



## 1 Introduction

This Construction Management Plan has been prepared to accompany the Environmental Impact statement (EIS) for the Sumatran Tiger Adventure, Taronga Zoo to the NSW Department of Planning and Environment in response to the Secretary's Environmental Assessment Requirements (SEARs) key issue No.10 Construction Impacts.

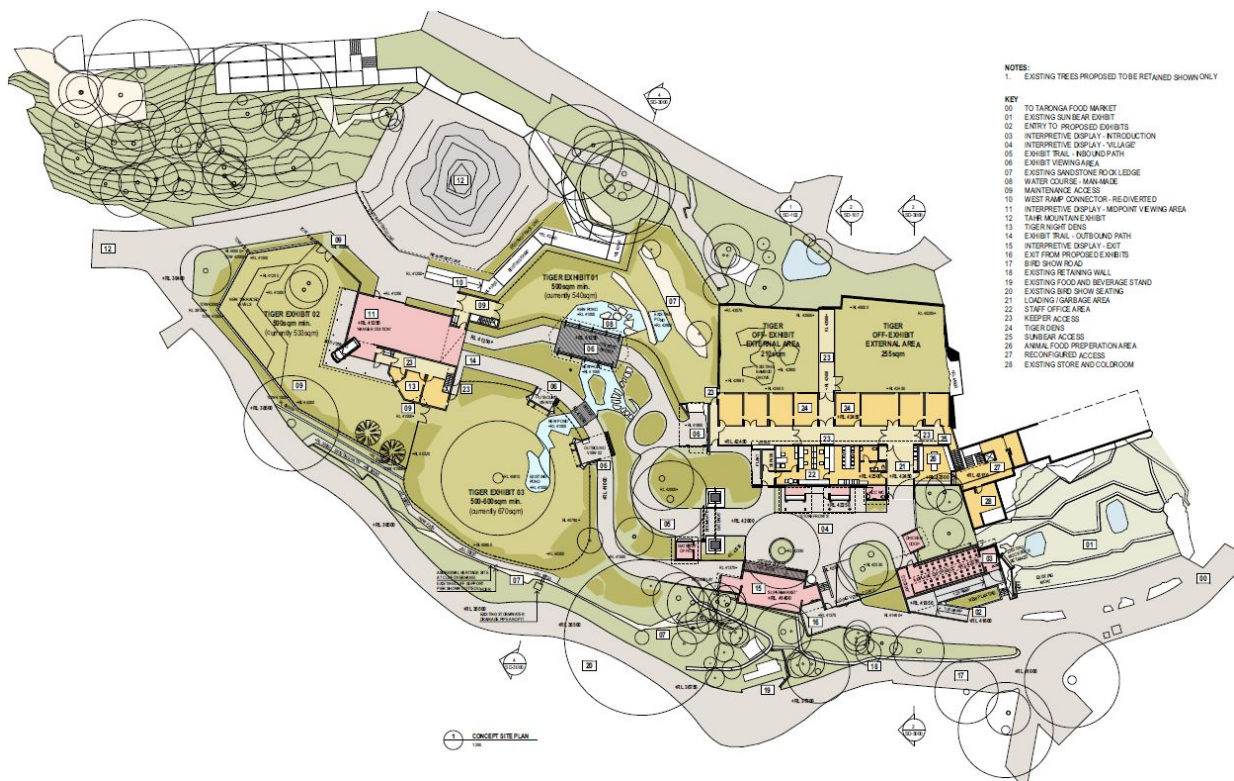


Figure 1 – Proposed Site Plan

## 2 Project Overview

The Sumatran Tiger Adventure project is a key component of the Masterplan works leading up to the Zoo's Centenary celebrations in 2016.

The new Visitor Experience will occupy an area of 2,000qsm and represents a significant capital investment in the Zoo's next 100 years; with a focus on building upon Taronga's contribution to conservation, science, education and enhancing the visitor experiences. The proposed new Tiger exhibits themselves occupy an area of 1,500sqm representing over 1,000sqm of additional outdoor exhibit area for the Taronga Sumatran Tigers.

This Construction Management Plan relates to the redevelopment of the existing carnivore/big cat precinct which is located in the lower South West Corner at Taronga Zoo.



**Figure 2 – Location Plan**

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

1. The Demolition of the existing carnivore exhibits and existing infrastructure
2. The construction of the new exhibit which will include:
  - Three tiger exhibit areas;
  - Interpretative Sumatran Village to facilitate learning about humans living with tigers;
  - Holding dens;
  - Containment fencing;
  - Landscaping, including new tropical vegetation;
  - Milling and seating areas;
  - Interpretative and directional signage;
  - Two new exhibit pedestrian pathways;
  - Keeper safe corridors;
  - Exhibit enrichment devices and visitor viewing areas;
  - Ranger outpost;
  - Office and staff amenities; and
  - Animal food preparation area / equipment store.

## 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   | Nov 2015    |
| Commencement on Site | Dec 2015    |
| Commissioning        | Jan 2017    |
| Animal Establishment | Feb 2017    |
| Opening of Exhibit   | Easter 2017 |

## 4 Construction Activities

### 4.1 Site Establishment

Site establishment will initially be located within the existing Carnivores Offices.

Site sheds will be located once demolition works have been completed and as soon as is practicable.

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

Security protocols, check points, crainage and loading zones will be established.

### 4.2 Service Diversions

Services affected during construction will be identified and traced so as to ascertain the exact effect on the construction works and to minimise disruption 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.

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.

## 4.3 Demolition and Deconstruction

The demolition of the existing concrete structures will be carried out using a combination of concrete saws, crushers and rock breakers 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 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.

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.

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 for the foundations and site levels will commence upon completion of the demolition.

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 the approved tip locations.

## 4.5 Foundations

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

## 4.6 Building Structures

The exhibit 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 Tiger Enclosures

The tiger enclosures are to be a 3D tensile stainless steel mesh structure supported by a combination of pylons, stays and long span cables

## 4.8 Landscaping

Landscaping works will involve the installation of mature plant to create a rainforest theme.

## 4.9 Finishes and Fit Out

The finishes and fit out of the exhibit buildings and spaces will commence once the building 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.

## 4.10 Services

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 exhibit buildings and spaces will be undertaken with the fit out and finishes of the relevant areas.

The commissioning of these services will be required before completion and handover of the facility.

Integration of the exhibit buildings and spaces services with the control systems for the entire Zoo will be form part of completion for the services to the project.

## 4.11 Material Handling

Materials for the project will be hoisted and moved by a combination of mobile cranes and forklifts.

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 lower South West corner of Taronga Zoo Sydney and is bounded by the free flight bird show, roar and snore and several other animal exhibits. The immediate adjoining neighbours closest to the development site are the residential properties accessed off Whiting Beach Road

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
- Perimeter hoardings
- Overhead mobile cranes
- Overhead works

## 6 Consultation Groups

### 6.1 General

TCSA and its Contractor will establish appropriate Liaison Groups to keep its residential neighbours informed of the construction works.

TCSA will also a 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 Complaints Register

The Contractor will record details of all complaints received during construction. The Contractor is to establish and maintain a Register of Complaints and report to the Project Manager on a monthly basis the status of each 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  |
|--|--|
| <b>Demolition/Site Establishment</b>           |  |
| 1. Noise from demolition work.                 | <ul style="list-style-type: none"> <li>The construction equipment (such as the excavator, small rock breaker, concrete pulveriser) will be fitted with noise mitigation equipment where possible.</li> <li>Noisy work will be identified and advised to stakeholders in advance, to inform when noise may affect their operations.</li> </ul>  |
| 2. Dust from demolition and construction works | <ul style="list-style-type: none"> <li>Screens to be placed around the site.</li> <li>If / where possible, large concrete elements to be crushed off site.</li> <li>Construction activities and vehicle access routes to be hosed down.</li> <li>Construction vehicles to be hosed down when leaving site.</li> <li>Adjacent roadways approaching site to be regularly cleaned.</li> </ul> |
| 3. Hazardous materials being removed           | <ul style="list-style-type: none"> <li>Hazardous material assessment to be undertaken to define removal and disposal methods.</li> <li>On approval, works to be undertaken as per the assessment / recommendation report.</li> </ul>   |
| 4. Runoff from stormwater                      | <ul style="list-style-type: none"> <li>Silt traps and filters (socks and fabric) to be used at required locations along the stormwater system.</li> </ul>  |
| <b>Construction Works</b>                      |  |
| 5. Noise from construction work                | <ul style="list-style-type: none"> <li>Construction equipment to be fitted with noise mitigation equipment.</li> <li>Location of concrete pump to be considered to minimise noise to adjacent neighbours.</li> <li>Noisy work will be identified and advised to stakeholders in advance, to inform when noise may affect their operations.</li> </ul>                                      |
| 6. Vibration whilst Constructing foundations   | <ul style="list-style-type: none"> <li>Bored piles to be used, instead of driven piles.</li> <li>Work will be identified and advised to stakeholders in advance, to inform when noise may affect their operations</li> </ul>   |
| 7. Use of construction traffic / plant         | <ul style="list-style-type: none"> <li>Construction activities and public to be separated with appropriate traffic control measures.</li> </ul>  |

|  |  |
|--|--|
|  | <ul style="list-style-type: none"> <li>• Safe public access routes to be pre-agreed, provided and maintained.</li> <li>• Construction work not to be undertaken on Major Event days, in consultation with stakeholders.</li> </ul> |
| 8. Waste water from construction activities. | <ul style="list-style-type: none"> <li>• Waste water to be collected and treated prior to disposal</li> </ul>  |

## 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 hours)
- Bradley's Head Road access (to be used outside of zoo operating hours)

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

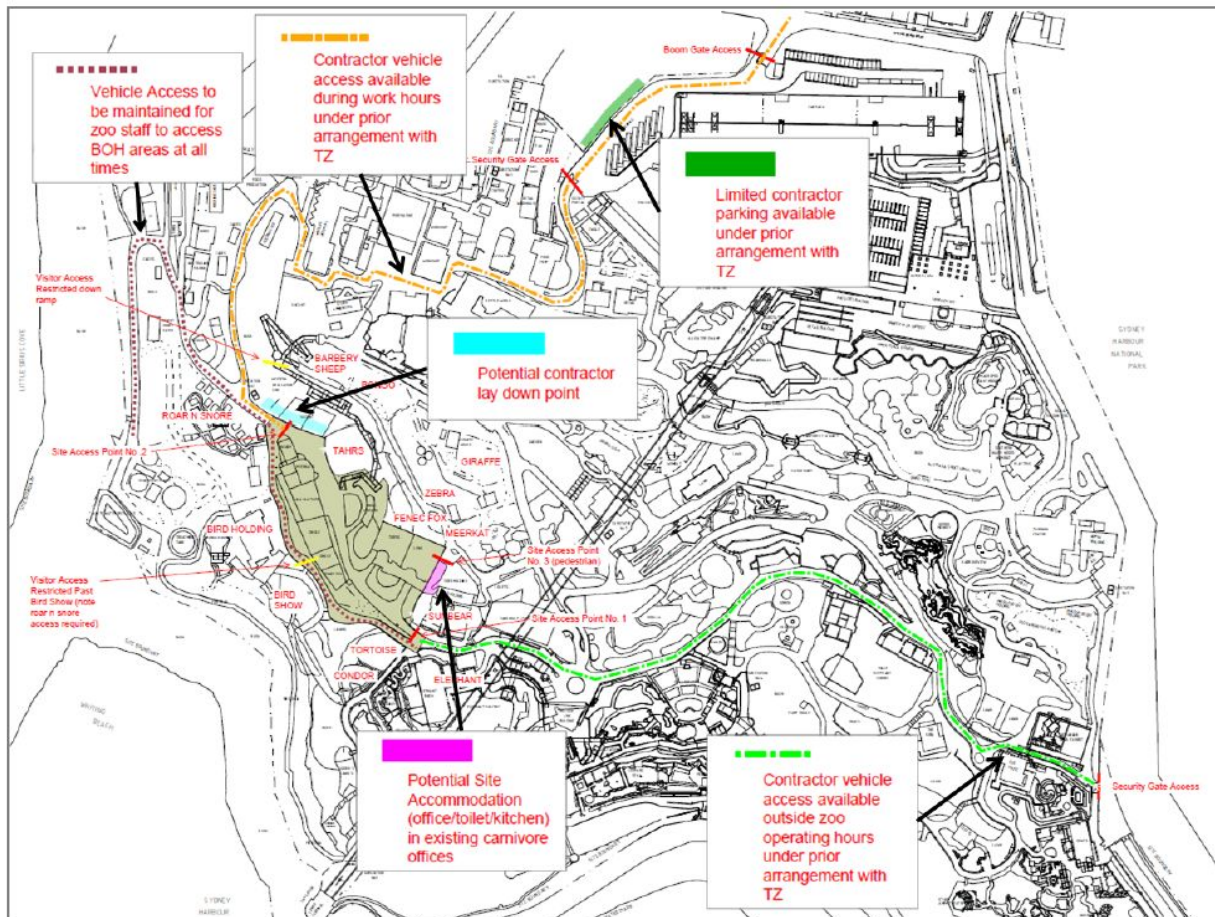


Figure 3 – Site Access Plan

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.**

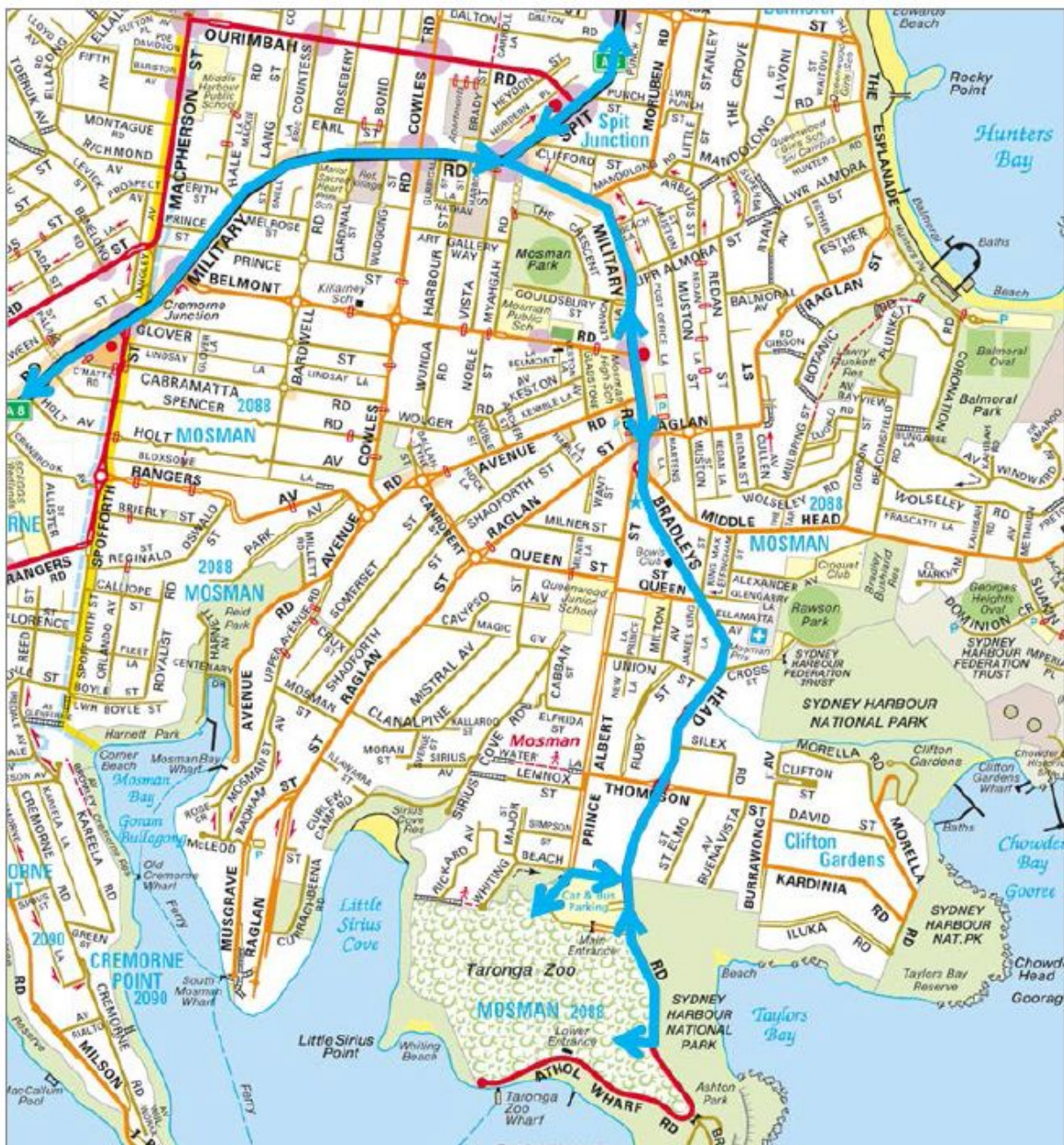
As listed above, the construction vehicles accessing the Zoo grounds would occur outside of the busy zoo operating period. Vehicle access within the Zoo grounds would generally be limited to 6.00am – 10.00am and 3.00pm – 6.00pm

## 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 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 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, including updated noise and vibration impact assessments for proposed methods and timing of each stage of work.