JULY 2024

Taronga Zoo Sky Safari

Appendix DD
Infrastructure Delivery, Management and Staging Plan

PREPARED BY

ADP Consulting : Engineering

PREPARED FOR

TARONGA CONSERVATION SOCIETY AUSTRALIA

For the Wild

Taronga Zoo Sky Safari

Infrastructure Report

Prepared for: Taronga Conservation Society Australia

Project No: SYD2146
Date: 15 July 2024
Revision: 03

ADP Consulting : Engineering

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Creating great environments with great people

Project:	Taronga Zoo Sky Safari
Location:	Bradleys Head Rd Macquarie Park NSW 2113
Prepared by:	ADP Consulting Pty Ltd Level 6, 33 Erskine Street Sydney NSW 2000
Project No:	SYD2146
Revision:	03
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Rev	Date	Comment	Author	Signature	Technical Review	Signature	Authorisa-tion & QA	Signature
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Project Team	
Client / Principal	Taronga Conservation Society Australia
Services Consultant (MEP)	ADP Consulting

Contents

1. Executive Summary

1.1 Development Details

This Infrastructure Report has been prepared by ADP Consulting to accompany a detailed State Significant Development Application (SSDA) for the redevelopment of the Sky Safari at Taronga Zoo. The site is legally described as Lot 22 on Deposited Plan 843294 and is Crown Land managed by the Taronga Conservation Society Australia (TSCA).

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-46807958).

This report concludes that the proposed sky safari development is suitable and warrants approval subject to the implementation of the following mitigation measures:

> Survey of inground services prior to construction

Following the implementation of the above mitigation measures, the remaining impacts are appropriate.

1.2 Site Infrastructure

This report provides a review of the existing in-ground infrastructure surrounding and serving the proposed Stations and Pylons for the revitalised Sky Safari located within Taronga Zoo.

The project involves the removal of the existing Sky Safari, and construction of a revitalised Sky Safari, providing an easily accessible bird's-eye view over Taronga Zoo and surrounding Sydney Harbour National Park

Our desktop review has found the following:

> The existing Sky Safari is served from two substations, substation No.8 at the Top Station and Substation No.3 at the Lower Station. The capacity of these two supplies will need to be further assessed for their suitability to supply the proposed loads.

> The existing sewer main runs throughout the site from the eastern end to the north-western end, the site appears to be adequate to serve the proposed development

> The existing sizes and depths of the internal sewer, water, recycled water and stormwater network is unknown. Any works that require excavation and general construction of the pylons within the zone of influence or affect the assets may require protection and/or deviation.

> The existing 150mm CICL water main on Bradley Head Rd appears to be adequate to serve the proposed development.

> No gas is proposed to be used for the station cable carts. However, it is noted that the development of the top station may affect Jemena's assets whilst the mid station may affect the internal gas infrastructure within Taronga Zoo.

2. Introduction

This report has been prepared to accompany an SSDA for the redevelopment of the Sky Safari at Taronga Zoo, which is legally described as Lot 22 on Deposited Plan 843294.

Taronga Conservation Society Australia is a statutory body representing the Crown. The Minister for Planning and Public Spaces, or their delegate, is the consent authority for the SSDA and this application is lodged with the NSW Department of Planning, Housing and Infrastructure (DPHI) for assessment as the works are located within the Taronga Zoo site and have an estimated development cost that exceeds the $10 million threshold pursuant to Clause 2(h) of Schedule 2 of the *State Environmental Planning Policy (Planning Systems) 2021*.

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 11 August 2022 and issued for the SSD - 46807958.

2.1 Site Description

Taronga Zoo is located at Bradleys Head Road, Mosman and is situated in the Mosman Local Government area (LGA) and on Cammeraigal Country. The site is bounded by Bradleys Head Road to the east, Athol Wharf Road and Sydney Harbour to the south, Little Sirius Cove to the west and Whiting Beach Road to the north. Taronga Zoo is legally described as Lot 22 on DP843294 and is Crown Land managed by the TCSA (the Zoological Park Board). Taronga Zoo has been subject to numerous upgrades and redevelopment schemes over time, to stay compliant with contemporary regulations, meet contemporary animal welfare and contemporary visitor experience expectations.

Taronga Zoo has evolved over time from a Zoo that simply provides the traditional visitor experience of viewing animals in exhibits, to a Zoo that focusses on wildlife conservation, animal welfare and providing a range of visitor learning experiences. Taronga Zoo is one of Australia's most popular attractions, and together with Taronga Western Plains Zoo hosts more than 1.8 million visitors annually.

2.2 Project Description

Taronga Zoo is one of Australia's most popular attractions, and together with Taronga Western Plains Zoo hosts more than 1.8 million visitors annually. The Zoo has evolved over time from a Zoo that simply provides the traditional visitor experience of viewing animals in exhibits, to a Zoo that focusses on wildlife conservation, animal welfare and providing a range of visitor learning experiences.

Within Taronga Zoo, the Sky Safari is one of Taronga's most loved experiences and has transported more than 20 million passengers since it was first installed in 1987 and upgraded in 2000. The former Sky Safari was an ageing asset and was formally retired in January 2023. The redevelopment of the existing Sky Safari will allow the Zoo to update the now obsolete infrastructure on site and provide new facilities which improve accessibility, ease increased demand and assist the public in moving around the Zoo.

Development consent is specifically sought for:

- Site establishment works including removal of the existing Sky Safari;
- Installation of a new 916m Sky Safari cable car system including:
  - Construction of six (6) new pylons and structures within the Zoo ranging in height between 4.3m (P1) to 36.5m (P5)
  - Construction of two new stations at both the upper and lower entrances within the Zoo grounds.

  - Public facilities including accessible queueing areas, ticket booths and public amenities.
  - Associated mechanical plant, servicing and storage areas for ongoing maintenance.
- Landscaping works, including new accessible pathways, planting, shade structures and seating areas and wayfinding signage.
- Excavation, site preparation works and tree removal/pruning to allow the works to occur.
- Increased hours of operation.

2.2.1 Upgraded Experience

The reimagined cable car experience introduces approximately 20-25 new cable cars that are accessible to visitors with prams, large wheelchairs, and mobility challenges, to ensure all visitors to the zoo have a safe and dignified experience in utilising the Sky Safari. The new cable cars are also larger in capacity than existing cable cars to meet current and future visitor demand to visit the Zoo.

The infrastructure associated with the cable cars will incorporate approximately 6 pylon towers (previously 9 pylon towers with the retired Sky Safari) ranging in height from 4.3m to 36.5m. The route itself has been carefully located to minimise impact on remnant bushland, existing trees and the archaeological and built heritage as well as scenic values of the Zoo.

Overall, the route of the upgraded Sky Safari maintains the existing footprint of the upgraded Sky Safari, however, will require the cable car corridor to increase from 9m to 12.5m.

2.2.2 Cable Car Stations

A new station is proposed at each end of the new cable car route allowing for visitors to enter and exit at both the top and bottom of the Zoo site.

Top Station is proposed to replace the existing storage facility adjacent to the Main Entrance Plaza. The new station will provide Zoo guests with direct access to the Sky Safari via the existing Main Entrance Plaza. The station provides covered queuing within the heritage building and associated landscaping and shading provided in the plaza space.

Lower Station is proposed to replace the existing lower station near the Taronga Ferry Wharf. The station aims to improve existing queuing on site by incorporating fully equitable queuing areas with shade and amenity in order to enhance the visitor's arrival experience. The Lower Station will have improved accessibility through the new ramping system up to the station which will make the station easily accessible for those in wheelchairs and with prams. In addition, level access into the station when re-queuing to use the cable car to go back to the Top Station, removing the existing stairs. A lift will also be provided to access the platform if required by guests. The station will also be supplemented with toilet amenities and a ticketing booth.

There are six pylons, one located at each station (top and lower) and four within zoo. There are no pylons outside of the Zoo grounds.

- Pylon 1 (4.3m) – located in close proximity to the existing and proposed Lower station;
- Pylon 2 (9.7m) – located by the existing Pylon 2;
- Pylon 3 (26.2m) – located by the Food Court;
- Pylon 4 (35.7) – in front of the Savannah toilet facilities;
- Pylon 5 (36.5m) – located to the north of the Helmore lawns; and
- Pylon 6 (6.5m)– located in close proximity to the existing and proposed Top station.

2.2.3 Hours of Operation

The Zoo is currently in operation 24/7. It is intended that the Sky Safari will continue to operate within the following indicative hours to activate the site and create a new immersive experience to educate visitors on the work of the TSCA. These hours fluctuate from time to time:

- Indicative Sunrise & Early Morning Sessions
  - Daylight savings (AEDT): 6:00am to 9:30am
  - Non-daylight savings (AEST): 5:00am to 9:30am
- Zoo Operating Period
  - 9:30am to 5:00pm (September to April)
  - 9:30am to 4:30pm (May to August)
- Indicative Sunset & Twilight Sessions
  - Daylight savings (AEDT): 5:00pm to 9:00pm
  - Non-daylight savings (AEST): 5:00pm to 7:00pm
- Indicative Special Events (ie. Vivid): 5:00pm to 12:00am

To meet safety standards, and comply with manufacturer specifications, commissioning, and maintenance will occur between 6:00pm – 6:00am.

3. Electrical Infrastructure

3.1 Existing Infrastructure

Taronga Zoo operates as a time of use HV customer with its own private 11kV HV network reticulating throughout the Zoo with 9 on site substations with varying capacities.

Of the 9 substations on site, three are relevant to the proposed development. Substation No.3, rated at 750kVA, located near the Lower Station currently provides power for the existing building. Substation No.8, rated at 750kVA, located near the Top Station is currently supplying the existing Sky Safari building.

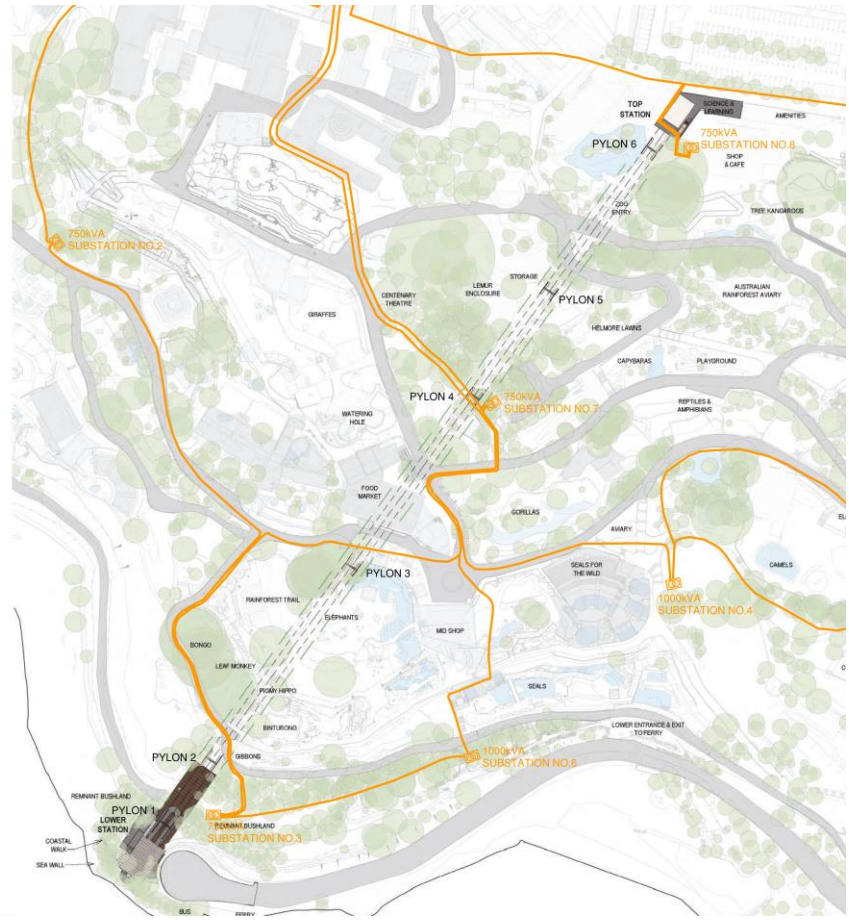
Substation No.7 is located close to the proposed Pylon 4 and could be impacted by ground works.

Information received indicates the existing Sky Safari had the following power loads:

> Substation No.3 – 137kVA

> Substation No.8 – 428kVA

Figure 1 Existing HV Electrical Infrastructure



3.2 New Works Associated with Electrical Infrastructure

Assuming there is sufficient capacity, it is proposed that the existing infrastructure be retained and reconfigured to provide supply to the new Sky Safari Stations and Pylons.

Figure 2 Lower Station Supply from Substation No.3

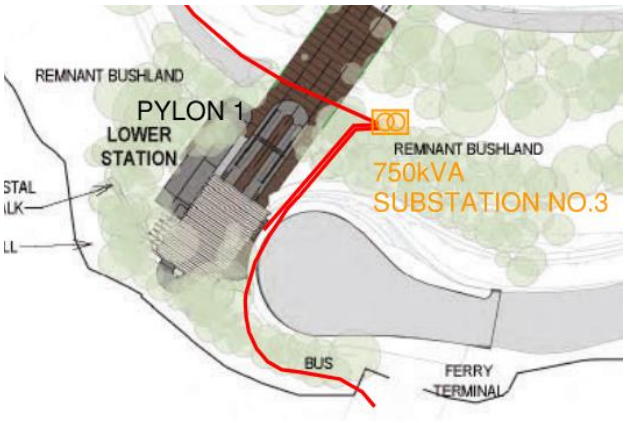
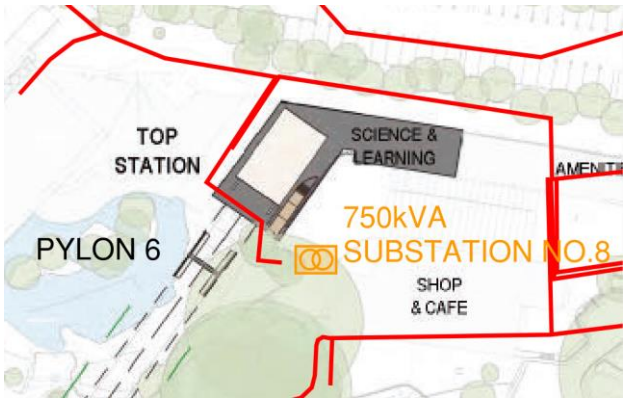


Figure 3 Top Station Supply from Substation No.8



The initial power requirements received from the system manufacturer are as follows:

Initial Case

- Bottom/Drive Terminal: 265 KW max draw
- Top/Return Terminal + O&M + Cable Car Storage: 210 KW max draw
- Backup Power Required: 164 KW (bottom), 80 KW (top)

Future Case

- Bottom/Drive Terminal: 315 KW max draw
- Top/Return Terminal + O&M + Cable Car Storage: 285 KW max draw
- Backup Power Required: 200 KW (bottom), 80 KW (top)

As can be seen in the loading, the drive system for the proposed new sky safari is reverse that which is currently installed, with the new drive unit being located at the Lower Station as opposed to the existing drive system being supplied at the Top Station.

With the increase in demand on the Lower Station, further assessment of the existing peak demand on Substation No.3 will be key to determining the suitability for the proposed arrangement. While with the

reduced load on the Top Station, it is assumed this can be adequately supplied from the existing substation No.8.

Confirmation from supplier will be required to confirm the extent of the backup power requirements.

3.3 Risks

The following items will need to be confirmed during the design development phase:

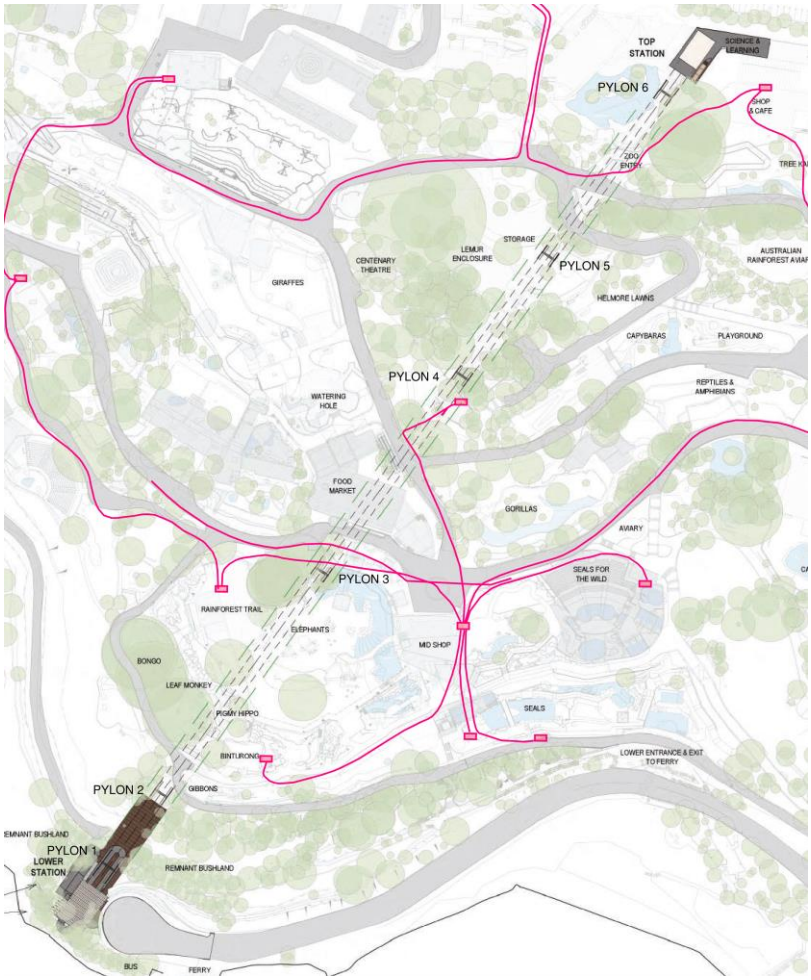
- Existing substation peak demands and load profiles
- Backup power requirements for the new Sky Safari.
- Accurate inground surveying to overlay existing electrical infrastructure with proposed building works.

4. Telecommunications

4.1 Existing Infrastructure

There is a mix of fibre and copper communications networks throughout Taronga Zoo, where building distributors are located in relatively close proximity to the existing Sky Safari and it is proposed that the network be extended to provide connectivity to the new buildings.

Figure 4 Existing Fibre Optic Network



5. Water, Sewer, Recycled Water & Stormwater Infrastructure

5.1 Existing Infrastructure

The existing infrastructure works located within Taronga Zoo have been obtained from AECOM's Taronga Zoo Infrastructure Records Project No: 60044290. The surrounding water & sewer authority serving Taronga Zoo is Sydney Water.

5.1.1 Sewer

The AECOM infrastructure records indicates:

> An existing sewer main network is located throughout the site.

> See Figure 13 below for sewer main location:

Figure 13 Existing Sewer Infrastructure

The BYDA information provided by Sydney Water indicates:

- An existing Ø225mm VC (Vitrified Clay) Sydney Water main runs south along the eastern boundary then towards the west along the southern boundary and then up north along the western boundary. The same sewer main upsizes to a Ø300mm VC sewer main.
  - There is an interval of the sewer main that changes from a VC to a CI (Cast Iron) pipe.
  - Sydney Water sewer manholes are located along the sewer main at each turn of direction.
  - The classification of sewer type is unclear from Sydney Water, however, given the topography of the site and the indicative flow noted on the BYDA document, it suggests that this may be a pumped system.
- The Sydney Water sewer main is also represented by the AECOM infrastructure records as the primary sewer main serving the site.

5.1.2 Water

The AECOM infrastructure records indicates:

- An existing water main network is located throughout the site
- See Figure 14 below for water main location:

Figure 14 Existing Water Infrastructure

The BYDA information provided by Sydney Water indicates:

- An existing Ø150mm CICL (Cast Iron Cement Lined) Sydney Water water main runs along the eastern boundary of the site on Bradleys Head Rd. The water main material changes from a CICL to SCL (Steel Cement Linted) back to CICL.
- A potable water connection is made from here. The size and exact location is unknown.

5.1.3 Recycled Water

The AECOM infrastructure records indicates:

> An existing recycled water main network is located throughout the site

> See Figure 15 below for water main location:

Figure 15 Existing Recycled Water Infrastructure

There are existing recycled water main connection points for the top station, however, there is no indication of a recycled water main available to the lower station.

5.1.4 Stormwater

The AECOM infrastructure records indicates:

> An existing stormwater main network is located throughout the site

> See Figure 16 below for water main location:

Figure 16 Existing Stormwater Infrastructure

The size and depths of the water, recycled water, sewer and stormwater mains are to be confirmed prior to any works being conducted to ensure that they have adequate capacity to serve the proposed pylon structure. Should any excavation works be required, it is necessary to confirm the invert levels (IL's) of the existing services to appropriate relocate or protect them.

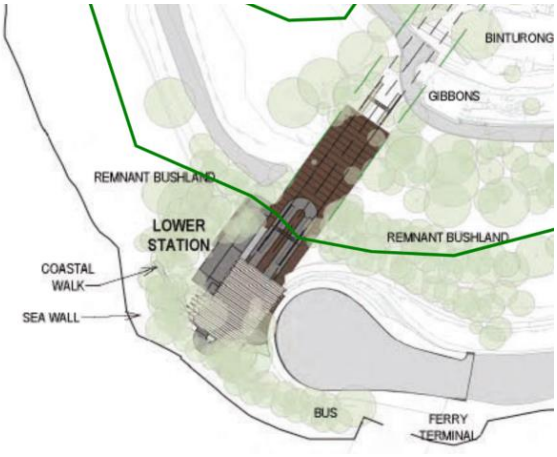
5.2 New Works Associated with Sewer, Water, Recycled Water & Stormwater Infrastructure

5.2.1 Sewer

The sewer connection will be to the following highlighted sewer mains running adjacent to the proposed Pylon locations. It is anticipated that the sewer main will be sufficient to serve the pylons. However, this is subject to the exact size and current loading of the sewer main. Should Sydney Water deem the main to be inadequate based on the loads in the existing infrastructure, an upgrade would potentially be required.

The sewer main serving the lower station will be connected into through a pumped system as gravity drainage may not be achievable.

Table 16 Sewer connection

Top/Nature Station	Bottom/Lower Station
	

The lower station sewer connection will be directly into the Sydney Water Ø300mm VC sewer main. The top nature station does not have a direct sewer connection point as seen above. A sewer main extension may be required to serve the station The exact location of sewer connection is subjected to a Section 73 Notice of Requirements Advice. The BYDA Sydney Water sewer and water diagram is shown below:

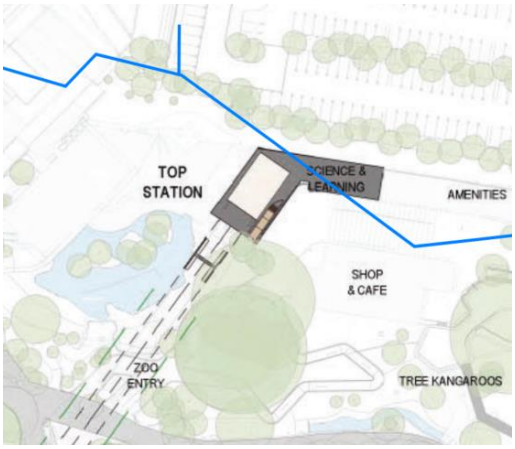
Figure 3 Sydney Water BYDA Diagram

5.2.2 Water

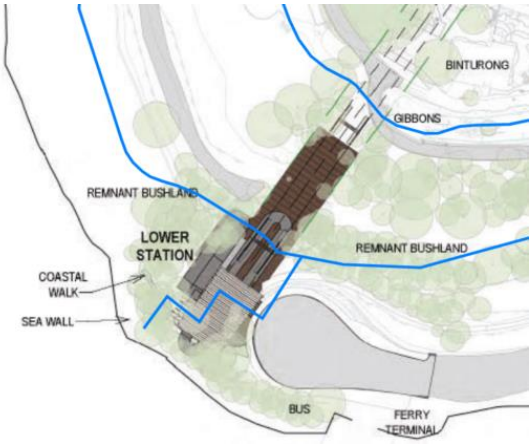
The water connection will be to the following highlighted water mains running adjacent to the proposed Pylon locations. It is anticipated that the water main will be sufficient to serve the pylons. However, this is subject to the exact size and current loading of the water main. If there is insufficient pressure in the mains, a pump will be supplied to boost the pressure. A direct connection from the water mains is available to both the top and bottom stations.

Table 16 Water connection

Top/Nature Station



Bottom/Lower Station



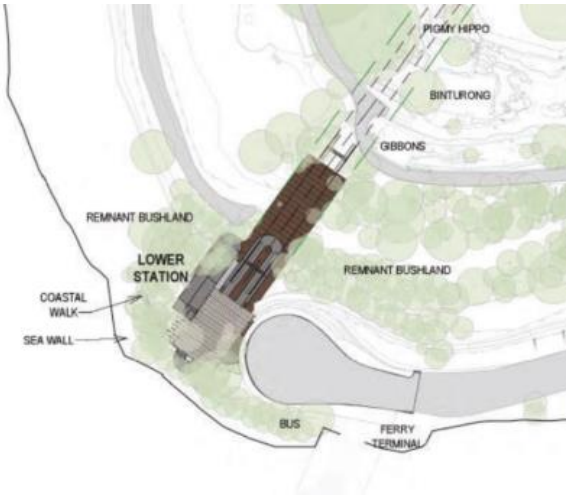
5.2.3 Recycled Water

The recycled water connection will be to the following highlighted recycled water mains running adjacent to the proposed Pylon locations. It is anticipated that the recycled water main will be sufficient to serve the pylons. However, this is subject to the exact size and current loading of the sewer main. If there is insufficient pressure in the mains, a pump will be supplied to boost the pressure.

Table 16 Recycled Water Connection

Top/Nature Station

Bottom/Lower Station



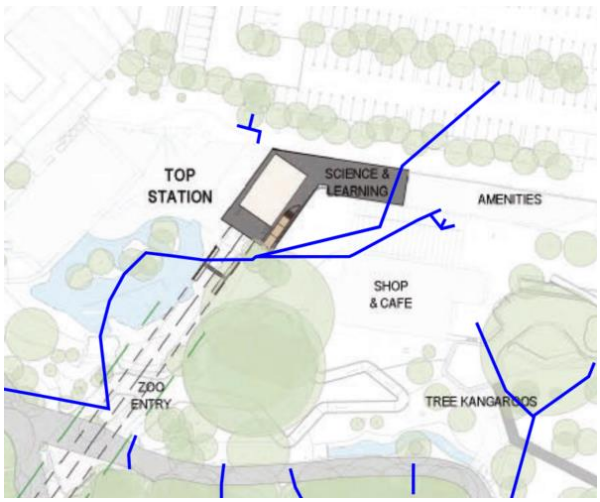
There are no recycled water mains located within the proximity to the lower station. If the lower station requires a recycled water connection, the recycled water main will have to be upgraded and extended to the lower station to serve. A recycled water main connection to the top station will have to be extended from the existing infrastructure.

5.2.4 Stormwater

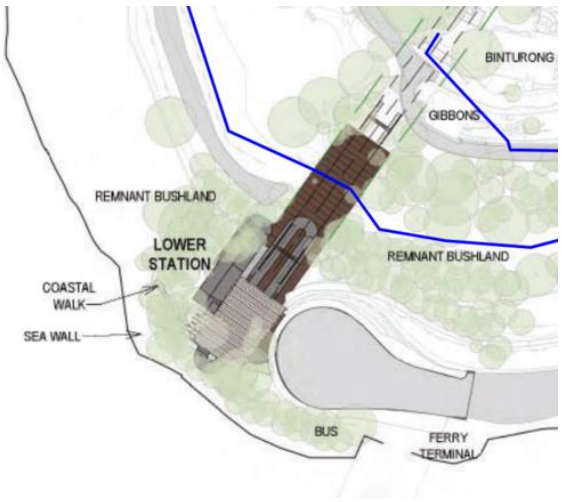
The stormwater connection will be to the following highlighted stormwater mains running adjacent to the proposed Pylon locations. It is anticipated that the stormwater main will be sufficient to serve the pylons. However, this is subject to the exact size and current loading of the stormwater main.

Table 16 Stormwater connection

Top/Nature Station



Bottom/Lower Station



There are direct connections for the top and lower station to a stormwater main.

5.3 Risks

The following items will need to be confirmed during the design development phase to determine the development sewer drainage and water demand:

- Fixture and Loading Units for the proposed building (respective sewer drainage and water services demand for the development).
- A pressure and flow inquiry will be required to confirm requirements for potable water booster pumps.
- The size and depths of the existing water, sewer, recycled water and stormwater mains are unknown and are required to confirm whether there is capacity.
- Excavation for the pylons next to existing Sydney Water assets is likely to affect the 'zone of influence' and trigger protection or relocation of the water mains. A Water Services Coordinator is required to be engaged for liaison with Sydney Water to assess the impacts of any buildings located on site under a Building Plan approval and may trigger the requirements for a structural engineer to advise and design appropriate Sydney Water Asset Protection.
- The frequency and usage of the cable car washdown will determine the size of the oil separator and pumpout connection to the sewer main.
- A Water Services Coordinator is required to be engaged for liaison with Sydney Water in regard to the Section 73 application, and to advise sewer drainage and water services connection locations to the respective Sydney Water mains.

6. Gas Infrastructure

6.1 Electrification Option

Gas will not be provided to the station for hot water generation instead electric hot water options will be provided. However, it is noted that there is existing gas infrastructure within the site.

6.2 Existing Infrastructure

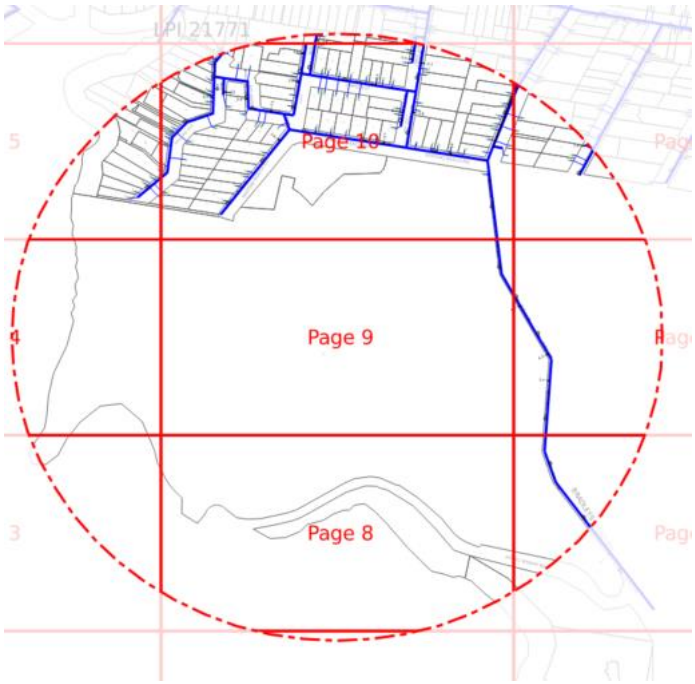
The existing size and rating of the internal infrastructure is unknown. Figure 3 below highlights the internal gas infrastructure network. It is anticipated that the gas main running along the eastern boundary of the site is Jemena's gas main.

Figure 5 Existing Gas Infrastructure

The BYDA information provided by Jemena indicates:

> A 75mm Nylon 210 kPa medium pressure gas main is located along Bradleys Head Rd

Figure 16 Existing Jemena Gas Infrastructure



6.3 New Works Associated with Gas Infrastructure (if required)

No new connections are proposed. Construction works associated with the development of the cable cart pylons may affect surrounding infrastructure. Works for the top station may impact Jemena's gas main along Bradley Heads Rd. Works for the mid station could potentially affect the existing gas infrastructure within Taronga Zoo. It is not anticipated that works at the mid and lower station will affect existing gas infrastructure.

6.4 Risks

The following items will need to be confirmed during the design development process in order to determine the development gas demand:

- Any works within 3m of the mains will require a high pressure standby technician onsite to oversee the works.
- If any relocations are required due to the development the gas main relocations may fall under complex/construction works and Jemena's projects and engineering team will need to review further to advise on required processes. This review has associated costs.
- Excavation for the Top Station Pylon next to existing gas mains is likely to affect the 'zone of influence' and trigger protection or relocation of the gas mains. Jemena is required to be engaged to assess the impacts of any buildings located on site.

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