



1 Introduction

This Construction Management Plan has been prepared in response to the Secretary's Environmental Assessment Requirements (SEARs) key issue No.8 Construction Impacts, and to be submitted with the Environmental Impact statement (EIS) for the Taronga Institute of Science and Learning (the Institute) at Taronga Zoo to be submitted to the NSW Department of Planning and Environment.

Figure 1 – Proposed Site Plan



2 Project Overview

The Taronga Institute of Science and Learning (the Institute) is a key component of Taronga's 10 year development program.

The Institute will occupy an area of 2,000qsm and represents a significant capital investment in the Zoo's redevelopment programme. The Institute will reinforce and expand Taronga's contribution to conservation, science, education and enhance the visitor experiences at the zoo.

This Construction Management Plan (CMP) relates to the redevelopment of the existing education centre, ANZ theatre and ancillary buildings located in the upper north west area of the Taronga Zoo (Figure 1). The proposed works will require significant demolition of existing structures and upgrade of critical infrastructure services and an existing lecture theatre and ancillary spaces.



Figure 2 – Location Plan

In summary the extent of the works can generally be summarised as follows:

1. The Demolition of the existing education centre building, the Section 170 Registered Staff Amenity Block and the archive and records building, the capital works building and animal holding areas and ancillary structures.
2. Construction of a new three level building consisting of :
 - Laboratory and research facilities (Lower Ground)
 - Classrooms and lecture rooms (Ground)
 - Open offices and administration (Level 1)
3. Existing lecture theatre and ancillary spaces and external wildlife encounter areas will be retained and upgraded, maintaining a similar function to the existing ie animal encounters with VIP and students.
4. Upgrade of existing courtyard and external landscape areas to support passive recreational use for students and staff.
5. Upgrade of surrounding landscape and integration with adjacent bushland areas.
6. Connection of facility to existing circulation pathways for the greater zoo.
7. Services upgrade and augmentation as required.

3 Project Staging and Key Milestones

The project is intended to be delivered in a single stage and encompass the works as shown on the proposed site plan.

3.1 Project Staging and Key Milestones

The indicative program and key milestones are outlined in the following schedule:

Site Establishment	September 2016
Commencement on Site	October 2016
Commissioning	December 2017
Animal Establishment	December 2017
Opening of Taronga Institute of Science and Learning	March 2018

4 Construction Activities

4.1 Site Establishment

Site compound is anticipated to be established from commencement of the contractor on site or as soon as practicable and be located at the top of the Zoo site within close proximity to the proposed works site.

Hoardings and scaffolds will be erected as required for safety and site demarcation.

Security protocols, check points, crainage and loading zones will be agreed and established with the appointed managing contractor prior to commencement of works.

4.2 Service Diversions

Infrastructure and critical services affected during construction will be identified and traced so as to ascertain the exact effect on the construction works and to minimise disruption to other areas of the Zoo.

Thorough investigation will be undertaken to ensure capping and removal of services does not affect other parts of the Zoo. It is anticipated that an early works package is utilised to upgrade and establish critical services that are located within the proposed construction zone. This programme is intended to mitigate risk and impact of construction on critical services that are essential for the Zoo's day to day operation.

The High Voltage network at Taronga Zoo operates at 11kV and is privately owned by Taronga Zoo and all works will be in accordance with Taronga Zoos High Voltage Installation Safety Management Plan (ISMP)

All hydraulic services, including water, stormwater and sewer drainage will be located and capped at the perimeter of the construction site during the demolition and site preparation

phase of the works as required. Appropriate sediment and discharge control devices will be incorporated throughout construction.

4.3 Demolition and Deconstruction

The demolition of the existing buildings and ancillary structures will be carried out using a combination of excavation machinery depending upon the location and nature of the demolition works.

No demolition work will commence until a hazardous material assessment has been completed and any identified hazardous materials have been removed.

A comprehensive survey of the existing site is to be conducted prior to demolition to identify existing materials for reuse or recycling. Possible recycled materials include sandstone, bricks and other valuable materials suitable for reuse are anticipated to be salvaged and utilised throughout the landscape at the Institute or with other projects at Taronga.

The project has intention is to minimise demolition and construction waste from landfill. A project specific Waste Management Plan (WMP) will be a requirement of the managing contractor to be submitted through the construction tender process and implemented by the contractor throughout the course of construction. All contaminated materials and soil such as asbestos are to be excluded from the 90% recycling / re-use rate.

There will be close consultation with all stakeholders during the demolition phase to inform of timing of any demolition works which may impact on the Zoo operations and amenity.

4.4 Excavation

The excavation of civil works will commence upon completion of the demolition. Priority will be to establish pathways for upgraded critical services infrastructure followed by preparation for building foundations and site levels.

Excavated material will be reused on site as controlled fill where required and any excess fill will be removed using excavators and trucks.

Trucks will be dispatched via the designated access routes to approved disposal locations.

4.5 Foundations

Foundations and footings will be engineered and constructed in such a way as to mitigate the risk of noise and vibration that may affect adjacent areas.

4.6 Building Structures

The buildings and spaces will be constructed from a variety of materials with a combination of masonry block construction and light weight construction methods.

4.7 Landscaping

Landscaping works are anticipated to integrate the proposed development area with the surrounding landscape typology. Where possible on site landscape and topography will be retained.

4.8 Finishes and Fit Out

The finishes and fit out of the buildings and spaces will commence once the buildings are watertight.

This work will proceed in a conventional sequence with the partitions, services rough-ins and wet trades followed by the dry finishes and services.

4.9 Services

Essential inground services to the Zoo including high voltage electrical supply are intended to be installed prior to the commencement of major building works. Non critical In-ground infrastructure services, including water, stormwater drainage, sewer drainage and electrical reticulation will be installed at the same time as the structure is commenced. The services design will determine the location of connection to mains supplies and also the need, if required, of any upgrading to these mains.

The rough-in and fit out of services within the buildings and spaces will be undertaken as part of the fit out and finishes of the relevant areas. The commissioning of these services will be required before practical completion and handover of the facility.

Integration of the buildings, external spaces, ancillary structures and services with the existing Zoo control systems will form part of completion for the services to the project.

4.10 Material Handling

It is anticipated that building structure and associated materials will be hoisted and moved by a combination of mobile cranes and forklifts. Where possible off site prefabrication methods will be utilised to minimise noise and impact to the Zoo's day to day operations.

Concrete pumping for the new structure will generally take place from within the site any impact on the surrounding Zoo operations will have to be addressed prior to concrete pours.

The size of materials delivery and weights will have to be considered in order to access the site via the existing Zoo's internal road network.

5 Impacts on Adjoining Neighbours

The development site is located in the upper South West corner of Taronga Zoo and is bounded by the existing at grade carpark park, multistorey carpark and general zoo entry area. There are some animal exhibits in the close vicinity, where possible animals will be relocated for the purposes of construction. The closest residential neighbours are those properties located on Whiting Beach Road and toward the end of Prince Albert Avenue.

The effect of construction on adjoining neighbours and other Taronga Zoo operations will be:

- Noise during demolition and construction activities
- Traffic from demolition and construction activities
- Overhead mobile cranes
- Overhead works

6 Consultation Groups

6.1 General

TCSA and its Managing Contractor (MC) will establish appropriate communication group to keep its residential neighbours and other relevant groups informed of the construction works.

TCSA will also develop a Communication Plan that will determine the appropriate communication with neighbours and other Taronga Zoo operations are consulted during the construction stage of the project.

6.2 Issues /Complaints Register

The MC will record details of all complaints received during construction by the establishment and maintenance of a Issues /Complaints Register and report to the TCSA Project Manager on a monthly basis the status of the register and respective issue/complaint.

7 Construction Risks and Mitigation Measures

With regard to construction risks and mitigation measures associated with the construction, refer to Table below.

Issue or Risk	Risk Mitigation Measure
Demolition/Site Establishment	
1. Noise from demolition work.	<ul style="list-style-type: none"> The construction equipment will be fitted with noise mitigation equipment where possible. Noisy work will be identified and advised to stakeholders and where applicable neighbouring residents in advance, to inform when noise may affect their operations.
2. Dust from demolition and construction works	<ul style="list-style-type: none"> Site hoardings to be placed around the site. If / where possible, large concrete elements to be crushed off site. Construction activities and vehicle access routes to be hosed down. Construction vehicles to be hosed down prior to leaving site. Adjacent roadways approaching site to be regularly cleaned.
3. Hazardous materials being removed	<ul style="list-style-type: none"> Hazardous material assessment to be undertaken to define removal and disposal methods. On approval, works to be undertaken as per the assessment / recommendation report.
4. Runoff from stormwater	<ul style="list-style-type: none"> Silt traps and filters (socks and fabric) to be used at required locations along the stormwater system.
Construction Works	
5. Noise from construction work	<ul style="list-style-type: none"> Construction equipment to be fitted with noise mitigation equipment. Location of concrete pump to be considered to minimise noise to adjacent neighbours. Noisy work will be identified and advised to stakeholders and where applicable neighbouring residents in advance.
6. Vibration whilst Constructing foundations and footings	<ul style="list-style-type: none"> Where pile footings are required bored piles to be used, in place of driven piles. Works will be identified and advised to stakeholders in advance, to inform when impact may affect their operations.
7. Use of construction	<ul style="list-style-type: none"> Construction activities and public to be separated with

traffic / plant	appropriate traffic control measures. <ul style="list-style-type: none"> • Safe public access routes to be pre-agreed, provided by managing contractor prior to commencement and maintained throughout. • Construction work not to be undertaken on Major Event days at the Zoo.
8. Waste water from construction activities.	<ul style="list-style-type: none"> • Waste water to be collected and treated prior to disposal.

8 Workplace Health and Safety

The Contractor is to be appointed the Principal Contractor under the OH&S Act. The Contractor is to prepare a Site Specific OH&S Management Plan.

Specific areas that have been identified of particular importance are:

- Preventing falls from height.
- Preventing electrocution from existing, future and construction power supply.
- Adjacent structures remaining safe and stable.
- Providing adequate side support to excavations.
- Hoarding and public protection.
- Controlling public pedestrian and vehicle traffic around perimeter of site.

9 Traffic Management (During Construction)

9.1 Work Hours

It is proposed that the construction works will be carried out between the following hours

Monday to Friday 7:00am – 6:00pm

Saturday 7:00am – 1:00pm if inaudible on adjoining premises, otherwise
 8:00am to 1:00pm

Construction vehicles will only be permitted to enter the Zoo between the hours of 6:00am to 5:00pm Mondays to Friday inclusive and 7:00am to 1:00pm Saturdays, but excluding public holidays.

Any work outside the proposed construction hours will be subject to prior approval from Mosman Council or NSW Department of Planning.

9.2 Construction Traffic Vehicle Type

Construction vehicles likely to be generated by the construction activities include:

- Articulated trucks for the delivery of machinery (including mobile cranes and diggers)
- Trucks to collect demolition material and excavated material
- General vehicles such as concrete trucks, medium rigid trucks, small rigid trucks, trademan's utilities and courier vans.

9.3 Construction Vehicle Access

The construction vehicles will use the following accesses:

- Whiting Beach Road access via the staff carpark (to be used during work and outside zoo operating hours)

The figure below shows access points and routes within the zoo and also potential lay down area for construction materials

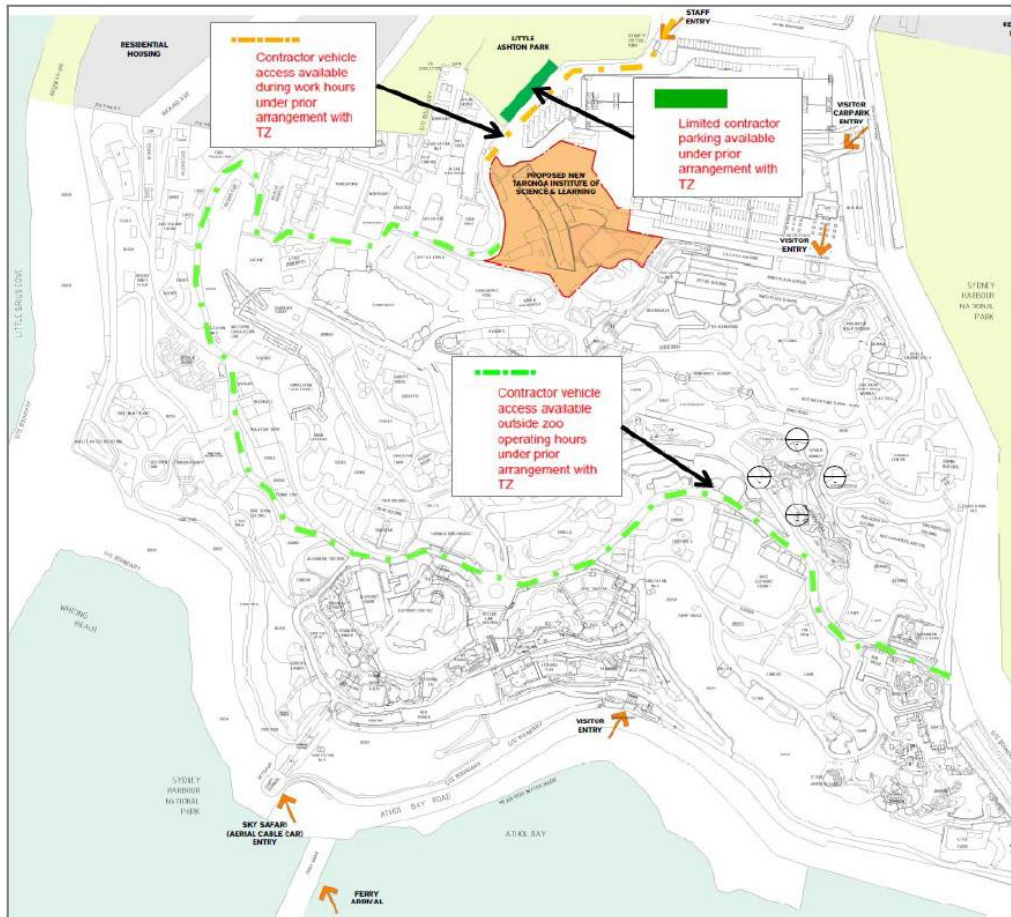


Figure 3 – Site Access Plan

Taronga Zoo also implements a strict vehicle policy within the Zoo grounds, which is applicable for the construction works. The Vehicle policy is detailed below.

1. Restrict movements of vehicles to the minimum requirements for executing the Works. Do not drive private vehicles into the Zoo grounds.
2. **Do not exceed 10 km per hour.**
3. Do not drive vehicles including suppliers' delivery vehicles within the **public areas** of the Zoo between the hours of 9.00am to 5.00pm during school holidays and weekends, and 10.00am to 3.00pm at other times.
4. Between 6.00am and 9.00am and between 5.00pm and 6.00pm during school holidays and between 6.00am and 10.00am and between 3.00pm and 6.00pm at other times, up to ten (10) vehicle movements are permitted per day in the **public areas**. Escort larger vehicles to the construction Site.
5. Movements of vehicles in **other areas** of the Zoo are restricted to between the hours of 6.00am to 6.00pm subject to the approval of the RP.
6. Roads within the Zoo may not have a heavy duty pavement. The roads may not be suitable for articulated or long wheel base vehicles. Some of the roads are unsealed and may not be suitable for use in wet weather.

7. Roads within the zoo may have limited width and headroom. Check the access before organising vehicular transport.
8. Use a route as directed by Zoo staff and notified prior to start and use service roads where possible.
9. Limit movement of heavy vehicles to be used in removing spoil or other materials from the Taronga Zoo to between the hours of 7.30am to 4.30pm on Monday to Friday and between 7.30am to 1.00pm on Saturday, or as required by Mosman Council, subject to restrictions in item 3 above for vehicle movements within the Zoo.
10. Take responsibility for any damage caused by vehicles, including those of subcontractors and suppliers, using the roads and repair any such damage at no cost to the Principal.
11. Keep access roads and adjacent footpaths, gutters and drains clear of construction waste, debris and mud, clean as required and remove waste, debris and mud from the Zoo, all at the Contractor's cost.
12. Comply with the physical limitations on the height of vehicles using Zoo roads.
13. Where it is necessary to remove fences within the Zoo to enable access to be gained to work areas, keep the areas secure at all times and reinstate the fences as soon as practical.
14. Do not ride in/on back of vehicles; and ride in seat with seat belt fastened.
15. Fuelling of vehicle at or near public areas is not permitted.
16. Park vehicles on Site within the site compound or at locations as directed by Zoo staff.
17. **The Zoo is a pedestrian park and pedestrians have right of way.**

As listed above, the construction vehicles accessing the Zoo grounds would occur outside of the busy zoo operating period. Vehicle access within the Zoo grounds would generally be limited to 6.00am – 10.00am and 3.00pm – 6.00pm

9.4 Construction Vehicle Routes

The designated truck routes for the construction vehicles are:

- To/from North – via Spit Bridge/Military Road/Bradleys Head Road
- To/from West – via Military Road/Bradley's Head Road

This is shown in the figure below



Figure 4 – Construction Access Routes

All construction vehicles accessing site would do so in full compliance with the required clearway and parking restrictions.

9.5 Estimate of Construction Traffic

It is estimated that the construction activities would generate construction vehicles peaking at 10 to 20 deliveries per day (i.e.: 1 to 2 vehicles per hour). This low volume of construction vehicle flow is unlikely to present any road capacity problems in the vicinity of the site.

9.6 Parking for Construction Workers

The number of workers likely to work on the site will vary throughout the project, however it is anticipated that up to 50 workers may be present at any one time.

Construction vehicles will park in along the green section as shown in Figure 3 which would be designated parking section for contractors only. This area currently accommodates about 30 to 40 informal (not line marked) spaces.

9.7 Emergency access

Access to the construction area by emergency vehicles would be available via the two access points, which are via Bradleys Head Road or Whiting Beach Road.

10 Waste Management

The proposed demolition contractor will be required to recycle and reuse where possible.

A comprehensive survey of the existing site is to be conducted prior to demolition to identify existing materials for reuse or recycling. Possible recycled materials include bricks and timber from existing structures.

Materials from the demolition process of the existing exhibit will be reclaimed where possible and reused in and around the zoo.

Elements such as inground stone, concrete, steel, aluminium and timber will be separated and recycled or reused where possible.

Prior to commencement of demolition and excavation works, a hazardous material and contaminated ground survey assessment will be undertaken on all structures and soil material. Any hazardous material identified will be disposed of in accordance with statutory and EPA requirements and guidelines.

The project has set a target to divert a minimum 90% of demolition and construction waste from landfill. A project specific Waste Management Plan (WMP) is to be developed and implemented by the contractor to manage all waste streams expected to be generated on site.

Soil or contaminated materials such as asbestos are to be excluded from the 90% recycling / re-use rate.

11 Construction Noise Management

A full construction noise and vibration impact assessment and management plan will be prepared by the contractor once the structure and likely construction methods are developed further.

A high level construction environmental noise assessment has been carried out, based on assumptions about the type of equipment that would be used on site. These noise sources are likely to be effectively controlled through:

- Hoarding around the work site, and local enclosures of noisy plant or activities;
- Selection of quieter methods where possible and appropriate, particularly for piling;
- Selection of low vibration work methods where possible and appropriate;
- Vibration monitoring and management controls for heritage and historic structures; and
- Coordination of works with zoo shows and activities such as the Free-flight Bird Show.

The Contractor will be responsible for preparing a detailed Works Plan and Schedule prior to construction, including updated noise and vibration impact assessments for proposed methods and timing of each stage of work.