



INTEGRATED WATER MANAGEMENT PLAN & FLOOD STUDY

TARONGA WILDLIFE HOSPITAL



PREPARED FOR:
TARONGA ZOO
Bradleys Head Road
Mosman NSW 2088



Document Status Note:

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1.0 Introduction

Taronga is the leading provider of veterinary services to the zoo's resident animals, wildlife rescue and rehabilitation in NSW. With the Taronga caring for over 1500 sick, injured and orphaned native animals each year. During the 2020 bushfires, the Wildlife Hospitals played a leading role in both the immediate rescue of wildlife and the rehabilitation of injured animals.

The proposed Taronga Wildlife Hospital (TWH) leverages from this expertise to deliver better outcomes and to train the next generation of wildlife vets and vet nurses. The TWH will support the health and wellbeing of wildlife, and Taronga Zoo's animals, through the provision of upgraded veterinary services and facilities. The proposed development will replace existing Wildlife Hospital providing a new state of the art treatment and teaching animal hospital. The facility will provide dedicated and purpose built spaces for the husbandry, treatment, diagnostics and education specifically related to the care of wildlife. The spaces include rehabilitation facilities (including wildlife intensive care and Marine turtle facilities), surgeries, necropsy room/s, pathology labs, medical equipment and supplies storage, medical equipment and quarantine facilities to replace existing facilities on site.

The TWH will include upgraded animal quarantine facilities to assist in the management of Taronga Zoo's animals and to support the conservation partnerships and animal management with other zoos. The new TWH will also include upgraded clinical diagnostic facilities that will assist in the forensic activities of the Taronga's clinical team and the Australian Registry of Wildlife Health. The new facilities will ensure the safety and welfare of wildlife in care but also for Taronga's staff. The TWH will strengthen Taronga's existing educational facilities by offering learning and training spaces that will enable training specific to veterinary treatment and wildlife care.

The TWH will be located in the heart of the zoo, to become part of every zoo guests experience. The TWH will be positioned at a strategic location to allow access by all guests to experience and engage with the day to day activities that occur within the Hospital. General guests will not access inside the TWH but be able to view into Marine Rescue, Animal Treatment and Diagnostic spaces, as well as Clinical Pathology and Nutrition Spaces. The public area will create a sheltered plaza that enables guests to watch Taronga's medical team at work. Back of house access to the TWH will only be accessible to staff and escorted visitors, and is accessed via the existing zoo roadway network.

The TWH will replace existing veterinary facilities that have exceeded their lifecycle, and enhance the operations of Taronga's veterinary services as well as contribute to the ongoing education and advocacy for Wildlife Conservation.

The purpose of this report is to detail the proposed stormwater drainage management plan and WSUD strategy for the proposed Taronga Wildlife Hospital development at Bradleys Head Road, Mosman NSW, on behalf of Taronga Zoo as required by the SEARs for the State Significant Development Application (SSDA) submission associated with the proposed development.

Section 4.12(8) of the Environmental Planning and Assessment Act 1979

Schedule 2 of the Environmental Planning assessment Regulation 2000

This report addresses the following SEARS conditions:

SEARs condition	Response
14. Stormwater and Wastewater - Provide an integrated Water Management Plan for the development that: - Is prepared in consultation with the local council and any other relevant drainage or water authority - Details the proposed drainage design for the site including any on-site treatment, reuse and detention facilities, water quality management measures, and the nominated discharge points. - Demonstrates compliance with the local council or other drainage or water authority, provide full hydraulic details and detailed plans and specifications of proposed works that have been prepared in consultation with, and comply with the relevant standards of, the local council or other drainage or water authority. - Where drainage infrastructure works are required that would be handed over to the local council, or other drainage or water authority, provide full hydraulic details and detailed plans and specification of proposed works that have been prepared in consultation with, and comply with the relevant standards of, the local council or other drainage or water authority.	Sections 3 & 4
15. Flooding Risk - Provide a flood impact and risk assessment prepared in accordance with the NSW Floodplain Development Manual, and existing councils and government studies and guidance. - Identify flood behaviour, flood constraints and risks on the site and on the surroundings, including the potential impacts of climate change for the full range of events i.e. up to and including the probable maximum flood (PMF). - Assess the impacts of the development, including any changes to flood behaviour and risk, impacts of flooding on the development and on the existing and the future community and for the full range of events. - Propose management measures required to minimise the impacts of flooding on the development and minimise flood risks to the community, including emergency management measures to consider access and evacuation issues during significant flood events, including the PMF, from both local catchments and the Shoalhaven River	Section 5

Consultation – As required by the SEARs, the proposed stormwater drainage and water treatment scheme has been discussed with Mosman Council.

This stage of the Taronga Zoo project involves demolition of existing buildings and construction of a 2-storey Wildlife Hospital. Post-development, the site will incorporate an elevated bushland walk, paths, stairs, landscaping and paved areas resulting in negligible change to impervious areas. The proposed stormwater drainage will connect to existing inground stormwater drainage discharging to existing end-of-line rainwater harvesting tanks and treatment units to attenuate flows to pre-development levels in accordance with Mosman Council – Policy for Stormwater Management in Mosman, dated October 2006.

2.0 Site Location

The proposed site is located towards the north western section of Taronga Zoo, to the west of the Taronga Institute of Science and Learning (refer Figure 2.0).



Figure 2.0 Proposed Site Location

3.0 Stormwater Drainage Design

3.1 Existing Stormwater Drainage Infrastructure

A desktop review and site inspection were carried out by Meinhardt Bonacci to determine the existing drainage infrastructure and overland flow paths within the development site. The inspection and desktop review revealed the following:

- The existing site slopes to the west, with an upstream catchment that generally slopes diagonally from north-west to south-east. A rock ledge is located at the eastern end of the building.
- There is a network of existing inground stormwater pits and pipes to the west and south-east of the site to facilitate drainage
- The existing stormwater drainage connects into the existing pits located on the roadway adjacent to the site to the west and to the south-east.
- These existing stormwater networks within the development area reticulate the captured stormwater to the existing stormwater treatment plant, which is located to the southwest of Taronga Zoo near Sydney Harbour, through the Zoo's internal private stormwater drainage system.
- All stormwater drainage is treated in the treatment plant before being discharged into Sydney Harbour. There are no stormwater connections into Mosman Council drainage assets.
- The details of the existing stormwater drainage (location, size, and depth) have been provided in Service proving investigation report no.75166, prepared by SureSearch, dated 11.02.2021, and further survey investigation and survey drawings

Refer Figure 3.2 & Figure 3.3 for an illustration of the existing stormwater drainage infrastructure.



Figure 3.1 Existing Rock Ledge (East of existing/new building location)

3.2 Council Requirements

As per Mosman Council's general design parameters, the following design criteria will be adopted:

For gravity flow pipe systems:

Recurrence interval: 20 years
 Time of concentration: 5 minutes
 Rainfall intensity: 206 mm/hr
 Runoff coefficient: Pervious: 0.75
 Impervious: 1.0

For overland flowpath:

Recurrence interval: 100 years
 Time of concentration: 5 minutes
 Rainfall intensity: 267 mm/hr
 Runoff coefficient: Pervious: 0.75
 Impervious: 1.0
 Minimum 1% fall from boundary to kerb.

Minimum freeboard of 300 mm to adjacent habitable floor levels of the development site and adjoining properties for overland flows.

Mosman Council has a requirement to provide On-site detention where additional stormwater runoff is generated. Refer to Table 3.2, for Pre-development and post-development catchment areas.

Catchment		Area [m ²] (Total Area 3035m ²)	Impervious Fractions (f)
Pre-development	Pervious	Landscape = 1135	0.75
	Impervious	Hardstand = 875	0.90
		Roof = 1025	1.00
Post-development	Pervious	Landscape = 1135	0.75
	Impervious	Hardstand = 545	0.90
		Roof = 1355	1.00

Table 3.2 Pre-development and post-development catchments

3.3 Proposed Stormwater Drainage Scheme

The proposed roof catchment will be captured by downpipes that will transition through the building to the proposed inground stormwater drainage (at grade). External catchments will be captured through stormwater inlet pits/grates and connect to the proposed inground stormwater drainage at grade. The area to the east of the building consists of a forecourt and circulation area adjacent to an existing rock ledge. A bund will be provided to the top of the rock ledge, incorporated with the landscaping (and located to protect existing high ecological value vegetation), to ensure that overland flow from external catchments to the circulation/forecourt area is minimised. The trapped catchment area adjacent the east of the building will be directed to a channel and grate system, which has been designed to convey twice the 1% AEP flows from these catchments. An emergency overland flow path is also provided, to convey water to the east, before it flows down the adjacent roadway toward the stormwater treatment plant.

Thus, all proposed stormwater drainage for the proposed site will be captured by a network of inground pits and pipes connecting to existing downstream internal stormwater drainage of Taronga Zoo to discharge via gravity.

There is an existing stormwater pipe and grate/pit at the west of the proposed development which will be adjusted and upgraded as required to ensure that flows near the Chimpanzee enclosure are adequately captured and conveyed. A new pit where all discharge of the proposed site will be collected will be constructed to connect to the existing stormwater line downstream.

Refer to Appendix A for proposed stormwater drainage scheme drawings.

3.4 Rainfall Data

The Rainfall intensity for proposed site has been derived from Rainfall intensity data provided by Bureau of Meteorology on <http://www.bom.gov.au>. These rainfall intensities are in line with the design parameters provided by Mosman Council.

Please refer to Table 3.4 below for Rainfall data and Appendix B for IFD chart (Intensity and Frequency Data)

RAINFALL INTENSITY IN mm/h FOR VARIOUS DURATIONS AND RETURN PERIODS

DURATION	RETURN PERIOD (YEARS)						
	1	2	5	10	20	50	100
5 mins	100.	129.	163.	183.	209.	243.	269.
6 mins	93.9	120.	153.	171.	196.	228.	253.
10 mins	76.9	98.8	126.	142.	163.	191.	212.
20 mins	56.4	72.8	94.6	107.	124.	146.	163.
30 mins	45.9	59.5	77.9	88.8	103.	122.	136.
1 hour	31.1	40.4	53.4	61.2	71.2	84.5	94.7
2 hours	20.3	26.5	35.0	40.1	46.7	55.4	62.1
3 hours	15.7	20.4	27.0	30.8	35.8	42.5	47.6
6 hours	10.1	13.1	17.1	19.5	22.6	26.7	29.9
12 hours	6.49	8.40	11.0	12.5	14.4	17.0	19.0
24 hours	4.19	5.42	7.08	8.06	9.33	11.0	12.3
48 hours	2.64	3.43	4.49	5.13	5.95	7.03	7.86
72 hours	1.96	2.54	3.33	3.80	4.41	5.20	5.82

Table 3.4 Rainfall Data

3.5 Post-Development Site Discharge Rates

The site discharge rates have been calculated using the rational method, based on Council parameters discussed above in section 3.2.

Rational method:

$$\text{Discharge 'Q' (20 or 100 yrs)} = (C \cdot I \cdot A) / 360,$$

where C = runoff co-efficient, I = Rainfall intensity, A = Catchment area

Storm Event (ARI)	1 in 20 years	1 in 100 years
Pre-development (L/s)	154L/s	197L/s
Post-development (L/s)	155L/s	199L/s

Table 3.5 Site Discharge Rates

The increase in post development discharge is negligible. Further, since the proposed drainage connection is to private internal drainage, there is no anticipated impact on Council assets. Consultation with Council's drainage engineer has been undertaken to obtain in principle approval of the proposed drainage layout. As the redevelopment maintains the existing connection to the Zoo internal stormwater network, Council Engineer indicated that the proposed drainage system was satisfactory. There is no change proposed to the overall Zoo outlet discharge point, which is supported by Council (as it ensures that there is less chance of any impact resulting from the proposed redevelopment).

As the redevelopment also proposes to increase capacity of existing stormwater drainage grates and pipes to the west of the proposed building, this will further assist in conveying additional runoff in the pit and pipe system, reducing risk of overland flow affectation.

The new building utilises the existing Taronga Zoo stormwater system, which directs flow to a Waste Water Treatment Plant. There are significant storage tanks at this facility, with a total storage volume of 100kL. These tanks, and the Waste Water treatment plant operation, will offset the very minor increase in peak flows (up to 2L/s for the 1% AEP event).



Figure 3.4 Existing Stormwater Drainage Infrastructure (Grate West of site) which is to be upgraded

4.0 Water Sensitive Urban Design (WSUD)

The aim of WSUD is to remove pollutants from stormwater before discharging it into existing drainage system/downstream catchment. Best Practice Environmental Management Guidelines (BPMEG) require the following pollution reduction targets:

- Total Suspended Solids 80%
- Total Phosphorous 45%
- Total Nitrogen 45%
- Litter 70%

Taronga Zoo has an existing Waste Water Treatment Plant (WWTP) located to the south west corner of the zoo, adjacent to Sydney Harbour that meets the WSUD requirements.

4.1 Existing Stormwater Treatment System

The WWTP captures the first-flush component from the overland stormwater flow from various animal enclosures and open areas within and surrounding the zoo – reclaiming approximately 100 ML annually. Excess stormwater during large storm events is redirected to an ocean outfall. The treated water from the plant is reused on site for irrigation, filling the moats, cleaning/hose down and toilet flushing purposes. Any excess treated water, such as during storm events, is also channelled to the ocean outfall following UV disinfection. The first flush diversion point and the effluent discharge are monitored by the NSW EPA.

This information has been extracted from *Taronga Zoo Wastewater Treatment Plant - Capacity and Condition Review*, prepared by KMH Environmental, dated March 2017.

Refer to below Figure 4.1 for WWTP layout and Appendix C for treatment flowchart.



Figure 4.1 Waste Water Treatment Plant at Taronga Zoo

4.2 Proposed Stormwater Treatment

The proposed stormwater drainage will be treated in the existing WWTP before being discharged into Sydney Harbour. The treatment process will be the same as noted in Section 4.1 above. This treatment exceeds the best management guideline and Council targets and satisfies the requirements for the SEARs Integrated Water Management Plan.

5.0 Sediment and Erosion Control Measures

Civil drawings or Sediment and Erosion control plans and details will be provided outlining the control measure. All sediment control measures to be installed in accordance with Landcom Managing Urban Stormwater "Blue Book".

Please refer to Appendix D for proposed sediment and erosion control plan. The final location of site protection measures will be in accordance with requirements to protect regenerating bushland adjacent to the new building. Implementation should be undertaken following consultation with flora experts.

5.1 Site protection Measures

It is proposed to provide the following measures discussed below, to inhibit the movement of sediment off the site during the demolition and construction phases.

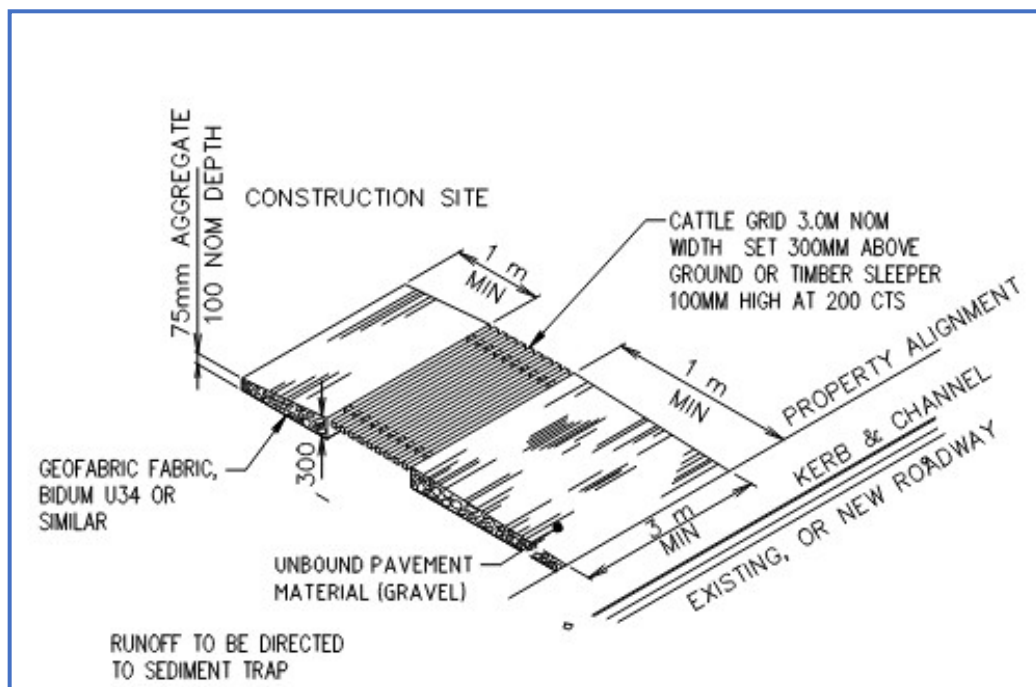


Figure 5.1.1 Temporary Construction Vehicle Entry/Exit Sediment Trap

5.1.1 Site Access

The site access for construction vehicles will be provided via Bradleys Head Road and then from the internal roads adjacent to the site area, through Temporary Construction vehicle shaker ramps with a cattle grid. Refer to Figure 5.1.1 above.

5.1.2 Sediment Control

All exposed earth areas where it may be possible for runoff to transport silt down slope shall be protected with a sediment and erosion control silt fence generally installed along the boundaries of the site.

The fence will be constructed in accordance with details provided by the Landcom "Soils and Construction – the Blue Book" incorporating geotextile fabric which will not allow suspended particles greater than 50mg/L non-filterable solids to pass through, and as such comply with the appropriate provisions of the applicable Environmental Legislation.

The construction of the silt fence will include the following:

- Geotextile fabric buried to a maximum of 100mm below the surface
- Overlapping any joins in the fabric
- Turning up on the ends for a length of 1 meter to prevent volumes of suspended solids escaping in a storm event

Please refer to Figure 5.1.2(a) below.

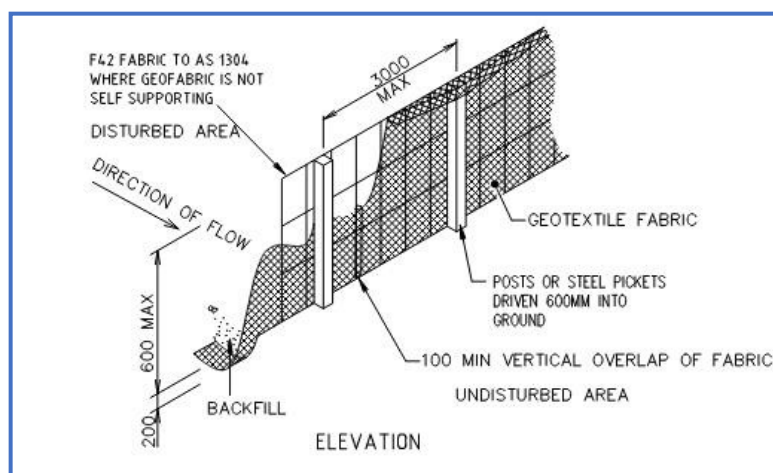


Figure 5.1.2 (a) Sediment Fence

Existing stormwater infrastructure is also to be protected from incoming sediment with the incorporation of geotextile pit filters to the existing downstream stormwater pits in proximity of the proposed site area.

Please refer to Figure 5.1.2(b) and Figure 5.1.2(c) below:

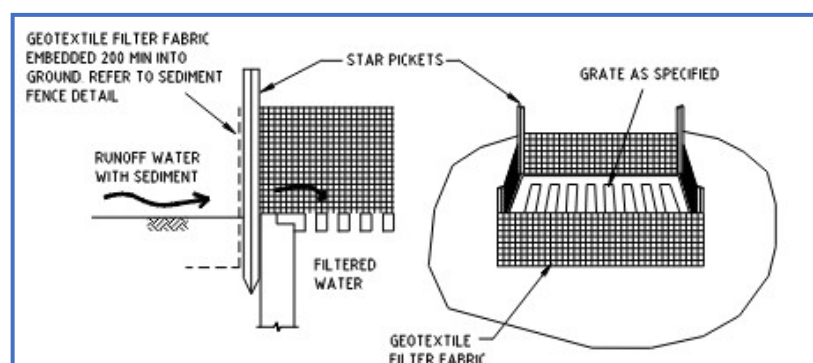


Figure 5.1.2(b) Geotextile Pit Filter 1

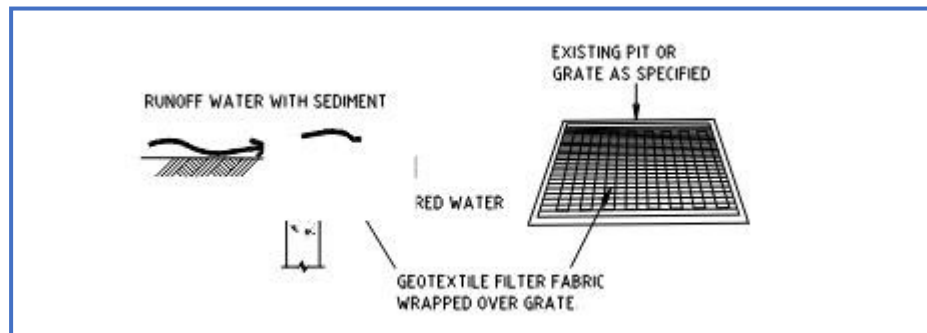


Figure 5.1.2(c) Geotextile Pit Filter 2

5.1.3 Temporary Stormwater Drainage (Where required)

Site runoff within the zones of the excavation will be drained into a central holding well within the excavation. Runoff will be allowed to settle out suspended particles and debris, and an acceptable water of 50mg per litre of Non-Filterable Residues (NFR) is required to be achieved prior to discharge.

5.1.4 Dust Control

The proposed dust control measures are as follows:

- Loose loads entering or leaving the site will be securely covered by a tarpaulin or like material in accordance with TfNSW and local Council Guidelines
- Soil transport vehicles will use the single main access to the site
- There will be no burning of any materials on site
- Water sprays will be used across the site to suppress dust. The water will be applied either by water sprinklers or water carts across ground surfaces whenever the surface has dried out and has the potential to generate visible levels of dust either by the operation of equipment over the surface or by wind. The watercraft will be equipped with a pump and sprays
- Spraying water at the rate of not less than three (3) L/s and not less than 700kPa pressure. The area covered will be small enough that surfaces are maintained in a damp condition and large enough that runoff is not generated. The water spray equipment will be kept on site during the construction of the works
- During excavation, all trucks/machinery leaving the site will have their wheels washed and/or agitated prior to travelling on Council Roads
- Fences will have shade cloth or similar fabric fixed to the inside of the fence

5.1.5 Maintenance

- It will be the responsibility of the contractor to ensure sediment and erosion control devices on site are maintained. The devices shall be checked daily, and the appropriate maintenance undertaken as necessary
- Prior to the closing of the site each day, the road shall be swept, and materials deposited back onto the site
- Gutters and roadways will be kept clean regularly to maintain them free of sediment
- Appropriate covering techniques, such as the use of plastic sheeting will be used to cover excavation faces, stockpiles, and any unsealed surfaces
- If dust is being generated from a given surface, and water sprays fail
- If fugitive emissions have the potential to cause the ambient air quality to foul the ambient air quality
- The area of soils exposed at any one time will be minimized wherever possible by excavating in a localized progressive manner over the site
- Materials processing equipment suitably comply with regulatory requirements. The protection will include the covering of feed openings with rubber curtains or socks.

It is considered that by complying with the above, appropriate levels of protection are afforded to the site, the adjacent public roads, footpaths, and environment.

6.0 Flood Impact Assessment

The Zoo site is not affected by mainstream flooding due to its location at Bradleys Head. Overland flow is effectively conveyed around the main hospital site by local roads. The overall Zoo site generally falls from north to south, towards Sydney Harbour.

The site under assessment was found to have little to no flood affectation. Figure 6.1 below shows the topography and general layout of the upper catchments relevant to the proposed Taronga Wildlife Hospital and the approximate location of the proposed building site marked in yellow outline. Contours indicate that the area immediately to the east contributes local runoff toward the proposed building, whilst other areas are conveyed away from the building. This adjacent catchment has been allowed for in the design of the proposed channel adjacent the rock ledge to the east of the building. As the catchment area falls toward the forecourt area of the building, there is limited opportunity to provide an overland flow path away from the building. The channel, grates, pits and pipes in this area have been designed to convey twice the 1% AEP flow (approximately 130L/s) in order to provide sufficient protection from localised overland flow.



Figure 6.1 Upper Catchments to Proposed Taranga Zoo Wildlife Hospital

The upper catchments were determined based on a high level analysis of existing topographical contours and levels from survey. A detailed flood model has not been conducted for the site, as discussed in the introduction, as any affectation can be characterised as localised overland flow from the site itself and adjacent small upstream catchments.

Further upstream to the highlighted catchment was the Taranga Institute of Science Learning and the car park area further to the east, which were determined not impacted by anything other than local overland flow. This was outlined in the *Taranga Zoo Flood Impact Assessment* report by GRC Hydro dated 25th June 2020.



Figure 6.2 View of Upstream Catchments to the North Proposed Taranga Zoo Wildlife Hospital (which are directed down roadway)

7.0 Appendices

Appendix A – PROPOSED CIVIL DRAWINGS

DRAWING REGISTER AND LOCALITY PLAN - CIVIL & STORMWATER

An aerial photograph of a large, multi-winged building complex, possibly a university or government facility. The building has a light-colored, possibly white or light grey, facade with dark roof sections. A prominent red outline is drawn around a central portion of the building and the surrounding greenery. The area is heavily landscaped with numerous trees and manicured lawns. Several parking lots with cars are visible around the building. The overall scene is a high-angle, top-down view of the property.

NOT FOR CONSTRUCTION



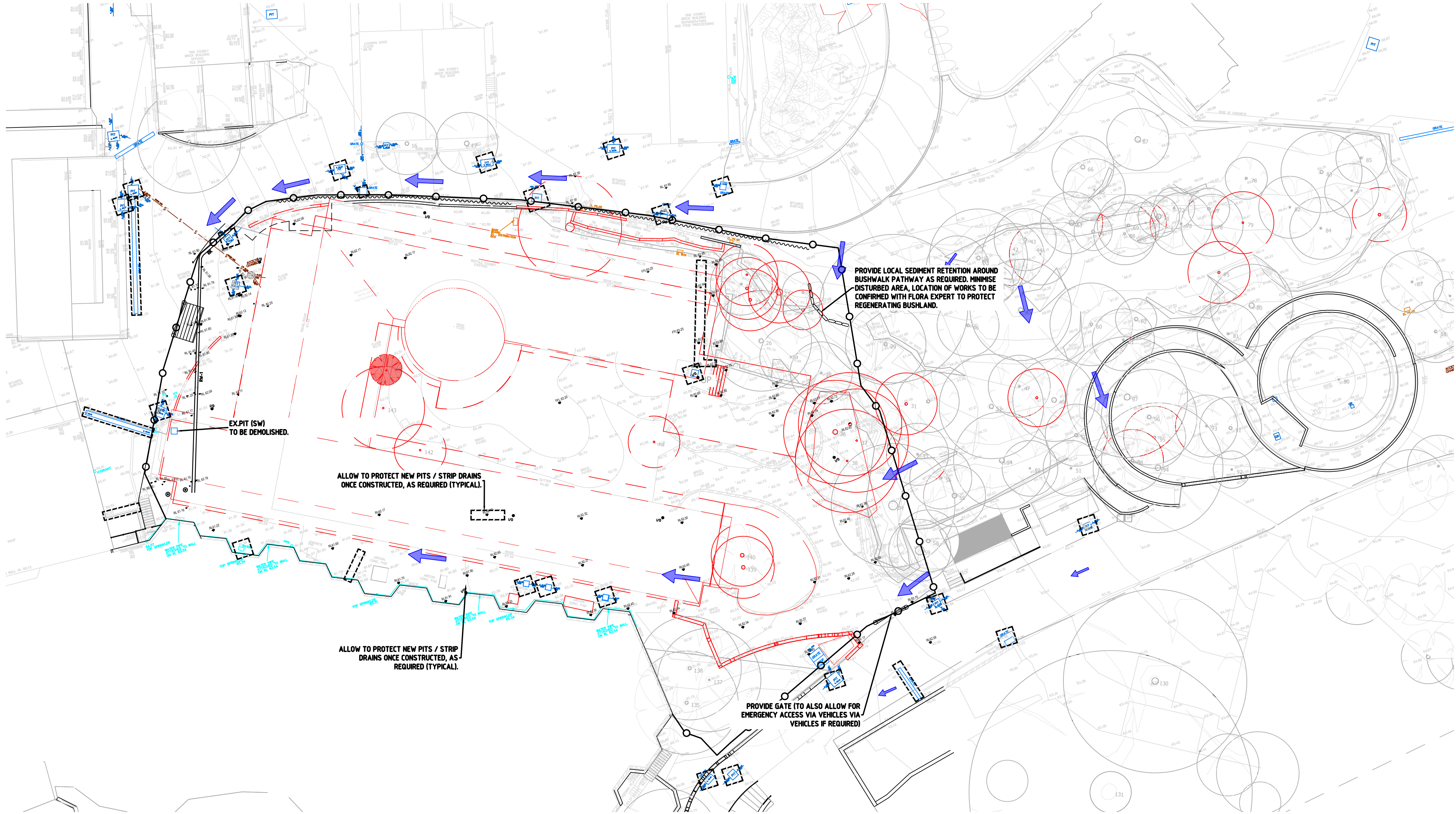
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SOIL AND WATER MANAGEMENT NOTES

- IT HAS BEEN ASSUMED THAT HOARDINGS/SILT FENCING WILL BE PROVIDED TO THE STAGE BOUNDARY SUFFICIENT TO PREVENT SEDIMENT RUNOFF FROM LEAVING SITE (EXCEPT IN THE CASE OF ENTRY/EXIT LOCATIONS WHERE TEMPORARY CONSTRUCTION ENTRY/EXIT SEDIMENT TRAP ARE PROVIDED). IF THIS IS NOT THE CASE, PROVIDE SEDIMENT FENCE TO STANDARD DETAIL BELOW AS REQUIRED TO PREVENT SEDIMENT FROM LEAVING SITE, DIRECT RUNOFF TO SEDIMENT BASIN.
- ALL SEDIMENT CONTROL MEASURES TO BE INSTALLED IN ACCORDANCE WITH LANDCOM MANAGING URBAN STORMWATER "BLUE BOOK".

SEDIMENT CONTROL CONDITIONS

- SEDIMENT FENCES WILL BE INSTALLED AS SHOWN AND ELSEWHERE AT THE DISCRETION OF THE SITE MANAGER TO CONTAIN COARSER SEDIMENT FRACTIONS (INCLUDING AGGREGATED FINES) AS NEAR AS POSSIBLE TO THEIR SOURCE.
- SEDIMENT REMOVED FROM ANY TRAPPING DEVICE WILL BE RELOCATED WHERE FURTHER POLLUTION TO DOWNSLOPE LANDS & WATERWAYS CANNOT OCCUR.
- STOCKPILES WILL BE PLACED WHERE SHOWN ON DRAWING OR ELSEWHERE AT THE DISCRETION OF THE SITE MANAGER AND NOT WITHIN 5m OF HAZARD AREAS INCLUDING LIKELY AREAS OF HIGH VELOCITY FLOWS SUCH AS WATERWAYS, PAVED AREAS & DRIVEWAYS.
- WATER WILL BE PREVENTED FROM DIRECTLY ENTERING THE PERMANENT DRAINAGE SYSTEM WITH INLET FILTERS (SEE DETAILS) UNLESS IT IS SEDIMENT FREE.
- TEMPORARY SEDIMENT TRAPS WILL BE RETAINED UNTIL AFTER THE LANDS THEY ARE PROTECTING ARE COMPLETELY REHABILITATED.

SITE INSPECTION & MAINTENANCE CONDITIONS

THE SITE MANAGER WILL INSPECT THE SITE AT LEAST WEEKLY AND WILL:

- ENSURE THAT DRAINS OPERATE PROPERLY & TO EFFECT ANY NECESSARY REPAIRS
- REMOVE SPILLED SAND OR OTHER MATERIALS FROM HAZARD AREAS, INCLUDING LANDS CLOSER THAN 5m FROM AREAS OF LIKELY CONCENTRATED OR HIGH VELOCITY FLOWS ESPECIALLY WATERWAYS & PAVED AREAS.
- REMOVE TRAPPED SEDIMENT WHENEVER LESS THAN DESIGN CAPACITY REMAINS WITHIN THE STRUCTURE
- ENSURE REHABILITATED LANDS HAVE EFFECTIVELY REDUCED THE EROSION HAZARD AND TO INITIATE UPGRADING OR REPAIR AS APPROPRIATE.
- CONSTRUCT ADDITIONAL EROSION AND/OR SEDIMENT CONTROL WORKS AS MIGHT BECOME NECESSARY TO ENSURE THE DESIRED PROTECTION IS GIVEN TO DOWNSLOPE LANDS AND WATERWAYS.
- MAINTAIN EROSION & SEDIMENT CONTROL MEASURES IN A FULLY FUNCTIONING CONDITION UNTIL ALL EARTHWORK ACTIVITIES ARE COMPLETED AND THE SITE IS REHABILITATED.
- REMOVE TEMPORARY SOIL CONSERVATION STRUCTURES AS THE LAST ACTIVITY IN THE REHABILITATION PROGRAM.

AS PART OF THE STATUTORY 'DILIGENCE OF CARE' RESPONSIBILITIES, THE SITE MANAGER WILL KEEP A LOGBOOK MAKING ENTRIES AT LEAST WEEKLY, IMMEDIATELY BEFORE FORECAST RAIN AND AFTER RAINFALL. ENTRIES WILL INCLUDE:

- THE VOLUME & INTENSITY OF ANY RAINFALL EVENTS
- THE CONDITION OF ANY SOIL & WATER MANAGEMENT WORKS
- THE CONDITION OF VEGETATION & ANY NEED TO IRRIGATE
- THE NEED FOR DUST PREVENTION STRATEGIES
- ANY REMEDIAL WORKS TO BE UNDERTAKEN

THE BOOK WILL BE KEPT ONSITE & MADE AVAILABLE TO ANY AUTHORISED PERSON ON REQUEST. IT WILL BE GIVEN TO THE PROJECT MANAGER AT THE CONCLUSION OF WORKS.

SURVEY LEGEND

- EX SURFACE LEVEL
- EX SURFACE CONTOUR
- EX TREE TO BE RETAINED. REFER TO LANDSCAPE AND ARBORIST REPORT FOR DETAILS.
- EX TREE TO BE REMOVED. REFER TO LANDSCAPE AND ARBORIST REPORT FOR DETAILS.
- EXISTING STORMWATER DRAINAGE LINE
- EXISTING SEWER LINE
- EXISTING WATER MAIN
- EXISTING STORMWATER PIT

SOIL AND WATER MANAGEMENT LEGEND

- SEDIMENT FENCE / HOARDING
- TEMPORARY SHAKER RAMP FOR ENTRY/EXIT
- SEDIMENT BASIN (LOCATION TBC ON-SITE)
- TEMPORARY STOCKPILE (LOCATION TBC ON-SITE)
- GEOTEXTILE PIT FILTER / FILTER SURROUND INSTALLED ON EXISTING PIT
- OVERLAND FLOW
- STRAW BALE
- SITE ACCESS GATE

WARNING
NO DRAINAGE WORKS SHALL COMMENCE UNTIL THE CONTRACTOR CONFIRMS THE I.L. OF ALL EXISTING DRAINS, AND CONFIRMS IN WRITING WITH THE ENGINEERING SUPERVISOR.

ALL EXISTING PROPERTY SERVICES' LOCATIONS AND DEPTHS ARE APPROXIMATE AND MUST BE VERIFIED ON SITE. THE CONTRACTOR SHOULD SUPPLY PRECISE LOCATIONS AND DEPTHS TO THE ENGINEER FOR REVIEW PRIOR TO ANY WORKS THAT MAY AFFECT THESE SERVICES.

WARNING
BEWARE OF UNDERGROUND SERVICES
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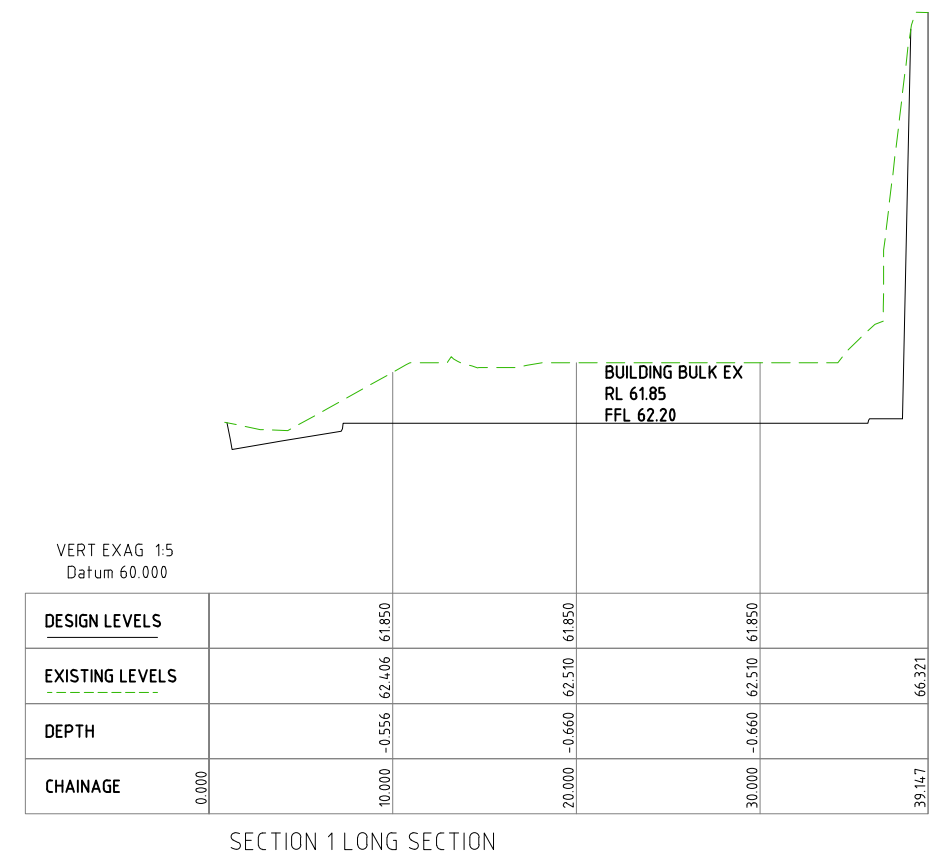
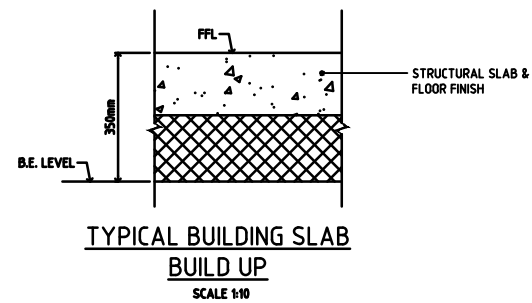
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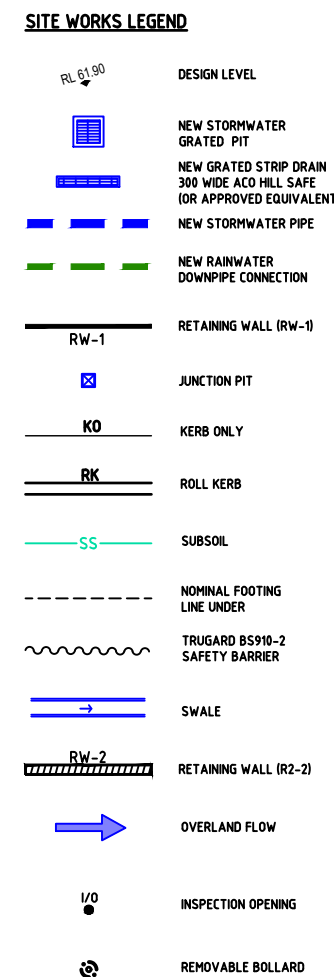
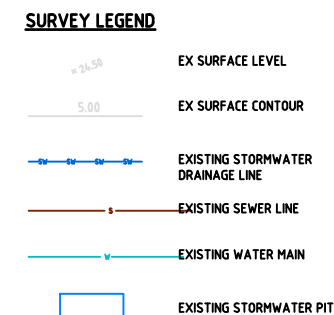
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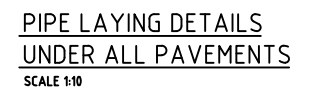
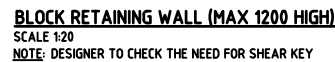
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Drawing Title	SITWORKS PLAN - LEVEL 1 SHEET 1 OF 2
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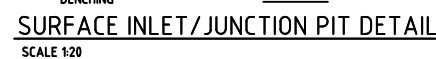
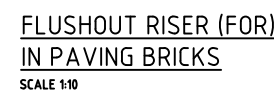
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BLOCK RETAINING WALL BASE TYPE 1							
WALL HEIGHT				REINFORCEMENT		BASE DIMENSIONS	
TOTAL HEIGHT (mm) H	HEIGHT OF BLOCKWORK			X-BARS AND V-BARS	K-BARS	WIDTH, B (mm) WITH FOLLOWING BACKFILL CONDITIONS	
	150 SERIES	200 SERIES	300 SERIES			LEVEL	MAX 1:4 SLOPE
800	800	-	-	N12-400	-	800	1000
1000	1000	-	-	N12-400	-	1000	1200
1200	1200	-	-	N12-400	-	1100	1500
1400	-	1400	-	N12-400	-	1300	1700
1600	-	1600	-	N16-400	-	1400	2000

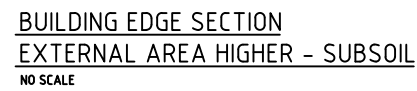
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LEGEND

SITE BOUNDARY

NOMINAL VEHICLE LOCATION

I/O

INSPECTION OPENING

EX SURFACE LEVEL

EX SURFACE CONTOUR

EX TREE

REMOVABLE BOLLARD

PAVEMENT LEGEND

PAVEMENT TYPE P5
CONCRETE PAVEMENT TO DETAILS

PAVEMENT TYPE P4
FOOTPATH PAVEMENT TO DETAILS

PAVEMENT TYPE 2
ROAD PAVEMENT
RECONSTRUCTION AND NEW

PAVEMENT TYPE 3
CNEW LANDSCAPE TO LANDSCAPE
CONSULTANT'S DRAWINGS AND
SPECIFICATIONS

ROAD TRIM & RESURFACE TO
PROVIDE ACCEPTABLE LOADING
DOCK GRADES

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PAVEMENT PLAN

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Appendix B — IFD CHART

