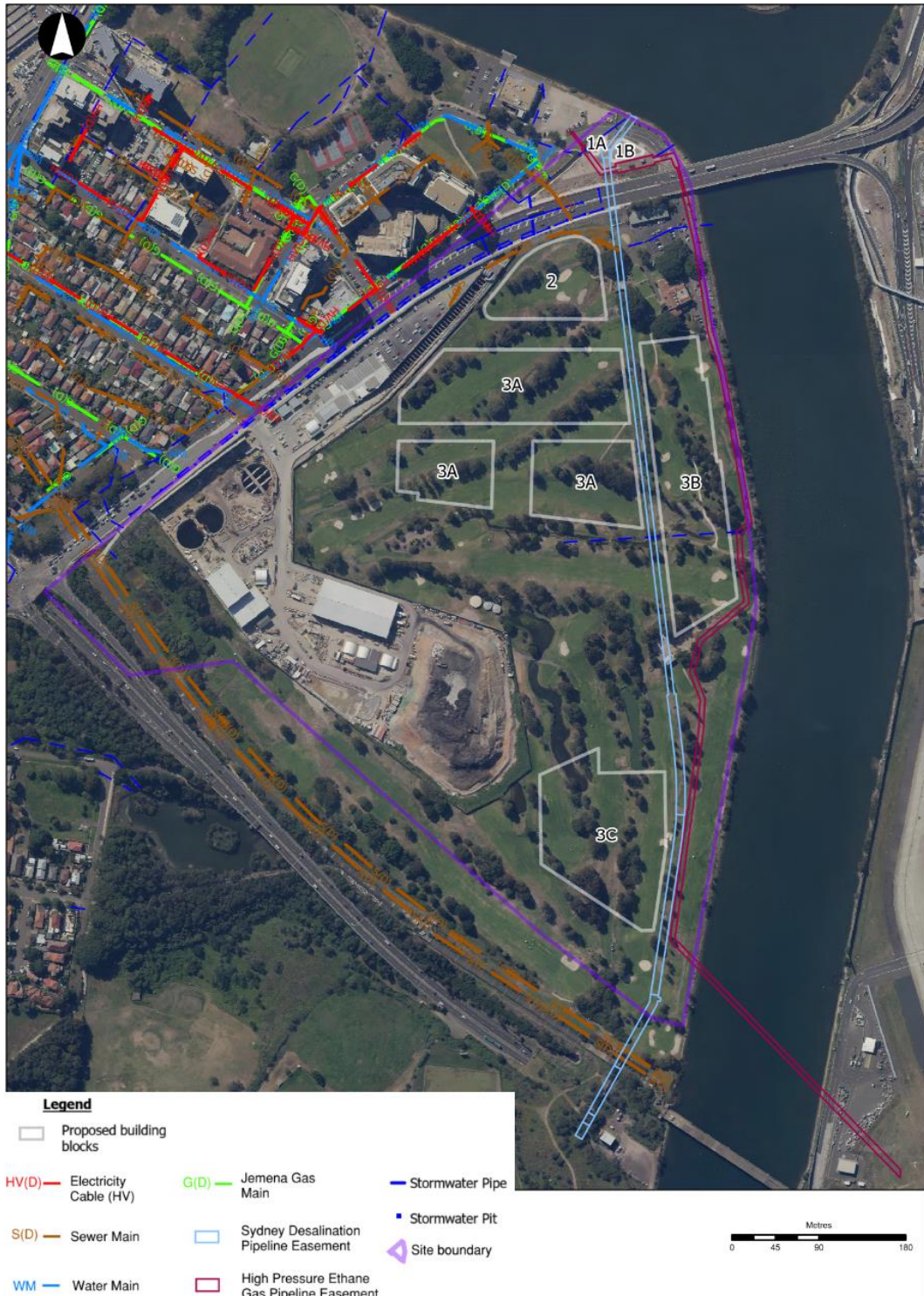


Figure 5 Indicative Plan showing major utilities relative to the proposed development

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4. Preliminary Ground Engineering Recommendations

4.1 Key Geotechnical issues

Key geotechnical issues identified from the reviewed information are as shown in Table 1.

Table 1 Summary of geotechnical risks and opportunities

Hazard	Implication	Mitigation
Uncertainty in ground profile – particularly rock head variability and increased uncertainty to the east and south of the Site where less data has been available to review.	Impacts on foundation and retention design e.g. deeper rock head profile results in deeper foundations and cut-off retention wall.	Undertake further Site Specific Geotechnical Investigation to understand this with more confidence.
Uncertainty in properties of superficial deposits.	Opportunities for foundation optimisation for pavements, civil structures and other lighter structures e.g. pre-loading, or rigid inclusion to manage settlements.	Undertake further Site Specific Geotechnical Investigation to understand this with more confidence.
Presence of known geological structures nearby to Site and across Site.	Likely that locally there will be zones that require increased engineered support to excavations, are more permeable and therefore require groundwater control measures.	Undertake further Site Specific Geotechnical Investigation to understand this with more confidence.
Uncertainty in Groundwater profile.	This has implications for: <ul style="list-style-type: none"> - Managing basement inflows and agreeing measures with WaterNSW - Quality control during piling and excavations. 	Undertake further Site Specific Geotechnical Investigation to understand this with more confidence.
Nearby Third Party assets.	Ground movements due to excavation, particularly the proposed Block 2 basement. Any works over major utilities have the potential to adversely impact neighbouring and underlying Third Party assets.	Undertake design analysis / ground movement assessment to understand zone of influence of the proposed development and to estimate ground movement effects from excavation and loading of the ground from new foundations.

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Hazard	Implication	Mitigation
		Undertake acoustic assessment to understand potential ground borne vibration impacts. Instrumentation and monitoring to check movements in line with design.
Uncertainty in as-built Third Party Asset details.	Risk that impact assessment will not be appropriate if construction detail of condition of asset is not as assumed.	Undertake dilapidation and geometrical survey for all interfacing assets identified. Request as-built records from asset owners when not already held.
Nearby Third Party assets.	Risk of works clashing with Third Party assets.	Survey assets in advance of finalisation of setting out. Obtain, review and design proposed works in response to existing assets.
High risk Potential Acid Sulfate Containing Materials.	Acid sulfates soils increase durability design requirements.	Undertake further geotechnical investigation to confirm this.

4.2 Pavements Approach

More details of the superficial deposit properties are required to assess shallow foundations / subgrade properties for the pavements. Options to improve subgrade condition through pre-loading will be explored once more geotechnical investigation is available.

4.3 Foundation Approach

Based on the anticipated subsurface conditions comprising a variable thickness of fill overlying alluvial / estuarine soils and limited test data across the Site, it is anticipated that footings for this development will comprise temporary cased bored piles socketed into the underlying sandstone bedrock.

It is noted that the basement level of Block 2 may be founded on bedrock. Depending on the number of basement levels, pad / strip footings may be possible. However, geotechnical investigations are required within the site to confirm rock levels and feasibility of shallow footings.

Pending further geotechnical investigation and sensitivity to ground movements, it may be possible to found smaller structures on piles through the Alluvial deposits.

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4.4 Retention Approach

There is currently one basement proposed on Site. This will be located under Block 2 and up to 16m deep.

Based on the anticipated subsurface conditions it is considered that a ground water ‘cut off’ retention system, such as diaphragm wall or hard firm secant piled wall retention system, will be required for this site.

Given the anticipated depth of the basement, it is anticipated that lateral restraint in the form of temporary ground anchors or internal propping will be required, installed progressively during the excavation. In the permanent case it is anticipated the internal permanent substructure will provide this restraint.

Where ground anchors are proposed, the anchors will require coordination with neighbouring assets to avoid clashes or impact the integrity of those assets. It is currently envisaged that all ground anchors will be destressed progressively once the permanent structure support is in place.

Groundwater bailing from the excavation would be required as the excavation progresses to Final Excavation Level.

4.4.1 Ground water retention

Given the proximity to the Cooks River, an undrained or ‘tanked’ basement is likely to be required in the permanent case to manage groundwater inflows, provide minimal impact to the aquifer, and so that WaterNSW requirements can be met.

A tanked basement would be designed to withstand full hydrostatic pressures in order to control uplift pressures on the basement floor slab. Ground water level will require consideration in relation to potential increases and fluctuations due to climate change. If the self-weight of the building cannot provide such uplift resistance, then tension anchors in the form of rock anchors or piles socketed into bedrock will be required to resist the uplift forces.

If the proposed basement is limited in levels, there is potential that a drained basement could be adopted through the bedrock. However, in the worst case, a drained basement could not be adopted in this location if relatively high potential inflow volumes impact on the aquifer surrounding the site and on Cooks River levels.

In a drained scenario, the basement would not need to be designed to resist hydrostatic uplift forces. Above the top of rock it is expected that a water cut off wall would still be required. A drainage layer would also be required beneath the basement floor slab and the water discharged to the stormwater system, which will require a sump and pump system. In addition, saline or contaminated groundwater may also require treatment prior to discharge. Any dewatering would be assessed for impact to surrounding areas.

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4.5 Recommendations

Further investigations should be undertaken to inform the development of risks associated with stratigraphy and other limitations. These would include, but would not be limited to:

- Further Geotechnical (including groundwater) and Contamination Site Investigations
- Confirmation of asset condition and locations for critical assets within and adjacent to the Site, including agreement of acceptable impact limits with asset owners (e.g. vibration, deformation, etc.)
- Geotechnical and Contamination interpretation for design
- Engagement with asset owners to agree parameters on development corridor and permissible locations for inground structures around their assets (i.e. piles, ground improvement columns, foundations, etc.)
- Ground Movement Impact Assessment – assessing various nearby Third Party assets
- Hydrogeological Impact assessment
- Detailed design and movement assessment of Third Party asset
- Collation of documentation at the completion of project construction works for the M8 of backfilling and inground structures left in-situ (i.e. anchors, walls, etc.)
- Develop Instrumentation and Monitoring Programme for the Works and protection management
- Construction Management Plan and Activity Method Statements supporting how quality and impact will be managed through methodology and good systems and processes on Site
- Construction Phase Services – Designer to attend in-ground works, checking works are being undertaken in agreement.

DOCUMENT CHECKING

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