BEFORE THE ENVIRONMENT COURT
AT WELLINGTON

ENV-2015-WLG-024

IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of applications for resource consent by Site 10 Redevelopment Limited Partnership and Wellington City Council in respect of the area known as Site 10

STATEMENT OF EVIDENCE OF PETER LAWRENCE MCGUINNESS ON BEHALF OF SITE 10 REDEVELOPMENT LIMITED PARTNERSHIP AND WELLINGTON CITY COUNCIL 3 JULY 2015

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INTRODUCTION

1. My full name is Peter Lawrence McGuinness. I am the Construction Manager for LT McGuinness Building Contractors Ltd (**LT McGuinness**). I graduated with a Bachelor of Engineering (Civil) in 1969 from Canterbury University. After graduating I have worked as a Civil Engineer on construction projects in Australia and New Zealand.

2. I have worked for LT McGuinness for 40 years as a Site Engineer, Project Manager, Quality Assurance Manager and Health and Safety Manager. I am both a shareholder and director of LT McGuinness. As a Construction Manager for LT McGuinness, I have been involved with numerous construction projects, including several on the waterfront. These include:

   (a) Odlins Building (NZX Building);

   (b) Shed 22;

   (c) Free Ambulance Building;

   (d) Refurbished Port Nicholson Yacht Club;

   (e) Wharf construction for the BT Global Challenge Round the World Yacht Race;

   (f) Modifications to the Queens Wharf Synergy and the Events Centre;

   (g) Wharewaka; and

   (h) Clyde Quay Wharf.

3. In addition to those developments I have also been involved with the following recent major construction projects:

   (a) One Market Lane; and

   (b) Chews Lane regeneration, including the Ballinger Building, 11 Chews Lane, 50 Victoria Street, the Poultry Building, 44 Victoria Street, and Chews Lane Apartments.

4. As a consequence of these projects and others, I am familiar with the challenges and opportunities presented by redevelopment sites particularly those on reclaimed areas along the wharf. Depending upon the nature of the project, this can require careful consideration of environmental as well as construction issues.

5. As a company LT McGuinness is also familiar with working in sensitive environments and has developed construction management plans which respond to these issues.

CODE OF CONDUCT

6. I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014 and that I agree to comply with it. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise.

SCOPE OF EVIDENCE

7. I have been asked to provide evidence in relation to management of construction of the proposed building at Site 10.

8. The building is to be located on Site 10, between Waterloo Quay and Kumutoto Lane. The construction works include building a four storey, five star commercial building on site. Included on the ground floor is open public space, retail and innovation retail space. Additionally there is a basement car park containing services plant, cycle and shower facilities.

9. The key issues regarding construction at this site are:

   (a) excavation (for the basement car park);

   (b) traffic management; and

   (c) public access and safety.

10. LT McGuinness is the preferred main contractor for the Site 10 building development and has been providing advice during the pre-construction phase on buildability, costs, staging, methodologies, and construction management. I have been involved in a number of construction projects on or near Wellington's waterfront that have involved basement excavation, contamination, ground remediation and dewatering, including:

(a) NZX Centre redevelopment (former Odlins Building) – including a new underground basement.

(b) Queens Wharf Centre refurbishment and ongoing maintenance including basement repairs.

(c) Wharewaka Building – including ground remediation, basement construction and removal of contaminated soil.

(d) Taranaki Wharf landscaping – including removal of contaminated spoil and extension of lagoon.

(e) Clyde Quay Wharf Apartments – including undersea carpark.

(f) Shed 22 redevelopment (now Macs Brewery and Bar).

(g) Free Ambulance Building redevelopment.

(h) One Market Lane – including contaminated spoil management and removal.

11. I prepared the Draft Construction Management Plan (CMP), included as appendix 22 of the Assessment of Environmental Effects (AEE) for the applications. A copy of the CMP is attached as Appendix A of this statement of evidence.

12. In preparing the draft Construction Management Plan, I have drawn on experience on projects with similar issues, and have also reviewed in respect of this project:

(a) The Architectural Drawings supporting the AEE;

(b) Transportation Assessment (Appendix 15);

(c) Basement Construction Method Statement (Appendix 17);

(d) Ground Contamination Report (Appendix 18);

(e) Structural Engineering Assessment (Appendix 20); and

(f) Draft Construction Traffic Management Plan prepared by Traffic Design Group (**TDG**) and appended to the draft Construction Management Plan.

13. My evidence will cover the following matters:

(a) Overview of the CMP; and

(b) Issues raised by submitters, including:

(i) Noise and vibration;

(ii) Contamination;

(iii) Dust;

(iv) Impact on neighbouring Shed 21 building during construction;

(v) Impact on the operations of Maritime Police from the Former Eastbourne Ferry Terminal; and

(vi) Impact on Powerco services.

EVIDENCE

14. The object of the CMP is to:

(a) Outline the construction methodology for the Kumutoto Site 10 Project.

(b) Identify any works during the course of the construction that have the potential to impact on the immediate environment.

(c) Demonstrate management procedures to deal with the potential effects of construction activity on the environment.

(d) Establish how public interface will be managed.

(e) Ensure the safety of the public at all times during the works.

(f) Outline potential issues and corrective procedures in consultation between neighbouring buildings, public, contractors and Wellington City and Greater Wellington Regional Councils.

15. The proposed building has being designed to embrace the latest engineering technology and in particular base isolation. To this end, significant basement works are required. These include:

(a) Excavation;

(b) Removal of existing buried foundation and piles;

(c) Deep soil mixing and/or Controlled Flight Auger technology;

(d) Piling;

(e) Construction of concrete slabs and walls;

(f) Removal of excavated spoil off site; and

(g) Dewatering the site.

16. Construction methodology and contamination controls have been addressed in the revised CMP attached as **Appendix B** to this brief of evidence. Further information regarding testing and disposal of contamination are addressed in the Ground Contamination Report (Appendix 18) and the evidence of Penny Kneebone.

17. A report (the draft Construction Traffic Management Plan) has been prepared by TDG addressing the issues of traffic management during the construction phase of the works. This is appended to the revised CMP at **Appendix B**.

18. Some key points are:

(a) Heavy construction deliveries will initially be made from the Whitmore Street entrance to the waterfront via the wharf gates to minimise the effects of heavy traffic around Shed 21.

(b) However at a later stage, deliveries will be generally from the Bunny Street entrance.

(c) No heavy vehicle deliveries will be permitted along the eastern sides of Shed 13 and Site 9, during peak pedestrian periods.

(d) The Eastern laneway will remain open for southbound traffic only, adjacent to Site 10.

(e) Weight restrictions will apply to the Eastern Laneway (Kumutoto Lane).

(f) The loading zone is located on the Eastern side of the site to minimise inconvenience to traffic in the area.

(g) Waterloo Quay footpath will be closed from the Bunny Street entrance to the Whitmore Street entrance during the initial phase of works.

19. As part of the traffic management plan, NZ Police, Shed 21 and other nearby building users will be consulted and their requirements included in the final traffic management plan prior to commencement of construction. Any relevant concerns would also be discussed at this time.

20. Public access will be maintained through Kumutoto Lane. A timber hoarding together with a steel gantry will be built along Waterloo Quay after the initial construction stage of 9 months. This will provide appropriate protection to the public particularly on windy days. A painted pedestrian /cycleway will be provided adjacent to the service lane on the Eastern side of the site.

21. LT McGuinness will provide contact details and form a liaison group for interested parties to meet regularly to discuss any issues that may arise during construction. This group would meet every two weeks to discuss relevant items around the current construction activity and also be familiarised with construction works to take place in the future.

22. I confirm that I am satisfied that the draft CMP as updated and attached at **Appendix B** to this brief meets these objectives.

RESPONSE TO SUBMISSIONS

23. Reviewing the submissions on the applications, I note that submissions 11 (Cullwick), 12 (Boardman), 13 (Swann), 14 (Greenwood), 15 (R. Underwood) and 29 (A. Mitcalfe) have raised concerns about the discharge of contaminants into waterways, the sea and/or the Coastal Marine Area during construction, or that the construction works might result in land contamination. In this respect I would comment as follows:

(a) A final Contaminated Site Management Plan (CSMP) must be submitted to the Compliance Monitoring Officer for approval prior to conducting ground disturbance works. The CSMP must be based on the amended draft CSMP lodged as part of the consent application and updated to reflect the final methodology for the site works.

(b) Tonkin and Taylor (T&T) has been commissioned to write a draft Contamination Site Management Plan for the ground works around Site 10. As part of the plan, T&T have tested the existing soil and groundwater around the site. From this testing T&T, have made recommendations around the excavation of soil and dewatering of the site works.

(c) In general terms, a trench will be dug around the site to ensure the containment of any groundwater. Additionally bunds may be used to contain wastewater locally within the site.

(d) Prior to excavation the groundwater will be tested to establish if:

(i) The groundwater can be discharged into the storm water drain without prior treatment.

(ii) The groundwater has contaminants that need to be treated.

(iii) The groundwater can be discharged to trade waste.

(e) Generally groundwater is pumped to a settlement pond or container to allow for heavy material to settle out. Silt screens or filters may be required.

(f) T&T will establish the levels of soil contamination and the protocols around their disposal, which LT McGuinness will then implement.

(g) Additionally a wheel wash will be established at the entrance to the site to ensure all construction vehicles are cleaned before they leave the site.

24. I note the concerns raised in a serious of identical submissions by owners of apartments in the neighbouring Shed 21 building and the related Waterloo on Quay Body Corporate (see submissions 19 (Ponatahi Trust), 20 (Body Corporate 309984), 21 (Pledger), 22 (Fergusson), 23 (Hayes), 24 (Constable and Compain) and 44 (Farley)) regarding noise and dust during construction, as well structural or other damage to Shed 21 as a result of piling and other works. I comment as follows:

(a) Prior to any earthworks commencing the consent holder will submit to, and have approved by, the CMO (Compliance Monitoring Office) an Erosion, Dust and Sediment Control Plan (EDSC Plan).

(b) During the excavation stage the effects of dust can be mitigated by a mix of:

(i) The use of hoardings and/or wind screens;

(ii) Water sprinklers on site to control dust;

(iii) Using a mist sprayer to contain air borne dust;

(iv) Using Bidem cloth to cover excavated spoil;

(v) Wheel washing at exit of site;

(vi) Minimise loose dry material on site;

(vii) For construction work above ground level, a wind break can be used on scaffolding to mitigate the effects of wind at a high level.

(c) Noise management will be covered off in the CMP. As in all similar projects, I anticipate that appropriate conditions around noise levels and hours of work will be imposed in the building consent and in accordance with NZSS 6803/ 1999 Construction Noise, to avoid unacceptable interference with occupiers of Shed 21 or other nearby buildings.

(d) The latest technology around piling sees the introduction of deep soil mixing and CFA technology which has a significant effect on the reduction of vibration caused by piling.

(e) As regards damage avoidance, pre-commencement and post-completion inspections of Shed 21 will be undertaken to provide reference points against which any effects of construction can be measured. Prior to construction commencing, the consent holder must submit a report to the Wellington City Council detailing the results of a 'pre-construction survey' prepared by a Structural Engineer or a suitably qualified person in relation to the condition of Waterloo on Quay Apartments (Shed 21) and the Former Eastbourne Ferry Terminal. This report must include annotated photos of the condition of these buildings; label the location of these photos; and detail the general condition of the building. All photographs must be dated, mounted, and labelled with descriptive captions to indicate tittle, location and the condition of the building at that location. Any concerns that arise during construction can be canvassed as part of the proposed liaison group meetings.

25. With reference to the submission by NZ Police (submission 35):

(a) I have met on site with representatives of Maritime Police and agreed the following to ensure their operations are not disrupted by the construction works. Attached at **Appendix C** is a letter from NZ Police confirming the proposed arrangements will be satisfactory.

(b) The updated CMP attached to this brief includes a revised construction traffic management plan (CTMP) supplied by TDG which includes a weekly refuelling plan for the vessels described. In summary, the refuelling will take place a short way south of the current location, away from the Site 10 building works.

(c) At this stage there is no designated parking for 2 police cars or for visitors north of the Eastbourne Ferry Terminal. The area suggested is designated as walkway. Two car parks can however be accommodated nearby on Site 9, as shown in TDG's revised CTMP.

(d) Regular loading and unloading of dive gear usually requires a large truck to pull up alongside the Former Eastbourne Ferry Terminal building for a period of time. During construction this would impede the laneway. Accordingly,

outside of emergencies, such loading and unloading will take place in the designated loading zone for the construction works (as shown in the CMP) and LT McGuinness will arrange for the gear to then be delivered onto the wharf behind Maritime Police headquarters by forklift or crane. In emergencies, unloading will be carried out in the existing manner.

(e) There will be gatemen on duty during construction hours to control the area in the case of a Police emergency.

(f) The traffic management plan, together with the CMP will ensure there is no significant disruption to Police operations from the Former Eastbourne Ferry Terminal building. If any possible disruption to such operations is anticipated, adequate notice will be given and solutions discussed and agreed prior to undertaking the relevant works.

(g) Any other concerns that arise during construction can be canvassed as part of the proposed fortnightly liaison group meetings.

26. In relation to the concerns raised by Powerco (submission 31), I note the existence of an easement in favour of Powerco that contains a requirement to obtain Powerco's written approval to disturb the soil below a depth of 300mm or to otherwise do anything on the land that may damage or endanger Powerco's infrastructure or reduce the existing clearance to less than the minimum required clearance for that infrastructure. In my opinion, the building works will not affect the land that is subject to this easement. In any event, existing services will be identified including routes prior to construction. Continuality of these services including a contingency plan will be completed as part of the final CMP prior to construction. The contractor will meet with Powerco and other affected parties to present the plans. This can also be managed through the liaison group during construction.

SECTION 87F REPORT

27. I have read the section 87F reports prepared for this matter.

28. The overall conclusions reached in respect of matters within my area of expertise as to construction management are that:

(a) the effects of the proposal associated with construction will be localised, limited in extent and temporary in nature. As such, effects will be minor and can be appropriately managed through consent conditions; and

(b) ground stability can be ensured both during and following the proposed construction of the building.

29. I also note that the effects related to contaminated material will be minor and that these effects can be adequately controlled through appropriate consent conditions and compliance with the CSMP.

30. I agree with the conclusions reached by the report author in this respect.

PROPOSED CONDITIONS

31. I have reviewed the proposed conditions of consent appended to the section 87F reports and confirm that in respect of those that relate to my areas of expertise (construction of the proposed building on Site 10), these are acceptable.

CONCLUSION

32. When LT McGuinness developed the Chews Lane Precinct there were a number of operating businesses, apartment occupiers and retail operations in adjoining buildings. Though the careful planning of construction activities, detailed at the fortnightly site meetings, no major incidents /inconvenience was experienced by the neighbours. In particular as Victoria Street was a busy street, construction traffic had to be organised to ensure public safety and that there were no delays caused to existing traffic flows.

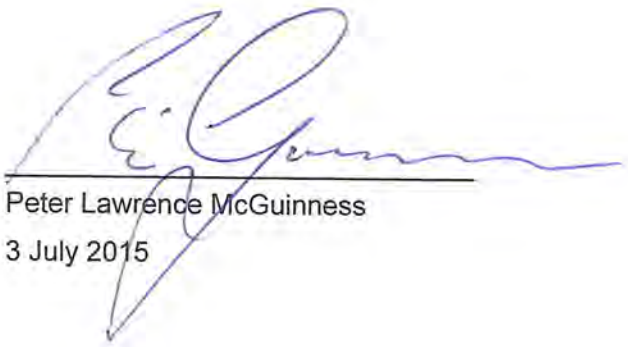
33. Good communication between all parties in relation to the use of the loading zone prevented traffic hold ups when significant structural items were being delivered.

34. The redevelopment of the NZX Building, the Wharewaka building and landscape, as well as Clyde Quay Wharf, all required significant containment of dust, noise and sediment within the construction zone. These sites were bounded by the waterfront, adjoining neighbours and arterial roads.

35. These projects were completed successfully with no major issues arising from construction activities affecting adjoining businesses or tenants. In particular the control

of contaminated materials was closely monitored and contained to ensure there was no pollution entering the harbour.

36. In conclusion LT McGuinness Ltd has built a successful record over 60 years of operations in the Wellington City area with successful refurbishment and redevelopment of many notable waterfront sites. I am confident LT McGuinness can complete the construction works in compliance with the proposed conditions and without undue inconvenience to neighbouring building users.



Peter Lawrence McGuinness
3 July 2015

ATTACHMENT A: Construction Management Plan

KUMUTOTO - SITE 10

CONSTRUCTION MANAGEMENT PLAN

OCTOBER 2014

WILLIS BOND & CO

L.T. McGuinness LIMITED BUILDING CONTRACTORS

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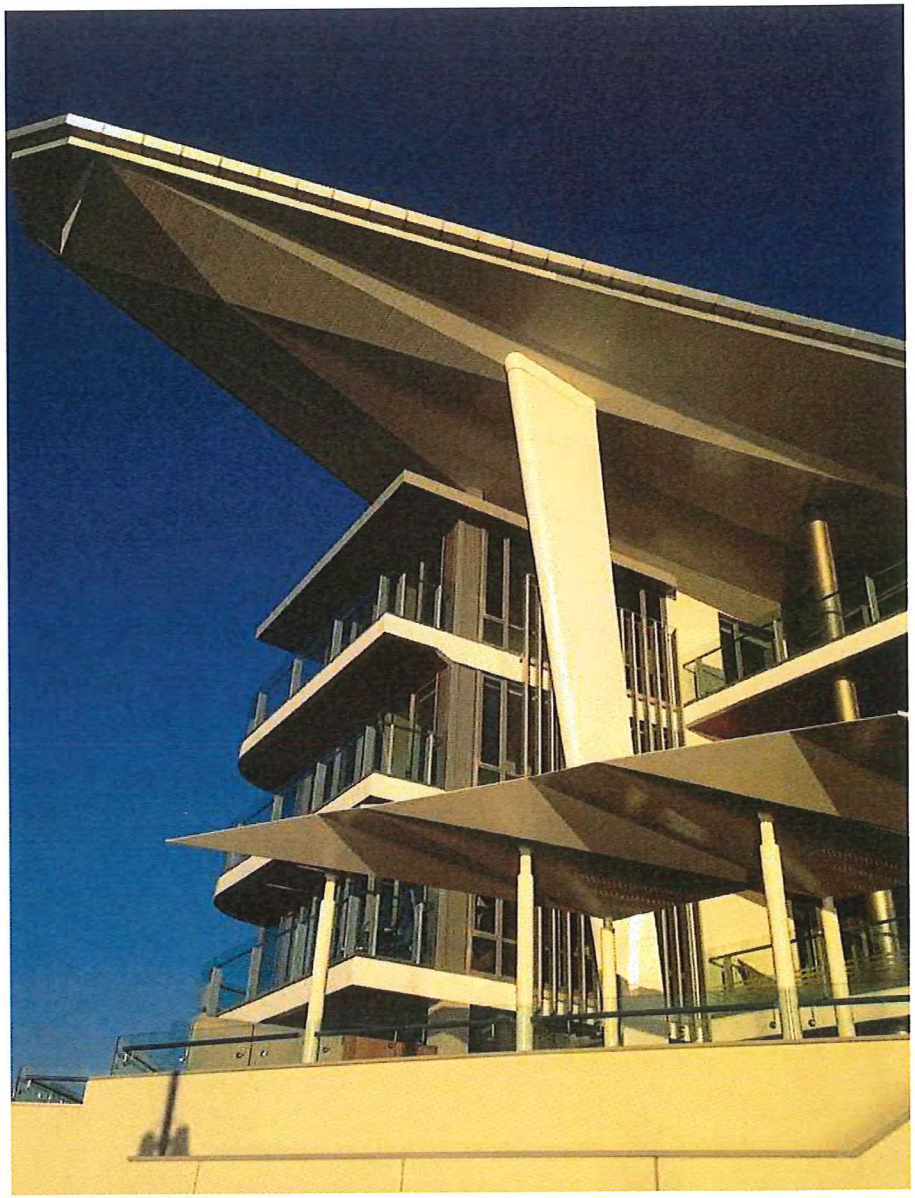


SECTION 1.0
PROJECT INTRODUCTION & CMP OBJECTIVES

PROJECT INTRODUCTIONS

This Construction Management Plan covers the proposed construction works to develop Kumutoto Site 10.

Located between Waterloo Quay and Kumutoto Lane, Site 10 will be the location for a new purpose built premium commercial office building which will comprise four upper levels of open plan office space, ground level 'creative' units, retail and a basement car park with cycle storage and shower facilities.

Access to the building is through a ground floor lobby, which can be accessed from either Waterloo Quay or Kumutoto Lane. A bank of lifts connects to the upper levels through a central core.

At each level, sited adjacent to the central core are toilet facilities. Also located in this area are service ducts providing access to plant spaces located at both roof and basement levels.

The building will be base-isolated, which provides seismic performance equivalent to Importance Level 4 (IL4)

The building is designed to achieve a 5 Greenstar rating equivalent.

CMP OBJECTIVES

- To outline a construction methodology for the Kumutoto Site 10 Project.
- Identify any works during the course of the construction that have the potential to impact on the immediate environment.
- To demonstrate management procedures to deal with the potential effects of construction activity on the environment.
- To establish how public interface will be managed.
- Ensure the safety of public at all times during the works.
- To outline potential issues and corrective procedures in consultation between neighbouring buildings, public, contractors and Wellington City Council.

SECTION 2.0
SCOPE OF WORKS

PROJECT SCOPE OF WORKS

The main works associated with the project include:

Stage 1 – Basement Construction

1. Excavation
2. Piling
3. Slabs
4. Cores
5. Base Isolators
6. Structural steel
7. Building Services

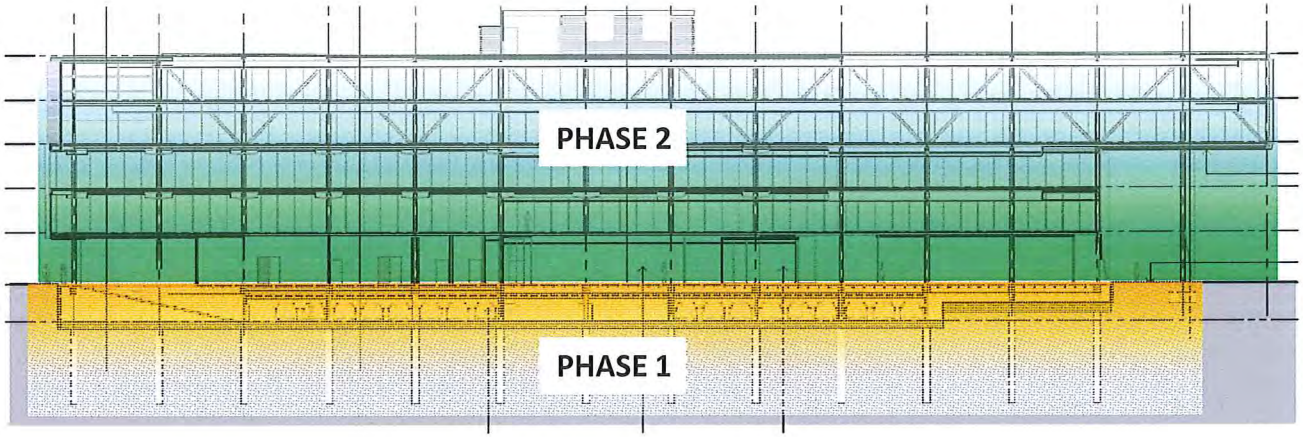
Stage 2 – Building Structure

1. Concrete and steel structure
2. Double T's
3. Cores
4. Building Services
5. Lifts
6. Façade
7. Roofing
8. Site Works

The basement phase incorporates new 18m deep tension piles to the perimeter of the building, concrete slab, concrete columns and plinths and also significant structural steel throughout the basement structure. The purpose of the basement is to facilitate parking for the office building, showers, bicycle parking and plant rooms as well as provide an base structure for the Site 10 building.

Stage 2 involves the construction of the concrete and structural steel structure. This structure is made up of concrete/ steel columns, steel braces throughout, interspan flooring and double tees. The façade, roofing, building services and all other works above ground level is also included in this phase.

It is anticipated that the construction stage of this project will be 24 months, however this will be reviewed following developed design.



LOADING

All excavated material will be transported off site throughout the Whitmore St entrance way. Trucks and machinery coming in/ out of the premises will be assisted by banksman to ensure the safety of the public and staff. Further management of the Whitmore entrance area is required to control the public egress from the northern and southern approaches. This will be achieved by suitable signage, gantries, timber hoardings and a permanent gate man to control machinery access and egress.

DUST CONTROL

Dust will be mitigated and managed through;

- Scaffolding
- Sprinklers
- Dust fighters.

All machinery / trucks and wheel will be hosed down prior to departing site to prevent any risk of dust transportation out of site.

CONTAMINATED GROUND CONDITIONS

Due to the presence of soil contamination, procedures will be required during the excavation and transportation of soil from the site to protect site workers, the public and the environment. These procedures will be set out in a separate Contamination Site Management Plan.
Groundwater is expected to be suitable for either discharge to storm water or to trade waste, both of which will require WCC permits. This will be subject to further testing of groundwater

SECTION 3.0
PROPOSED METHODOLOGY

Site establishment will involve securing the site and making it safe, the demolition of existing site structures and site clearance. Identification of existing services will also be required together with diversions or re-location as necessary.

Secant piling to the perimeter of the building will act as both a ground retaining structure and groundwater barrier to the excavation of the basement which is below the average mean sea level. Once formation level has been reached further piling (secant and anchor piling) will commence.

The basement floor slab will be poured in a checkerboard pattern incorporating waterbar jointing. The concrete walls of the basement will be formed against the perimeter secant piling and the junction to the floor slab detailed to ensure a waterproof envelope to the basement.

The concrete / steel structure to accommodate the base-isolation can then be constructed and the ground floor slab installed.

Ground floor, Level 1 and Level 2 are a combination of structural steel and concrete framing, while Levels 3 & 4 are steel framed. Suspended floors are typically of double Tee construction. A central core located between grid lines F – K provide vertical transport, toilet facilities and services duct. Plant areas are located at both roof level and basement.

The façade will be a unitised glazing system spanning from floor to floor. Isolated panels of zinc / timber will also feature.

Membrane roofing will be applied to either plywood or concrete substrate, depending on the location, while hardwood cladding / zinc panels will feature to external soffits.

A comprehensive construction methodology will be will be incorporated in our Final Construction Management Plan following developed design. This methodology will have particular focus on the basement construction and temporary works required.

SECTION 4.0
SITE ESTABLISHMENT

HOARDINGS

Timber and wire mesh 1800mm high hoardings will be used to separate the public areas and the construction zone.
The hoardings will be positioned along side Waterloo Quay initially, and also around the perimeter of the construction site. Signage on the Whitmore entrance is initial to direct public traffic and educate the public of the environment. Stage two requires gantries along Waterloo Quay to enable public egress.

GANTRYS

The main principal of the gantries positioned along Waterloo Quay is to allow public traffic along the footpath. A gantry will also be present from the eastern side of the Whitmore/ Waterloo Quay crossing to facilitate public traffic heading south. Appropriate signage will direct public as necessary.

TRUCKS & MACHINERY

Due to the nature of this new build, a substantial amount of plant and equipment will be required to facilitate the construction stage. Piling rigs, excavators and large trucks will be required initially in phase one . The basement and temporary loading dock will house these whilst on site. All machinery will be hosed off via a wheel wash prior leaving the construction site to minimise nuisance to surrounding roads/ public spaces.

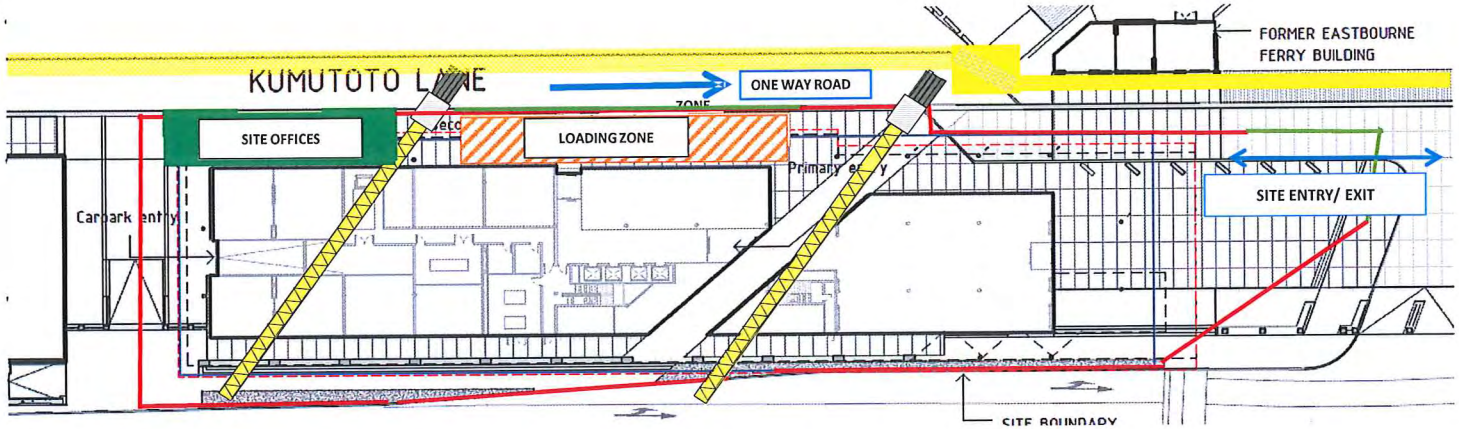
CRANAGE

Due to the length of Kumutoto Site 10, LT McGuinness proposes to erect two tower cranes. The two cranes will be positioned on Kumutoto Lane , allowing full reach over the entire building., and will be used for erection of the structural frame, double tee floor structure and façade installation.

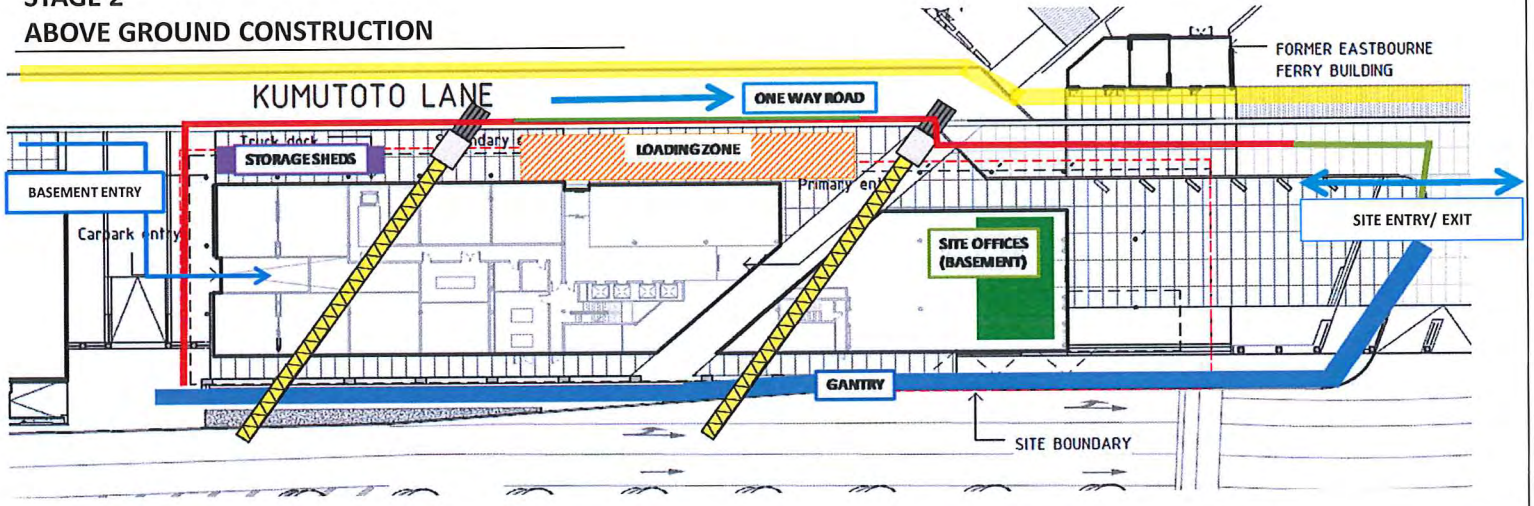
We have positioned the loading zone on the eastern side of the building, Kumutoto Lane. This location offers benefits in terms of easy access by delivery vehicles and also proximity to the new building while minimising impact to Customhouse Quay.

SECTION 4.0
PROPOSED SITE PLANS

STAGE 1
BASEMENT CONSTRUCTION



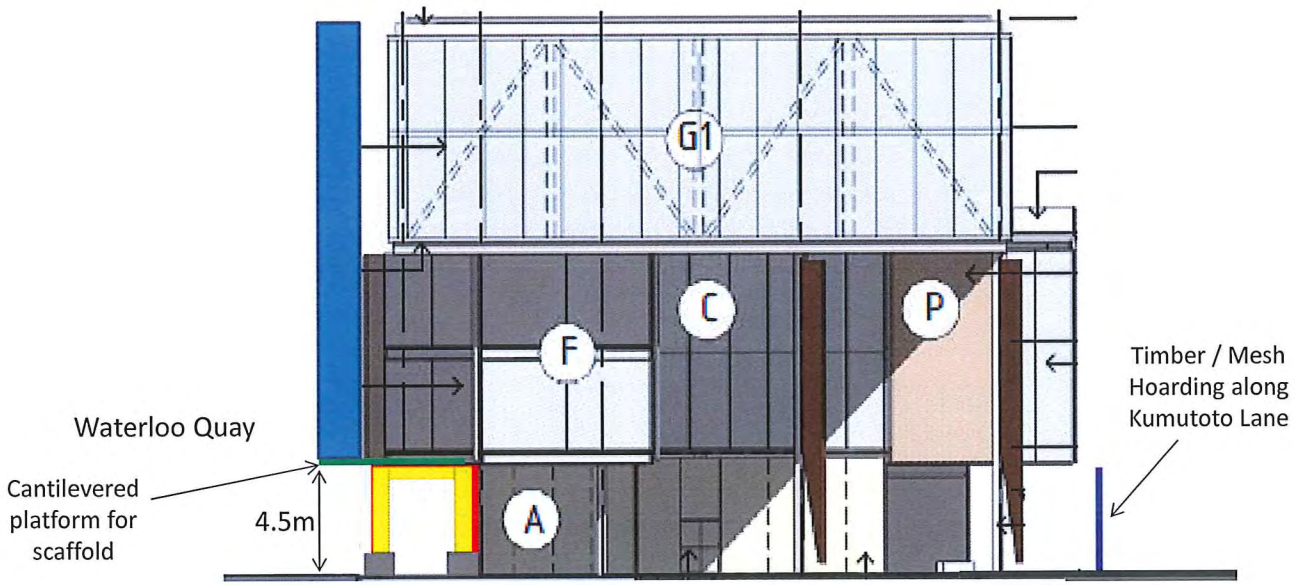
STAGE 2
ABOVE GROUND CONSTRUCTION

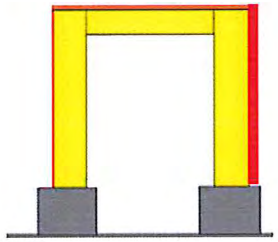


KEY

- Timber Hoardings
- Gates
- Gantry
- Site Entry/ Exit
- Site Offices
- Loading Zone
- Storage Sheds
- Site Fencing
- Walkway

SECTION 4.0
PROPOSED SITE PLANS
STAGE 2 HOARDINGS





Waterloo Quay Hoarding

SITE PLAN
HOARDING CONSTRUCTION

KEY

- Steel Portal
- Ply Construction Cover
- Timber Hoardings
- Concrete Foundations
- Steel scaffold support
- Scaffolding
- Timber Hoardings

SECTION 5.0
ROLES AND RESPONSIBILITIES

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SECTION 6.0
ENVIRONMENTAL MANAGEMENT PLAN

VISION

L.T McGuinness Limited's environmental vision is to be regarded as an environmentally responsible construction company. L.T. McGuinness Limited is committed to creating a sustainable future by utilizing both people and resources in the care of the environment during the construction process in an effort to maintain the quality of the environment for future generations.

POLICY

- To support our environmental vision, L T McGuinness Limited will:
- Implement and maintain environmental systems, including measurable objectives and targets.
- Ensure employees, subcontractors and suppliers are made aware of environmental issues through ongoing training, communication and reporting.
- Comply with environmental legislation, RMA requirements and relevant regulations.
- Ensure staff are accountable and provided with adequate resources to deliver good environmental outcomes.
- Where possible will reduce, reuse or recycle materials to minimize waste.
- Regularly review this environmental policy.

ROLES AND RESPONSIBILITIES

There are four groups with responsibility for the environmental management of the contract;

- The Client;
- LT McGuinness Limited together with its subcontractors;
- Greater Wellington Regional Council, Wellington City Council, Wellington City Waterfront.
- The client's consultants who audit the works and monitor compliance with resource consent conditions and the environmental management plan.

The Consultants are as follows:

Architect	Athfield Architects
Structural Engineer	Dunning Thornton Consultants
Building Services	Aecom
Piling Engineer	Dunning Thornton Consultants
Geotechnical Engineer	Tonkin + Taylor

LT McGuinness Limited shall appoint an Environmental Officer responsible for the environmental performance and compliance where they apply to the works in the contract.
The Environmental Officer will liaise directly with the Site Project Manager.

SECTION 6.0
ENVIRONMENTAL MANAGEMENT PLAN

ENVIROMENTAL CONSIDERATIONS AS A RESULT OF CONSTRUCTION ACTIVITY

- Dirt and Droppings
- Damage and Nuisance
- Construction Noise
- Dust Mitigation
- Wind
- Construction Traffic
- Cement, Grout and Concrete waste
- Fire Prevention

Dirt and Droppings

Dirt and droppings deposited on public or private thoroughfares from vehicles servicing the site are to be removed by the contractor to the satisfaction of the appropriate authorities.

Damage and Nuisance

L.T. McGuinness Limited will take all reasonable precautions to prevent damage and nuisance from water, fire, smoke, dust, rubbish and all other causes resulting from the construction works.

Construction Noise

The increased noise associated with the construction activities will be as a result of the construction works, these include:

Pneumatic breaking;
Saw cutting
Concrete pumping and placing;
Construction plant.
Significant construction activities will take place during daytime 7:30 am to 6 pm hours weekdays and Saturdays as far as is reasonable practical and noise will be managed in accordance with NZS6803:1999 Acoustics – Construction Noise and in accordance with the requirements of the resource consent conditions.

Dust Mitigation

Hoardings/ fences with scrim will be erected around the construction site . The screens will reduce the effects of dust produced by the demolition work. Activities which generate dust will be monitored closely along with weather conditions so any foreseeable issues will be minimized. Housekeeping will be maintained vigilantly with routine sweep ups to minimize dust clouds during construction phase.
The use of stockpiles and handling of excavated materials will be limited.

Wind

The exposed nature of the site will require constant monitoring as the wind poses significant issues which need to be addressed:
1. Dust from demolition;
2. Concrete slurry from skip and pump;
3. General construction debris.

All of the above will require constant monitoring during windy weather. To mitigate the effects by keeping exposed areas free from built up piles of construction debris, dampening down where necessary, proper containment and removal of concrete slurry .

SECTION 6.0
ENVIRONMENTAL MANAGEMENT PLAN

Construction Traffic

Before construction activities begin construction signage will be installed where deemed necessary by all parties involved. The signs will inform the public of the project and provide restrictions of access where necessary. Signs should contain main contact numbers, a brief construction description and approximate time frame of the development. Refer to Appendix A.

A construction Traffic Management Plan is prepared for the project for each phase in accordance with the Wellington City Council Code of Practice for Temporary Traffic Management Control as required. The traffic Management plans will include the following;

- Brief description of works
- Staging
- Traffic and pedestrian control during the construction
- Temporary Traffic Control to close the footpath during loading out times to be installed. This work will be carried out outside of normal working hours.
- Truck and vehicle movements to and from site
- Applicable signage
- Parking and turning areas
- Public safety
- STMS and TC details

Cement, Grout and Concrete Waste

- Concrete has the potential to impact upon water quality through the release of fine particles through a localized increase in pH. This is most likely to occur during the inappropriate washing down of cement truck sluices prior to departing the site.

- No excessive waste concrete or grout materials are to be discharged down (or where they can run into) storm water grates or into the marine environment.

- Concrete Trucks after placing are to wash down in the designated wash bay. Pump trucks are to blow back into the concrete truck for disposal back at quarry.

- Waste concrete will be stored in skips for later removal.

Fire Prevention

To assist in minimizing the risk of fire, the following actions shall be undertaken:

1. A hot permit system shall be used for welding and similar activities that are undertaken on site.
2. At the completion of the working day, the security staff shall inspect all work areas.
3. A fire hazard sign shall be erected at the site entrance.
4. Fire extinguishers and fire hose reels will be made available and installed on site.
5. The water main must remain operating wherever possible to ensure water supply for the fire hose reels.

SECTION 7.0
HEALTH AND SAFETY PLAN
OUR SAFETY PLAN

- Before site work commences, Safety Supervisor/Foreman consults the "Site Hazard Register" table. This list is used to identify hazards on site. Any items that are site specific can be added to the list.
- Information from the above table together with any site specific hazards and hazard information requested from subcontractors will be included into the first Health & Safety Site Meeting Agenda.
- The Safety Supervisor is to review and sign off the effectiveness of the controls for the hazard on a regular basis to check that controls for hazards are effective, i.e. before each monthly Health & Safety meeting.
- All employees and subcontractors are inducted on site, using the "Site Induction" forms.
- This induction includes the LT McGuinness health & safety plan for the site.
- All employees and subcontractors are required to attend the monthly health & safety meeting.
- The health & safety meeting agenda is issued to all attending the health & safety meeting.
- The items listed on the health & safety meeting agenda are discussed and any questions answered.
- An attendance form is then signed and is kept in the health & safety job folder on site. The employee or subcontractor keeps the remaining portion of the form as reference to site hazards.
- A copy of the minutes of the health & safety meeting together with an attendance list is sent to the Architect/Principal.
- The Principal/Engineer is invited to attend the monthly health & safety meeting if applicable.
- LT McGuinness employees only then review the site hazard register "Tool Box" section with their safety supervisor with reference to their own activities at the monthly Tool Box Meeting, held after the health & safety meeting.
- There are ongoing "hazard evaluations" as site operations change and progress. These new hazards will be added to the existing "Site Hazard Register". The hazard board on site is updated daily.
- Employees and subcontractors should use the "Health & Safety Improvement Form", if they feel any safety improvement needs to be made on site. These are actioned by the Safety Officer on site and later used in the Health and Safety review. These forms are also given to subcontractors at the tender acceptance stage, so confidentiality can be reserved if necessary.
- There will be site inspections through Site Safe Ltd. These are carried out on a monthly basis. Findings from these inspections ensure that the LT McGuinness health & safety policy is being maintained on site.
- The safety supervisor also has a "Hazard Identification Report" book in which they write out infringement notices to any offenders that have been properly informed and trained on Health & Safety information but continue to breach the rules. The warning has three copies, one going to the offender, one kept as a record on site and one going to the LT McGuinness office where it is faxed to the offender's employer. Positive action needs to be followed through when the notice is issued. Please refer to the following pages outlining our proposed card system for the project.
- Staff and subcontracting companies take these tickets seriously as they indicate lack of understanding of LT McGuinness health & safety issues particularly in relation to activities on site. These tickets are lodged in a staff personnel file and can be a basis for staff dismissal if continued re-offending occurs.
- Safety co-coordinators liaise with Safety Supervisors on any complaints regarding the health & safety system and its implementation on sites. Meetings at the office are held on a 6 monthly basis ensure a constant review of all safety procedures.
- At the completion of the project a review is carried out of the LT McGuinness health & safety policy and the success of its implementation on site. Any improvements are then added to the existing health & safety document

The following page outlines of safety plan and procedures in a flow Chart form

LTM DRUG AND ALCOHOL POLICY

In 2009 LT McGuinness implemented a new drug and alcohol policy which included mandatory testing of staff and sub contractors.

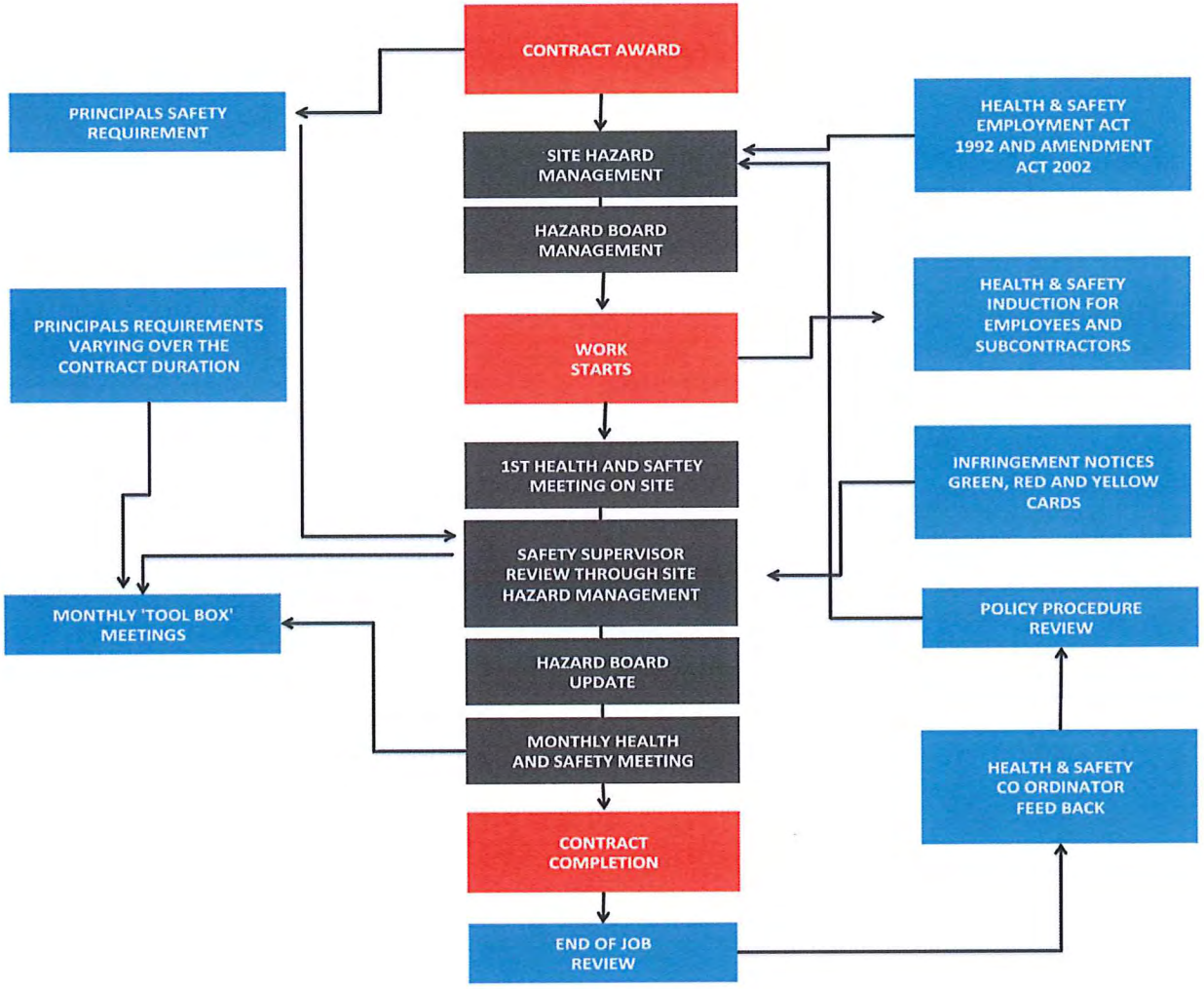
We believe this initiative was the first in the New Zealand Construction Industry.
All of our sites are subject to ongoing testing.
Since its inception the quality of sub contractors on our sites have improved and it ensures a drug and alcohol free construction site.

CARD SYSTEM PROPOSED FOR SITE 10

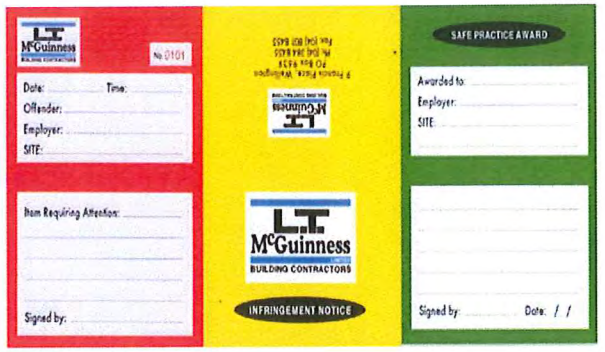
The LT McGuinness green, yellow and red card system has been introduced on to our sites over the past few years. It is a system that encourages safe behavior and deals efficiently with non-conformance.
Safe Practice Award – A monthly draw is conducted with a winning prize.
infringement Notice – 2 yellow cards in 3 months and the offender is removed from site.

GREEN CARD – Safe Practice Award – A monthly draw is conducted with a winning prize.
YELLOW CARD – Infringement Notice – 2 yellow cards in 3 months and the offender is removed from site.
RED CARD – Serious Infringement Notice – Immediate removal from site.
The card system has worked very effectively to date, it is a simple system in which the rules are very clear for everyone entering site.

SECTION 7.0
HEALTH AND SAFETY PLAN



LTM CARD SYSTEM



SECTION 8.0
LTM COMPLAINTS PROCEDURE

The following complaints procedure will be implemented on Kumutoto Site 10;

1. All complaints will be directed in the first instance to the Site Manager. Gerry Andrews

   Gerry Andrews
   Mob: 021 221 9083
   Email: gerrya@mcguinness.co.nz

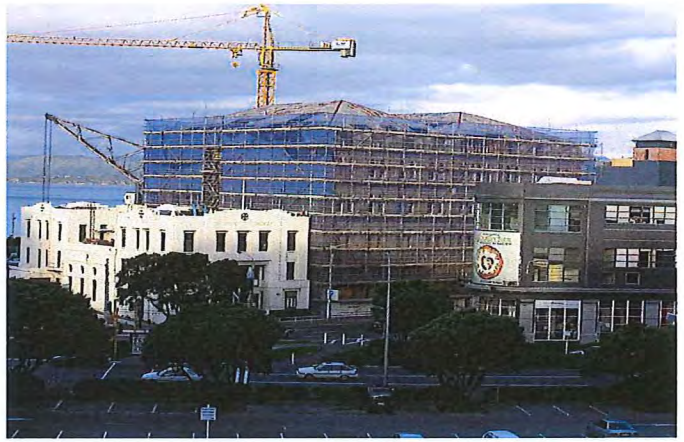
2. Gerry Andrews will have the responsibility to ensure that the complaints procedure process is enacted and communicated correctly.

   LT McGuinness will prominently display alongside the works a signboard with the 24 hour contact number of LT McGuinness Site Manager, Gerry Andrews.

3. LT McGuinness will maintain on site a complaint register and log of actions taken.

   The register will include the following;

   - A standard complaints procedure pro forma
   - Date of complaint log
   - Complaint names log
   - Actions taken log
   - Report back on log
   - Close out log



APPENDIX A
DRAFT TRAFFIC MANAGEMENT PLAN

LT McGuinness

Site 10 Development, Wellington Waterfront

Construction Traffic Management Plan

DRAFT

Date _____

TDG Ref: 12950 ctmp.docx

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LT McGuinness

Site 10 Development, Wellington Waterfront

Construction Traffic Management Plan

Quality Assurance Statement

DRAFT

Prepared by:

Eliza Sutton _____

Principal Transportation Engineer

Reviewed by:

Name _____

Title

Approved for Issue by:

Name _____

Title

Status: Draft report

Date: Date _____

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1. Background

TDG have been commissioned by LT McGuinness to develop this Construction Traffic Management Plan (CTMP) in support of the planned development of a commercial building known as 'Site 10', on Wellington Waterfront. The purpose of this report is to outline the anticipated construction philosophy, as it is known at this early stage of planning, to provide Council with information as to how the effects the construction phase on the wider roading network are planned to be mitigated.

This CTMP has been developed with regard to the construction of the commercial building only; the construction of the adjoining Open Space areas (which form a parallel Resource Consent to that for the building itself) will be the responsibility of others.

The site is located to the north of the Waterloo Quay intersection with Whitmore Street. The site can be accessed via a number of intersections located along Waterloo and Customhouse Quay, however, it is most conveniently accessed via the Whitmore Street intersection, or Bunny Street (to the north).

The site is currently used as a surface level campervan park and commuter carparking area, with an established residential apartment building (Shed 21) to the immediate north. To the north-east of the site, the land and wharfs are under the control of CentrePort, and on-going access to these established facilities will need to be provided for the duration of the construction period.

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2. Existing Environment

The Site 10 development site is located within land under the management of Wellington City Council City Shapers (previously Wellington Waterfront Ltd). The site is located to the immediate north-east of the Customhouse Quay intersection with Whitmore Street.

The site is currently used as a public carpark and campervan park, with a poorly defined vehicle laneway running north-south to the east of Site 10. This laneway provides access to Site 10, the established Shed 21 (to the north) and CentrePort land (to the north-east). The laneway has connections with both Bunny Street and Whitmore Street, and also connects to the established Kumototo Precinct laneway to the south.

The Waterfront as a whole attracts and carries a significant volume of pedestrian and cycle traffic. To the south of the site, formed routes are established throughout the Waterfront to cater for these users. In the immediate vicinity of the site, pedestrians and cyclists are less well catered for, with these modes being mixed with vehicular traffic. Nonetheless, there remains a high volume of pedestrians and cyclists travelling along the laneway, and across Customhouse Quay, and these users will require particular consideration when planning the construction development.

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3. Construction Operations

3.1 Construction Programming

Preliminary programming of the construction works has identified an overall work programme of some 24 months, likely beginning mid-2016 (subject to various consents being granted).

Stage 1: The initial construction phase will involve piling around the perimeter of the site, before excavating to enable the basement carpark and services to be established.

For this initial period of around 9 months, during which the piling, excavation, and construction of the basement through to approximately Level 1 of the building will be undertaken, the footpath fronting Waterloo Quay will be closed to enable the works to be undertaken. Pedestrian diversion signage throughout the surrounding area will be required to support this closure. This will be discussed later in the report.

Stage 2: The construction of the building (L1 and above) will allow for the Customhouse Quay footpath to be re-opened via a covered gantry will be provided, to enable safe pedestrian access.

In keeping with other developments throughout the Waterfront, construction traffic access will be restricted during peak pedestrian periods. On-going access for all legitimate users of the waterfront will be maintained.

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3.2 Site Access

3.2.1 Stage 1: Piling and Ground Floor Development

It is intended that site access for heavy vehicles will be achieved primarily via the Whitmore Street gates. As the right turn into the waterfront area is banned from the south at the Whitmore Street intersection, this will mean that all trucks will arrive to the site either via Waterloo Quay (to the north) or Whitmore Street (to the west).

During the initial construction period, controlled access will be established from the Waterfront land to the construction site itself, so that only vehicles associated with the woks are able to access the site. Staff will be made available on the ground during the arrivals and departure of heavy vehicles, to ensure the safety of other users through the area.

Key features of the traffic management during this stage includes:

- Closure of the Customhouse Quay footpath adjacent to Site 10, with pedestrian diversion routes signs established within the adjoin Waterfront area and roading network.
- The eastern laneway will remain accessible to all vehicular traffic throughout. Due to the localised width restriction adjacent to the south-eastern corner of the building, pedestrian and cyclists will be discouraged from using the lane (but not specifically restricted).
- All truck access to the site will be via Whitmore Street gates.

Figure 1 shows the intended work site area, and access for the largest vehicles. **Figure 2** highlights the pedestrian and vehicle routes through the area. The footpath closure and restrictions of the eastern laneway will require some pedestrian diversion routes to be signed.

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3.2.2 Stage 2: Level 1 (and above) Construction

During the latter period of construction (when the portion of building above ground is being constructed), loading will occur by way of a dedicated loading zone adjacent to the laneway. This is shown on **Figure 3.**

Key features of the traffic management during this stage includes:

- Customhouse Quay footpath will be re-opened, with a pedestrian gantry installed to enable works to safely occur overhead.
- An overnight lane closure of the left/through lane may be required on occasion, subject to Council approval.
- The eastern laneway will remain accessible to all vehicular traffic throughout. Due to the localised width restriction adjacent to the south-eastern corner of the building, pedestrian and cyclists will be discouraged from using the lane (but not specifically restricted).
- A construction loading zone will be installed within the laneway.
- All truck egress to the site will be via the Bunny Street gates, and exit via Whitmore Street.

A cantilevered structure is proposed to be installed at a height 4.5m above the adjacent left/through lane, to enable the façade to be constructed. This is shown indicatively by **Figure 4**, and will require approval by Council. Over-dimensioned loads will be required to use the outer southbound lanes.

3.2.3 Staff Parking

When practicable, some staff parking will be available within the work site itself. This may include the basement carpark (once it is completed). When no space is available, staff will be directed to park elsewhere or use public transport. With respect to this latter point, it is noted that the Wellington Train Station and Bus Transfer Station are located in close proximity to the site.

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3.3 Hours of Operation

Construction traffic movements into and out of the site will be limited to between 7am and 7pm Monday – Saturday, with heavy vehicle movements avoided during the peak pedestrian periods. It is not expected that works on the site itself will need to be undertaken outside these hours, with the exception of some façade work on the western side of the building, which will occur during the overnight lane closures.

3.4 Access to Adjacent Properties

On-going and enduring vehicular access through the area will be maintained throughout the construction period, to ensure full access to Shed 21 and CentrePort is provided. In addition, access will be ensured for pedestrian and cyclists though diverted routes and protected pathsways.

As previously described, the Customhouse Quay footpath will be closed for a period of approximately six months, to enable piling and excavation works to be completed. Pedestrian diversion routes (either through the Waterfront area or on the adjoining public roading network) will be signed for this period.

3.5 Dust Suppression and Detritus Control

Dust suppression and detritus control is to be provided by the Contractor. The Contractor is to liaise with the Road Controlling Authority to ensure that dust suppression and the spread of detritus material (dropped from heavy haulage vehicles carting materials to the site) is appropriately controlled and remedied. The Contractor is to adhere to any further guidance given by the Traffic Management Co-ordinator and/or the road controlling authorities (such as localised speed restrictions) in relation to dust suppression and removal of detritus material.

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3.6 Material Storage

All materials will be stored on-site. No material will be stored within the public highway at any time.

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4. Traffic Management

The adjoining roads are classified as Principle or Arterial Streets, and as such are designed to accommodate large and heavy vehicles. Based on the size of the development area, it is anticipated that the largest truck able to be accommodated on site will be a maximum rigid truck. The number of truck movements associated with the development will be subject to a more detailed traffic management plan to be developed prior to works being undertaken, but access by the large vehicles will be limited to outside pedestrian peak periods, to ensure on-going safety for the general public.

4.1 Heavy Vehicle Volumes

??

4.2 Access

Given the constrained size of the development site, it is not anticipated that any significant number of vehicles will be on site at any one time. Any vehicles on site will be marshalled while moving.

4.2.1 Stage 1: Heavy Vehicles

Heavy vehicle access to the site will be managed entirely via the Whitmore Street intersection during the initial construction period, to minimise the impact of heavy vehicle traffic around the adjoining residential building of Shed 21 during the excavation works. With right turns into the waterfront banned at this intersection, arrivals by heavy vehicles will be entirely accommodated via Customhouse Quay (north) or Whitmore Street (west). All outbound movements are permitted at the Whitmore Street gates, so the outbound route adopted by the heavy vehicles will not be restricted.

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Trucks entering the site will do so in a forward motion where possible. However, there may be the occasional need for a truck to reverse into the site or loading zone (from the Whitmore Street driveway access area) dependant on construction operations at any given point. These movements will occur under the control of marshals to ensure the on-going safety of the public.

All movements out of the site will occur in a forward motion.

4.2.2 Stage 2: Heavy Vehicles

During subsequent periods of construction, a loading zone will be established in the laneway adjacent to the site. The preferred location of the zone will be identified as detailing such as the crane location is finalised. During this period, access will be required by both intersections, with heavy vehicles directed to enter via Bunny Street and exit via Whitmore Street. No heavy vehicles associated with the construction will be permitted during peak pedestrian periods, including the weekday commuter period and Saturday mid-day (summer) periods or event days (such as the 7's).

4.2.3 General Access and Management

Smaller vehicles associated with the construction phase (trades vans and the like) may arrive and depart from either the Whitmore Street or Bunny Street access, as suits.

The Site and/or Project Manager will be responsible for communicating the site access limitations to all drivers and/or contractors bringing trucks to the site.

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4.3 Loading

During the initial piling and excavation phase, all loading and unloading will occur within the construction site.

During the subsequent phases, as the above ground levels are constructed, loading will occur from a loading zone on the adjacent laneway. The exact location of the loading zone will be confirmed as the planning for the construction works is developed.

4.4 Signage

Traffic and warning signs will, wherever possible, will conform to the standards specified in COPTTM. These signs may be supplemented with some specifically designed unique signage, particularly with respect to providing information for pedestrian diversion routes.

4.5 Material Storage

All materials will be stored on-site. No material will be stored within the public highway at any time.

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5. Pedestrian and Cycle Access

5.1 Stage 1

As previously described, for an initial six month period, the Customhouse Quay footpath adjacent to the site will be closed to pedestrian traffic, to enable the piling and excavation works to be completed.

In addition, the laneway located to the east of the construction site will be limited to vehicular traffic only. There is a localised pinch point to the south-east of the building footprint, and a requirement to provide for on-going access to Shed 21 and CentrePort. Pedestrians and cyclists will be diverted so as to connect with the CBD via the Customhouse Quay signalised crossing, rather than be encouraged to share the narrow laneway with vehicular traffic.

During this period, pedestrian diversions will be in place, to direct members of the public through alternative routes. The anticipated extent of the closure and the alternative available routes was shown previously in Figure 2. The full extent of the signage adopted will be agreed with Council as part of the more detailed TTMP process which will be undertaken prior to construction works beginning.

5.2 Stage 2

After the initial works have been completed, a gantry will be established along the same length of Customhouse Quay, to enable protected pedestrian access through this area, with construction work then able to occur above.

Pedestrians and cyclists will be able to access the laneway, however they will be encouraged to use protected route on Customhouse Quay in order to avoid the 'pinch point' on the lane adjacent to the Police building.

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6. Implementation and Liaison

6.1 Project Manager Contact Details

Contact details for the Project Manager and associated personnel are provided below:

- Project Manager: Kerrin Manuel
- Site Traffic Management Supervisor: XXX

6.2 Affected Parties

Access to Shed 21 and CentrePort will be maintained throughout the works, as will access for pedestrians, cyclists and vehicles through the adjacent area.

Notices detailing the timing of the construction works will be provided to the owners and occupiers of Shed 21 commercial and residential units, as well as CentrePort and WWL. In addition, public notices will be posted in the vicinity of the site in advance of the works and through the duration when the footpath is closed.

Communication with the Shed 21, CentrePort and WWL will be the responsibility of the Project Manager, and will be on-going through the duration of the works. A contact number will be provided within any communications, in order that any issues may be raised and dealt with promptly.

These communications will be issued at least ten working days prior to the commencement of works on site. The communication will be the responsibility of the Project Manager.

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6.3 Driver Induction

The STMS is responsible to undertake a site induction with all transport operators contracted to transport materials to the site. The induction is to cover (but not be limited to):

- the route of travel
- permissible times of deliveries
- requirement for and use of possible communication systems
- requirements to abide by local speed restrictions for dust and detritus management
- requirement for courteous driving
- requirement to report hazards on the transport route

6.4 Utility Services

There will not be a need to restrict access to utilities providers. Should access to the site, or surrounding area, be required by such parties, the Project Manager should be engaged.

6.5 Complaints Procedure

Any communications issued will include contact details for the Project Manager for any complaints to be directed. Any comments will be quickly communicated to the relevant project staff and a response provided and actions taken as appropriate. Should any changes be required to any approved CTMP or TTMP, a records of the change itself shall be kept.

A full record of complaints and responses shall be maintained by way of a complaints register.

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6.6 Updates to Plans

Approved CTMPs and TTMPs will be reviewed by the Project Manager and STMS on a regular basis, to ensure that the documents remain relevant for use.

Any changes to these plans will be recorded.

The structure of and requirements for the CTMP are to be approved by the road controlling authorities prior to construction as directed by the conditions of consent.

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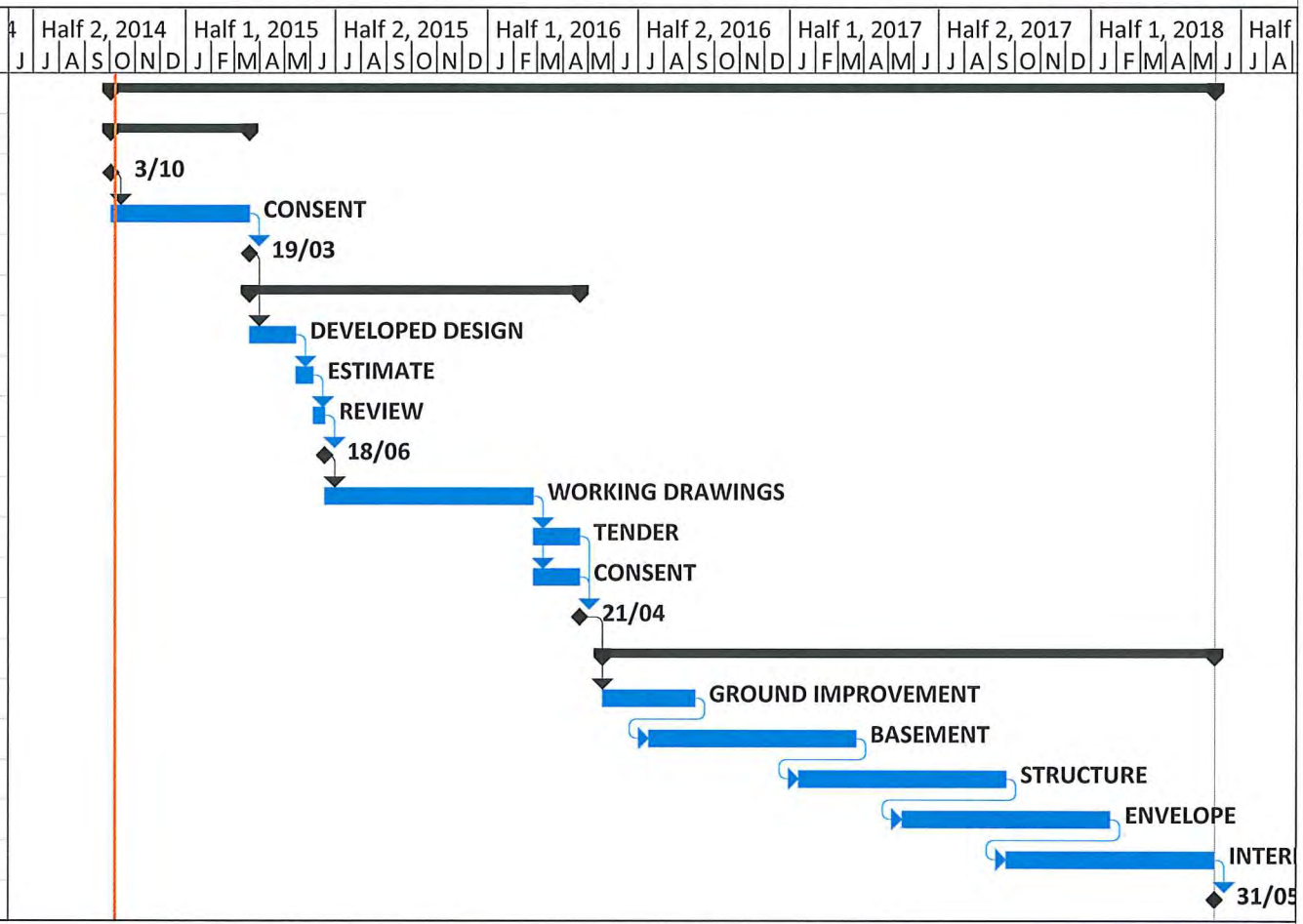
APPENDIX B
DRAFT PROGRAMME

WILLIS BOND & CO

SITE 10
CONCEPT PROGRAMME FOR DISCUSSION
REVISION 5 - SEPTEMBER 2014

L.T. McGuinness BUILDING CONTRACTORS

ID	Task Name	Duration
1	**SITE 10**	**955 days**
2	**RESOURCE CONSENT**	**120 days**
3	APPLICATION	0 days
4	CONSENT	120 days
5	APPROVAL	0 days
6	**PRE CONSTRUCTION**	**285 days**
7	DEVELOPED DESIGN	40 days
8	ESTIMATE	15 days
9	REVIEW	10 days
10	APPROVAL TO PROCEED	0 days
11	WORKING DRAWINGS	180 days
12	TENDER	40 days
13	CONSENT	40 days
14	APPROVALS	0 days
15	**CONSTRUCTION**	**530 days**
16	GROUND IMPROVEMENT	80 days
17	BASEMENT	180 days
18	STRUCTURE	180 days
19	ENVELOPE	180 days
20	INTERIOR FITOUT	180 days
21	PRACTICAL COMPLETION	0 days



Project: DraftProgrammeREV1.09
Date: Wed 8/10/14

Task	External Milestone	Manual Summary Rollup	
Split	Inactive Task	Manual Summary	
Milestone	Inactive Milestone	Start-only	
Summary	Inactive Summary	Finish-only	
Project Summary	Manual Task	Deadline	
External Tasks	Duration-only	Progress	

ATTACHMENT B: Updated Construction Management Plan

KUMUTOTO - SITE 10

CONSTRUCTION MANAGEMENT PLAN – **REVISION 3**

JUNE 2015

WILLIS BOND & Co

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SECTION 6.0	Environmental Management Plan
SECTION 7.0	Health and Safety Plan
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APPENDIX D	Waste Management Plan

SECTION 1.0
PROJECT INTRODUCTION & CMP OBJECTIVES

PROJECT INTRODUCTIONS

This Construction Management Plan covers the proposed construction works to develop Kumutoto Site 10.

Located between Waterloo Quay and Kumutoto Lane, Site 10 will be the location for a new purpose built premium commercial office building which will comprise four upper levels of open plan office space, ground level 'creative' units, retail and a basement car park with cycle storage and shower facilities.

Access to the building is through a ground floor lobby, which can be accessed from either Waterloo Quay or Kumutoto Lane. A bank of lifts connects to the upper levels through a central core.

At each level, sited adjacent to the central core are toilet facilities. Also located in this area are service ducts providing access to plant spaces located at both roof and basement levels.

The building will be base-isolated, which provides seismic performance equivalent to Importance Level 4 (IL4)

The building is designed to achieve a 5 Greenstar rating or equivalent.

CMP OBJECTIVES

- To outline a construction methodology for the Kumutoto Site 10 Project.
- Identify any works during the course of the construction that have the potential to impact on the immediate environment.
- To demonstrate management procedures to deal with the potential effects of construction activity on the environment.
- To establish how public interface will be managed.
- Ensure the safety of public at all times during the works.
- To outline potential issues and corrective procedures in consultation between neighbouring buildings, public, contractors and Wellington City Council.

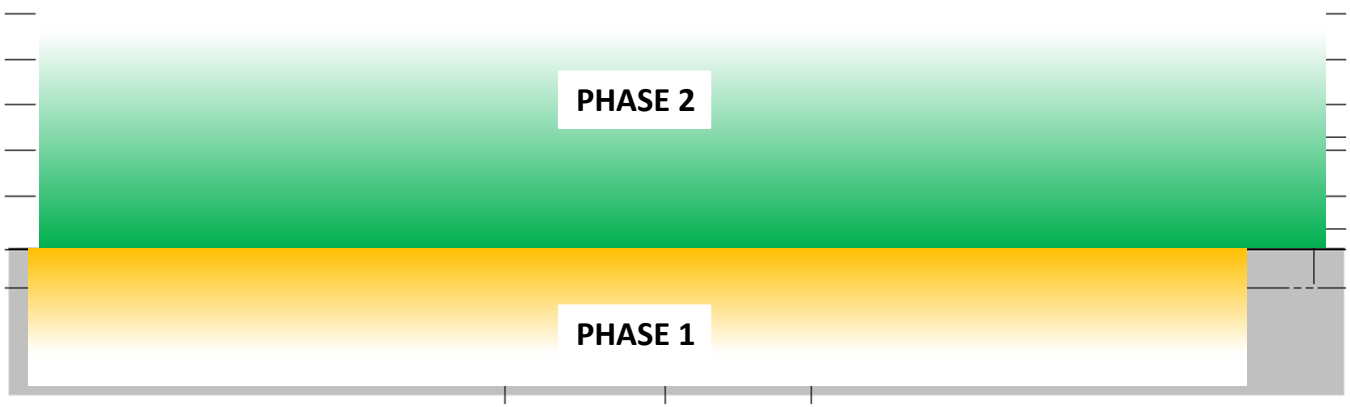
SECTION 2.0
SCOPE OF WORKS

PROJECT SCOPE OF WORKS

The main works associated with the project include:

Stage 1 – Basement Construction

1. Excavation
2. DSM / CFA
3. Piling
4. Slabs
5. Cores
6. Base Isolators
7. Structural steel
8. Building Services



Stage 2 – Building Structure

1. Concrete and steel structure
2. Double T's
3. Cores
4. Building Services
5. Lifts
6. Façade
7. Roofing
8. Site Works

The basement phase incorporates new 18m deep tension piles to the perimeter of the building, concrete slab, concrete columns and plinths and also significant structural steel throughout the basement structure. The purpose of the basement is to facilitate parking for the office building, showers, bicycle parking and plant rooms as well as provide an base structure for the Site 10 building.

Stage 2 involves the construction of the concrete and structural steel structure. This structure is made up of concrete/ steel columns, steel braces throughout, interspan flooring and double tees. The façade, roofing, building services and all other works above ground level is also included in this phase.

It is anticipated that the construction stage of this project will be 24 months, however this will be reviewed following developed design.

LOADING

All excavated material will be transported off site throughout the Whitmore St entrance way. Trucks and machinery coming in/ out of the premises will be assisted by banksman to ensure the safety of the public and staff. Further management of the Whitmore entrance area is required to control the public egress from the northern and southern approaches. This will be achieved by suitable signage, gantries, timber hoardings and a permanent gate man to control machinery access and egress.

DUST CONTROL

Dust will be mitigated and managed through;

- Scaffolding
- Sprinklers
- Dust fighters.

All machinery / trucks and wheel will be hosed down prior to departing site to prevent any risk of dust transportation out of site.

CONTAMINATED GROUND CONDITIONS

Due to the presence of soil contamination, procedures will be required during the excavation and transportation of soil from the site to protect site workers, the public and the environment. These procedures will be set out in a separate Contamination Site Management Plan.
Groundwater is expected to be suitable for either discharge to storm water or to trade waste, both of which will require WCC permits. This will be subject to further testing of groundwater

SECTION 3.0
PROPOSED PRELIMINARY METHODOLOGY

Site establishment will involve securing the site and making it safe, the demolition of existing site structures and set up for all contamination works. Identification of existing services will also be required together with diversions or re-location as necessary.

The perimeter of the site will be trenched and settlement ponds formed to manage any water / spoil from the excavations. Removal of any asbestos contaminated material can then commence in accordance with our Contamination Site Management Plan. Removal of any existing foundations that impede the new construction can proceed once any contaminated material has been removed. DSM / CFA walls to the perimeter of the site will act as both a ground retaining structure and groundwater barrier to the excavation of the basement which is below the average mean sea level. Once the perimeter DSM / CFA walls are installed, the site will be excavated to above water table level and dewatering systems established. Construction of internal DSM / CFA walls and anchor piles can now proceed, followed by the progressive excavation to final reduced level, construction of basement slabs and forming of basement walls.

The basement floor slab will be installed progressively in a checkerboard pattern incorporating waterbar jointing. The concrete walls of the basement will be formed against the perimeter DSM / CFA wall and the junction to the floor slab detailed to ensure a waterproof envelope to the basement.

The concrete / steel structure to accommodate the base-isolation can then be constructed and the ground floor slab installed.

Ground floor, Level 1 and Level 2 are a combination of structural steel and concrete framing, while Levels 3 & 4 are steel framed. Suspended floors are typically of double Tee construction. A central core located between grid lines F – K provide vertical transport, toilet facilities and services duct. Plant areas are located at both roof level and basement.

The façade will be a unitised glazing system spanning from floor to floor. Isolated panels of zinc / timber will also feature.

Membrane roofing will be applied to either plywood or concrete substrate, depending on the location, while hardwood cladding / zinc panels will feature to external soffits.

A comprehensive construction methodology will be will be incorporated in our Final Construction Management Plan following further site investigations and developed design. This methodology will have particular focus on the basement construction and temporary works required to mitigate the ground contamination, and will be updated and agreed prior to any construction activities commencing on site.

PRELIMINARY PROPOSED SITE 10 FOUNDATION CONSTRUCTION METHODOLOGY	
STAGE	ACTIVITY
1	Site Establishment including set up for all contamination works.
2	Trench perimeter of site and settlement ponds to form catch for any water/spoil.
3	Remove Asbestos contaminated spoil (Zone 3)
4	Remove any existing foundations that impede new construction
5	Construct DSM walls to perimeter of site.
6	Bench site to above water table
7	Establish dewatering Systems
8	Construct DSM walls to internal area
9	Install new concrete piles
10	Progressively excavate to final RL
11	Progressively construct basement slabs
12	Progressively construct basement walls

SECTION 4.0
SITE ESTABLISHMENT

HOARDINGS

Timber and wire mesh 1800mm high hoardings will be used to separate the public areas and the construction zone.
The hoardings will be positioned along side Waterloo Quay initially, and also around the perimeter of the construction site. Signage on the Whitmore entrance is initial to direct public traffic and educate the public of the environment. Stage two requires gantries along Waterloo Quay to enable public egress.

GANTRYS

The main principal of the gantries positioned along Waterloo Quay is to allow public traffic along the footpath. A gantry will also be present from the eastern side of the Whitmore/ Waterloo Quay crossing to facilitate public traffic heading south. Appropriate signage will direct public as necessary.

TRUCKS & MACHINERY

Due to the nature of this new build, a substantial amount of plant and equipment will be required to facilitate the construction stage. Piling rigs, excavators and large trucks will be required initially in phase one . The basement and temporary loading dock will house these whilst on site. All machinery will be hosed off via a wheel wash prior leaving the construction site to minimise nuisance to surrounding roads/ public spaces.

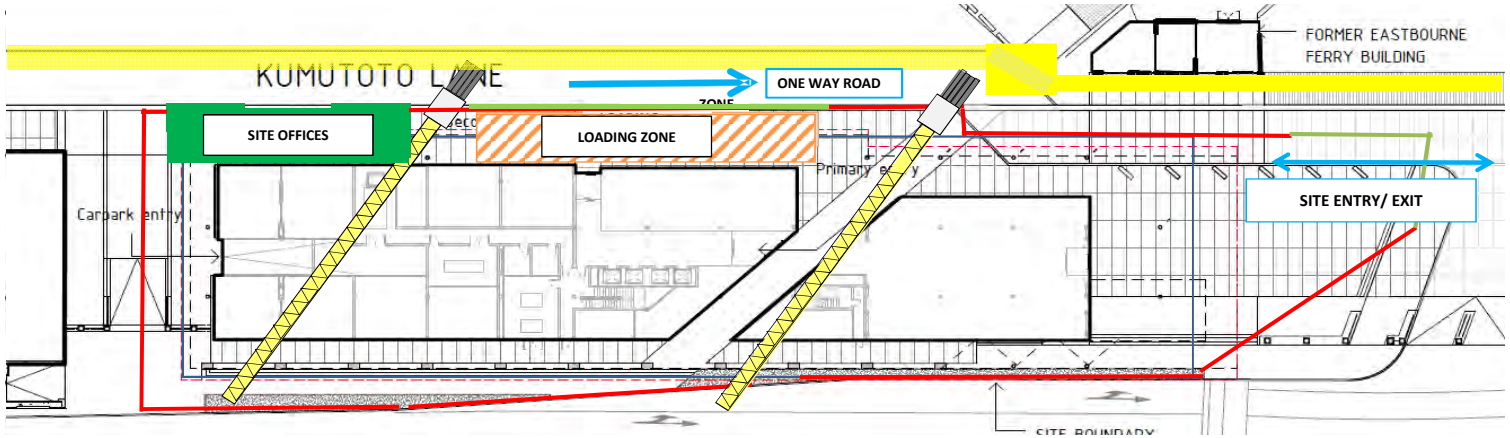
CRANAGE

Due to the length of Kumutoto Site 10, LT McGuinness proposes to erect two tower cranes. The two cranes will be positioned on Kumutoto Lane , allowing full reach over the entire building., and will be used for erection of the structural frame, double tee floor structure and façade installation.

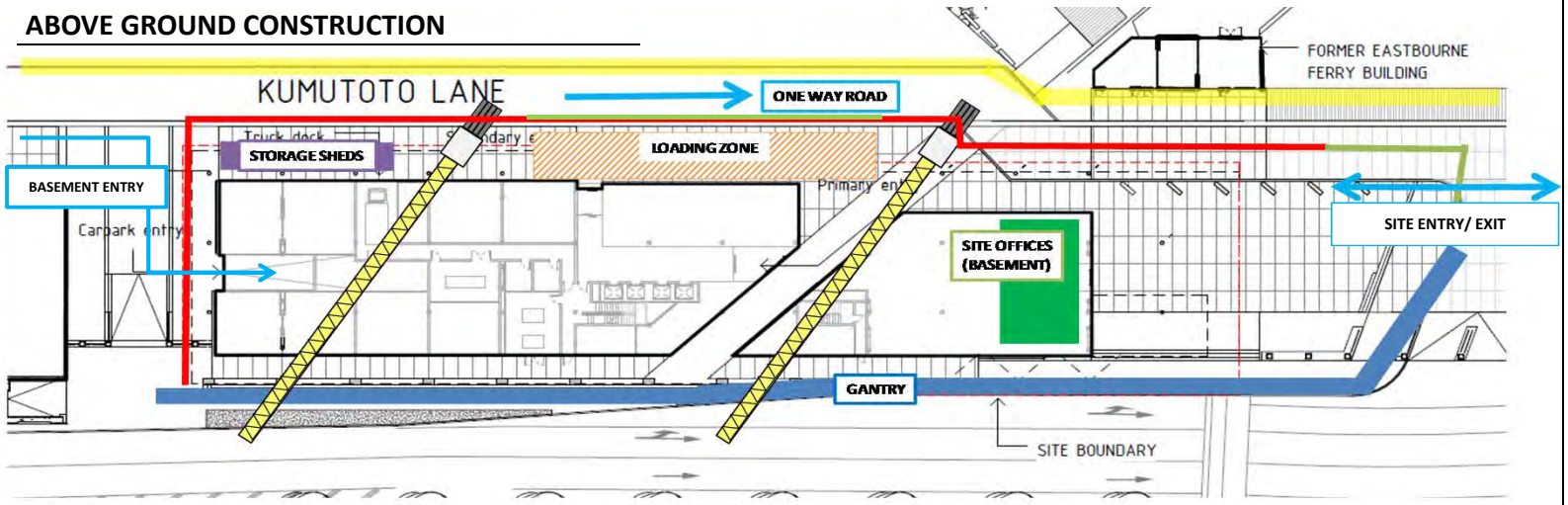
We have positioned the loading zone on the eastern side of the building, Kumutoto Lane. This location offers benefits in terms of easy access by delivery vehicles and also proximity to the new building while minimising impact to Customhouse Quay.

SECTION 4.0
PROPOSED SITE PLANS

STAGE 1
BASEMENT CONSTRUCTION



STAGE 2
ABOVE GROUND CONSTRUCTION



KEY

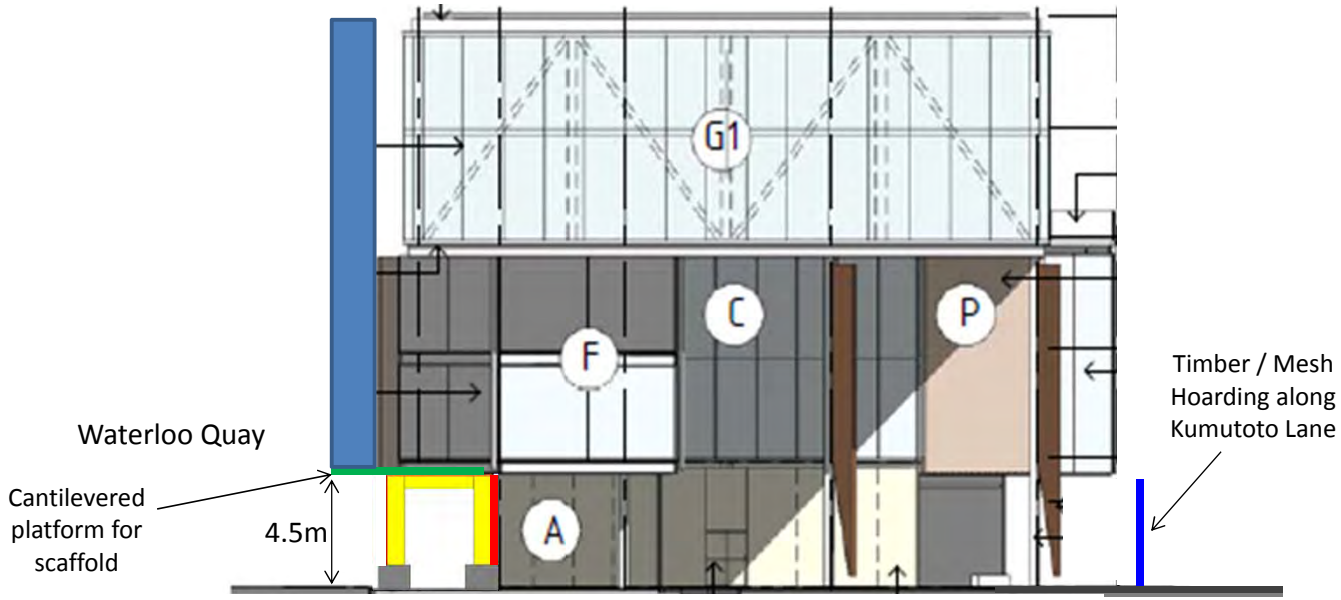
- Timber Hoardings
- Gates
- Gantry
- Site Entry/ Exit
- Site Offices
- Loading Zone
- Storage Sheds
- Site Fencing
- Walkway

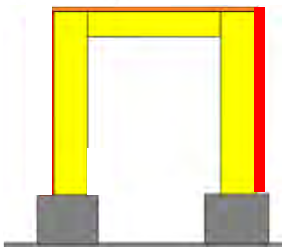
SECTION 4.0

PROPOSED SITE PLANS

STAGE 2 HOARDINGS

SITE PLAN
HOARDING CONSTRUCTION





Waterloo Quay Hoarding

KEY

- Steel Portal
- Ply Construction Cover
- Timber Hoardings
- Concrete Foundations
- Steel scaffold support
- Scaffolding
- Timber Hoardings

SECTION 5.0

ROLES AND RESPONSIBILITIES

SITE MANAGER
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Mob: 021 2219083
Email: gerrya@mcguinness.co.nz

PROJECT MANAGER
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Email: kerrinm@mcguinness.co.nz

CONSTRUCTION MANAGER
Sean McGuinness
Mob: 027 438 5770
Email: seanm@mcguinness.co.nz

HEALTH AND SAFETY MANAGER
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Email: chrisd@mcguinness.co.nz

QUALITY ASSURANCE MANAGER
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Email: davida@mcguinness.co.nz

ENVIRONMENTAL MANAGER
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CONSTRUCTION DIRECTOR
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Mob: 027 4477 549
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MANAGING DIRECTOR
Brian McGuinness
Mob: 0274 231 6118
Email: brian@mcguinness.co.nz

HEAD OFFICE
9 Francis Place
H: (04) 384 8455
F: (04) 801 8455

SECTION 6.0
ENVIRONMENTAL MANAGEMENT PLAN

VISION

L.T McGuinness Limited's environmental vision is to be regarded as an environmentally responsible construction company. L.T. McGuinness Limited is committed to creating a sustainable future by utilizing both people and resources in the care of the environment during the construction process in an effort to maintain the quality of the environment for future generations.

POLICY

- To support our environmental vision, L T McGuinness Limited will:
- Implement and maintain environmental systems, including measurable objectives and targets.
- Ensure employees, subcontractors and suppliers are made aware of environmental issues through ongoing training, communication and reporting.
- Comply with environmental legislation, RMA requirements and relevant regulations.
- That all construction works, where applicable, are carried out in accordance with the Heritage Management Plan.
- Ensure staff are accountable and provided with adequate resources to deliver good environmental outcomes.
- Ensure any archaeological finds will be dealt with in accordance with the Accidental Discovery Protocol.
- Where possible we will reduce, reuse or recycle materials to minimize waste in line with REBRI guidelines.
- Regularly review this environmental policy.

ROLES AND RESPONSIBILITIES

There are four groups with responsibility for the environmental management of the contract;

- The Client;
- LT McGuinness Limited together with its subcontractors;
- Greater Wellington Regional Council, Wellington City Council, Wellington City Waterfront.
- The client's consultants who audit the works and monitor compliance with resource consent conditions and the environmental management plan.

The Consultants are as follows:

Architect	Athfield Architects
Structural Engineer	Dunning Thornton Consultants
Building Services	Aecom
Piling Engineer	Dunning Thornton Consultants
Geotechnical Engineer	Tonkin + Taylor

LT McGuinness Limited shall appoint an Environmental Officer responsible for the environmental performance and compliance where they apply to the works in the contract.
The Environmental Officer will liaise directly with the Site Project Manager.

SECTION 6.0
ENVIRONMENTAL MANAGEMENT PLAN

ENVIROMENTAL CONSIDERATIONS AS A RESULT OF CONSTRUCTION ACTIVITY

- Dirt and Droppings
- Damage and Nuisance
- Construction Noise
- Dust Mitigation
- Waste Management
- Wind
- Construction Traffic
- Cement, Grout and Concrete waste
- Fire Prevention
- Contaminated Spoil

Dirt and Droppings

Dirt and droppings deposited on public or private thoroughfares from vehicles servicing the site are to be removed by the contractor to the satisfaction of the appropriate authorities.

Damage and Nuisance

L.T. McGuinness Limited will take all reasonable precautions to prevent damage and nuisance from water, fire, smoke, dust, rubbish and all other causes resulting from the construction works.
A Building Damage Record of Shed 21 will be undertaken prior to commencement of any construction works at Site 10.

Construction Noise

The increased noise associated with the construction activities will be as a result of the construction works, these include:

Pneumatic breaking;
Saw cutting
Concrete pumping and placing;
Construction plant.
Significant construction activities will take place during daytime 7:30 am to 6 pm hours weekdays and Saturdays as far as is reasonable practical and noise will be managed in accordance the requirements of the Construction Noise and Management Plan and applicable resource consent conditions.

Dust Mitigation

In accordance with the Erosion, Dust and Sediment Control Plan (EDSC), hoardings/ fences with scrim will be erected around the construction site . The screens will reduce the effects of dust produced by the demolition work. Activities which generate dust will be monitored closely along with weather conditions so any foreseeable issues will be minimized. As per the EDSC, housekeeping will be maintained vigilantly with routine sweep ups to minimize dust clouds during construction phase.
The use of stockpiles and handling of excavated materials will be limited.

Waste Management

A waste management plan for the project will be completed and reviewed on an ongoing basis in line with REBRI guidelines. This will incorporate the following:

1. A waste management system and process for separating of waste.
2. As much as possible waste materials recycled and/or reused.
3. Tracking and monitoring of waste.

Wind

The exposed nature of the site will require constant monitoring as the wind poses significant issues which need to be addressed:
1. Dust from demolition;
2. Concrete slurry from skip and pump;
3. General construction debris.
All of the above will require constant monitoring during windy weather. To mitigate the effects by keeping exposed areas free from built up piles of construction debris, dampening down where necessary, proper containment and removal of concrete slurry .

SECTION 6.0
ENVIRONMENTAL MANAGEMENT PLAN

Construction Traffic

Before construction activities begin construction signage will be installed where deemed necessary by all parties involved. The signs will inform the public of the project and provide restrictions of access where necessary. Signs should contain main contact numbers, a brief construction description and approximate time frame of the development. Refer to Appendix A.

A Construction Traffic Management Plan is prepared for the project for each phase in accordance with the Wellington City Council Code of Practice for Temporary Traffic Management Control as required. The Construction Traffic Management Plan will include the following;

- Brief description of works
- Staging
- Traffic and pedestrian control during the construction
- Temporary Traffic Control to close the footpath during loading out times to be installed. This work will be carried out outside of normal working hours.
- Truck and vehicle movements to and from site
- Applicable signage
- Parking and turning areas
- Arrangements with Maritime Police to minimize impact on their operations
- Public safety
- STMS and TC details

Cement, Grout and Concrete Waste

- Concrete has the potential to impact upon water quality through the release of fine particles through a localized increase in pH. This is most likely to occur during the inappropriate washing down of cement truck sluices prior to departing the site.
- No excessive waste concrete or grout materials are to be discharged down (or where they can run into) storm water grates or into the marine environment.
- Concrete Trucks after placing are to wash down in the designated wash bay. Pump trucks are to blow back into the concrete truck for disposal back at quarry.
- Waste concrete will be stored in skips for later removal.

Fire Prevention

To assist in minimizing the risk of fire, the following actions shall be undertaken:

- A hot permit system shall be used for welding and similar activities that are undertaken on site.
- At the completion of the working day, the security staff shall inspect all work areas.
- A fire hazard sign shall be erected at the site entrance
- Fire extinguishers and fire hose reels will be made available and installed on site.
- The water main must remain operating wherever possible to ensure water supply for the fire hose reels.

Contaminated Ground

Following preliminary investigations, ground contamination has been identified on site (see Appendix C). It is likely that the contamination originated from fill used to form the reclamation and / or from historical activities at the site.

The presence of ground contamination may have the following implications:

- Additional health and safety requirements during the works.
- Landfill disposal of surplus soil that has to be disposed off-site (i.e., not clean fill).
- Pre-treatment would be required if highly contaminated material is present.
- Odour management during works and to prevent odour entering buildings.
- Contamination Site Management Plan before works begin and a Site Validation Report on completion of works.
- A Long Term Site Management Plan if contamination remains onsite (e.g., beneath building or paving).

Further investigations of the soil to be disturbed, including the reclamation fill and other activities that may have caused contamination, will be required to reduce uncertainty.

All of the above will be confirmed on final testing and design and an updated and agreed Construction Management Plan will be established prior to any construction activities commencing on site. This CMP will incorporate a detailed Contamination Site Management Plan, and all ground works will be carried out in accordance with the CSMP, which will be reviewed and updated regularly.

SECTION 7.0
HEALTH AND SAFETY PLAN
OUR SAFETY PLAN

- Before site work commences, Safety Supervisor/Foreman consults the "Site Hazard Register" table. This list is used to identify hazards on site. Any items that are site specific can be added to the list.
- Information from the above table together with any site specific hazards and hazard information requested from subcontractors will be included into the first Health & Safety Site Meeting Agenda.
- The Safety Supervisor is to review and sign off the effectiveness of the controls for the hazard on a regular basis to check that controls for hazards are effective, i.e. before each monthly Health & Safety meeting.
- All employees and subcontractors are inducted on site, using the "Site Induction" forms.
- This induction includes the LT McGuinness health & safety plan for the site.
- All employees and subcontractors are required to attend the monthly health & safety meeting.
- The health & safety meeting agenda is issued to all attending the health & safety meeting.
- The items listed on the health & safety meeting agenda are discussed and any questions answered.
- An attendance form is then signed and is kept in the health & safety job folder on site. The employee or subcontractor keeps the remaining portion of the form as reference to site hazards.
- A copy of the minutes of the health & safety meeting together with an attendance list is sent to the Architect/Principal.
- The Principal/Engineer is invited to attend the monthly health & safety meeting if applicable.
- LT McGuinness employees only then review the site hazard register "Tool Box" section with their safety supervisor with reference to their own activities at the monthly Tool Box Meeting, held after the health & safety meeting.
- There are ongoing "hazard evaluations" as site operations change and progress. These new hazards will be added to the existing "Site Hazard Register". The hazard board on site is updated daily.
- Employees and subcontractors should use the "Health & Safety Improvement Form", if they feel any safety improvement needs to be made on site. These are actioned by the Safety Officer on site and later used in the Health and Safety review. These forms are also given to subcontractors at the tender acceptance stage, so confidentiality can be reserved if necessary.
- There will be site inspections through Site Safe Ltd. These are carried out on a monthly basis. Findings from these inspections ensure that the LT McGuinness health & safety policy is being maintained on site.
- The safety supervisor also has a "Hazard Identification Report" book in which they write out infringement notices to any offenders that have been properly informed and trained on Health & Safety information but continue to breach the rules. The warning has three copies, one going to the offender, one kept as a record on site and one going to the LT McGuinness office where it is faxed to the offender's employer. Positive action needs to be followed through when the notice is issued. Please refer to the following pages outlining our proposed card system for the project.
- Staff and subcontracting companies take these tickets seriously as they indicate lack of understanding of LT McGuinness health & safety issues particularly in relation to activities on site. These tickets are lodged in a staff personnel file and can be a basis for staff dismissal if continued re-offending occurs.
- Safety co-coordinators liaise with Safety Supervisors on any complaints regarding the health & safety system and its implementation on sites. Meetings at the office are held on a 6 monthly basis ensure a constant review of all safety procedures.
- At the completion of the project a review is carried out of the LT McGuinness health & safety policy and the success of its implementation on site. Any improvements are then added to the existing health & safety document

The following page outlines of safety plan and procedures in a flow Chart form

LTM DRUG AND ALCOHOL POLICY

In 2009 LT McGuinness implemented a new drug and alcohol policy which included mandatory testing of staff and sub contractors.

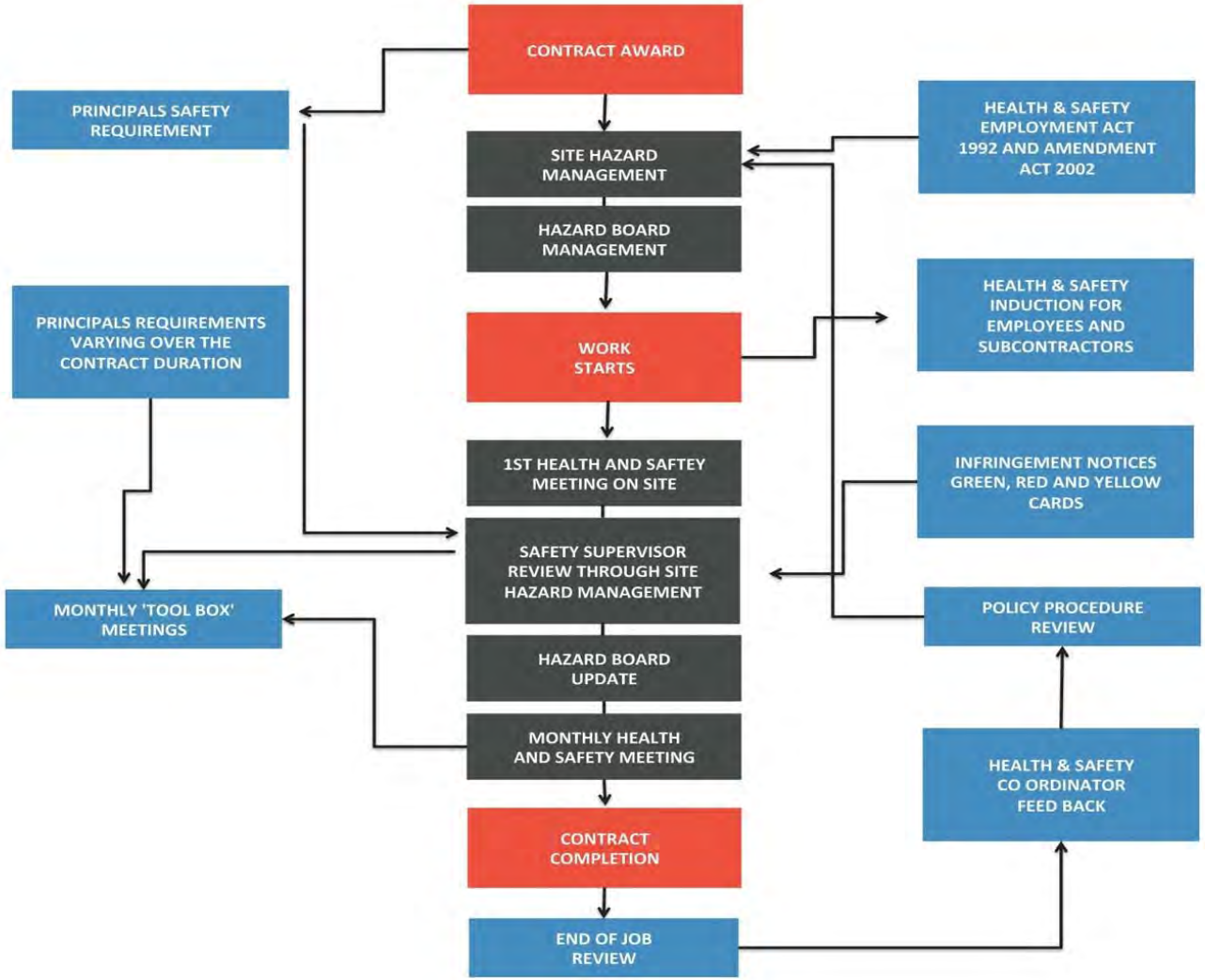
We believe this initiative was the first in the New Zealand Construction Industry.
All of our sites are subject to ongoing testing.
Since its inception the quality of sub contractors on our sites have improved and it ensures a drug and alcohol free construction site.

CARD SYSTEM PROPOSED FOR SITE 10

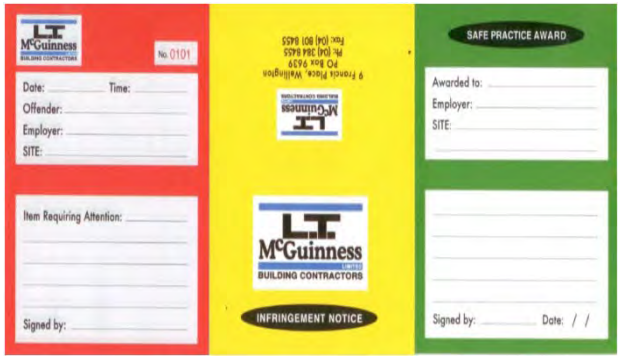
The LT McGuinness green, yellow and red card system has been introduced on to our sites over the past few years. It is a system that encourages safe behavior and deals efficiently with non-conformance.
Safe Practice Award – A monthly draw is conducted with a winning prize.
infringement Notice – 2 yellow cards in 3 months and the offender is removed from site.

GREEN CARD – Safe Practice Award – A monthly draw is conducted with a winning prize.
YELLOW CARD – Infringement Notice – 2 yellow cards in 3 months and the offender is removed from site.
RED CARD – Serious Infringement Notice – Immediate removal from site.
The card system has worked very effectively to date, it is a simple system in which the rules are very clear for everyone entering site.

SECTION 7.0
HEALTH AND SAFETY PLAN



LTM CARD SYSTEM



SECTION 8.0
LTM COMPLAINTS PROCEDURE

The following complaints procedure will be implemented on Kumutoto Site 10;

1. All complaints will be directed in the first instance to the Site Manager. Gerry Andrews

   Gerry Andrews
   Mob: 021 221 9083
   Email: gerrya@mcguinness.co.nz

2. Gerry Andrews will have the responsibility to ensure that the complaints procedure process is enacted and communicated correctly.
   LT McGuinness will prominently display alongside the works a signboard with the 24 hour contact number of LT McGuinness Site Manager, Gerry Andrews.
3. LT McGuinness will maintain on site a complaint register and log of actions taken.
   The register will include the following;
   - A standard complaints procedure pro forma
   - Date of complaint log
   - Complaint names log
   - Actions taken log
   - Report back on log
   - Close out log

APPENDIX A
DRAFT TRAFFIC MANAGEMENT PLAN

LT McGuinness

Site 10 Development, Wellington Waterfront

Construction Traffic Management Plan

2 July 2015

TDG Ref: 12950 141007 ltm ctmp july 2015 final report.docx

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1. Background

TDG have been commissioned by LT McGuinness to develop this Construction Traffic Management Plan (CTMP) relating to the planned development of a commercial building on 'Site 10', on the Wellington Waterfront.

The purpose of this report is to outline the anticipated construction method, to provide Wellington City Council with information as to how the construction needs are to be managed and mitigated, from a traffic perspective.

This CTMP has been developed for the construction of the commercial building only; the construction of the adjoining Open Space areas (which form a parallel Resource Consent to that for the building itself) will be the responsibility of others.

The site is located to the north of the Waterloo Quay intersection with Whitmore Street, and it is most conveniently accessed via the Whitmore Street intersection or Bunny Street (to the north).

The site is currently used as a surface level motorhome park and commuter carparking area, with an established residential apartment building (Shed 21) to the immediate north. To the east of the site, the land and wharves are under the control of CentrePort, and on-going access to established facilities and activities, including for the Maritime Police, will need to be provided for the duration of the construction period.

This CTMP provides revisions and updates from the previous October 2014 version that was submitted with the related applications for resource consent.

2. Existing Environment

The Site 10 development site is located within land under the management of Wellington City Council City Shapers (previously Wellington Waterfront Ltd) and is located to the immediate north of the Waterloo Quay intersection with Whitmore Street.

The site is currently used as a public carpark and motorhome park, with a poorly defined laneway running north-south to the east of Site 10. This laneway provides access to Site 10, the established Shed 21 (to the north) and CentrePort land (to the east). The laneway has connections with both Bunny Street and Whitmore Street, and also connects to the established Kumutoto laneway to the south.

The Waterfront as a whole attracts a significant volume of pedestrian and cycle traffic. To the south of the site, formed routes are established throughout the Waterfront to cater for these users. In the immediate vicinity of the site, the laneway is less defined, and pedestrians and cyclists share space with vehicular traffic. The high volume of pedestrians and cyclists travelling along the laneway and across Waterloo Quay require particular consideration in the construction planning.

3. Construction Operations

3.1 Construction Programming

Preliminary programming of the construction works has identified an overall work programme of some 24 months, likely beginning mid-2016 (subject to various consents being granted).

Stage 1: The initial construction phase will involve piling around the perimeter of the site, before excavating to enable the basement carpark and services to be established.

For this initial period of around 9 months (during which the piling, excavation, and construction of the basement through to approximately Level 1 of the building will be undertaken) the footpath fronting Waterloo Quay will be closed to enable the works to be completed. Pedestrian diversion signage throughout the surrounding area will be required to support this closure.

In addition, due to localised constraints between the construction site and the former Eastbourne Ferry Terminal building, the laneway will be temporarily restricted to one way (southbound), adjacent Site 10, with a painted pedestrian/cycle path adjacent.

Stage 2: The construction of the building (L1 and above) will allow for the Waterloo Quay footpath to be re-opened with the protection of a covered gantry to be provided so as to enable safe pedestrian access. The laneway will remain as a one way (southbound) route, adjacent Site 10. The painted pedestrian/cycle path will also remain.

In keeping with other developments throughout the Waterfront, construction traffic access will be restricted during peak pedestrian periods. On-going access for all legitimate users of the waterfront will be maintained.

3.2 Site Access

3.2.1 Stage 1: Piling and Ground Floor Development

During the initial construction period, controlled access will be established to the construction site itself, so that only vehicles associated with the works are able to access the site. Gatemen will be present during the arrival and departure of heavy vehicles, to ensure the safety of other users through the area.

It is intended that site access for heavy vehicles will be achieved primarily via the Whitmore Street gates, to and from the south end of the construction site. As the right turn into the waterfront area is banned from the south at the Whitmore Street intersection, this will mean that all trucks will arrive at the site either via Waterloo Quay (to the north) or Whitmore Street (to the west).

A loading zone will be introduced adjacent to the laneway, with truck access and egress handled from Bunny Street and then out to Whitmore Street in accordance with the temporary one-way direction of the laneway.

Site access for construction traffic will be restricted to these two locations through the establishment of hoarding and/or site fencing.

Key features of the traffic management during this stage include:

- closure of the Waterloo Quay footpath adjacent to Site 10, with pedestrian diversion route signs established within the adjoining Waterfront area and road network;
- the eastern laneway will remain open for southbound traffic only, in the length adjacent Site 10. A painted pedestrian/cycle path will be provided adjacent to the laneway;
- most truck access to the site will be via Whitmore Street gates;
- a loading zone will be established adjacent to the laneway, with access limited through the provision of site fencing, and with access from Bunny Street and egress to Whitmore Street.

Figure 1 shows the intended work site area, and access for trucks to and from the south end of the construction site.

The temporary closure of the Waterloo Quay footpath will require directional signage to be installed throughout the area. This will be agreed with Council as part of future construction traffic management planning. The existing signalised pedestrian crossing at Whitmore Street will remain available throughout construction. Given the alternative routes for pedestrians, it is considered that the footpath closure will result in only minor inconvenience to the public.

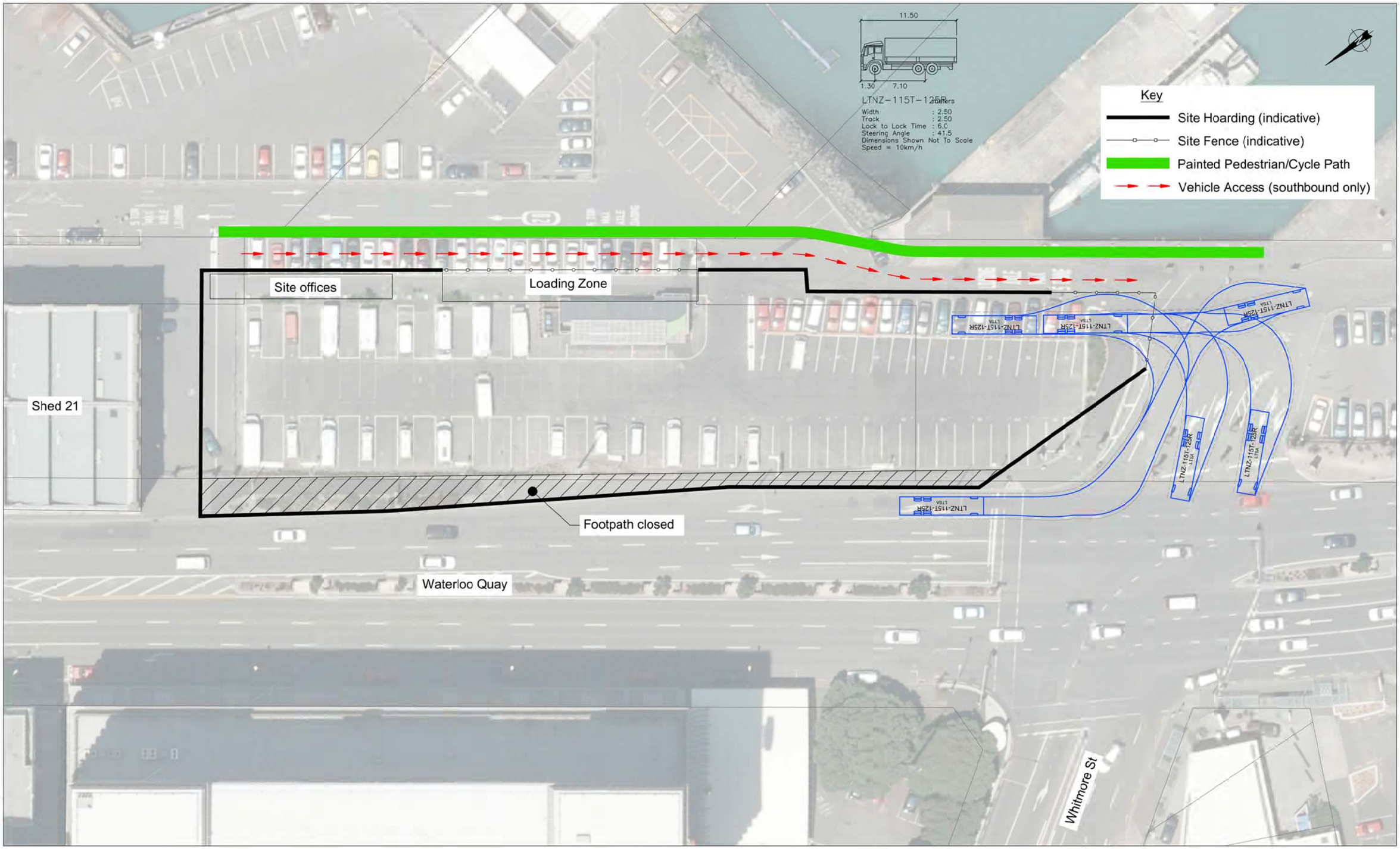
3.2.2 Stage 2: Level 1 (and above) Construction

During the latter period of construction (when the above ground building work is underway), loading will occur by way of a dedicated loading zone adjacent to the laneway. This is shown on **Figure 2.**

The basement parking area will be used for staff parking.

Key features of the traffic management during this stage include:

- Waterloo Quay footpath will be re-opened, with a pedestrian gantry installed to enable works to safely occur overhead;
- an overnight lane closure of the left/through lane on Waterloo Quay will be required on occasion;
- the eastern laneway will remain open for southbound vehicle traffic only, adjacent Site 10, alongside the painted pedestrian/cycle path provided in Stage 1;
- a loading zone will remain adjacent to the laneway, with access limited through the provision of site fencing, and with access from Bunny Street and egress to Whitmore Street.



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Site 10 Construction Traffic Management Plan

Stage 1: Indicative Work Site

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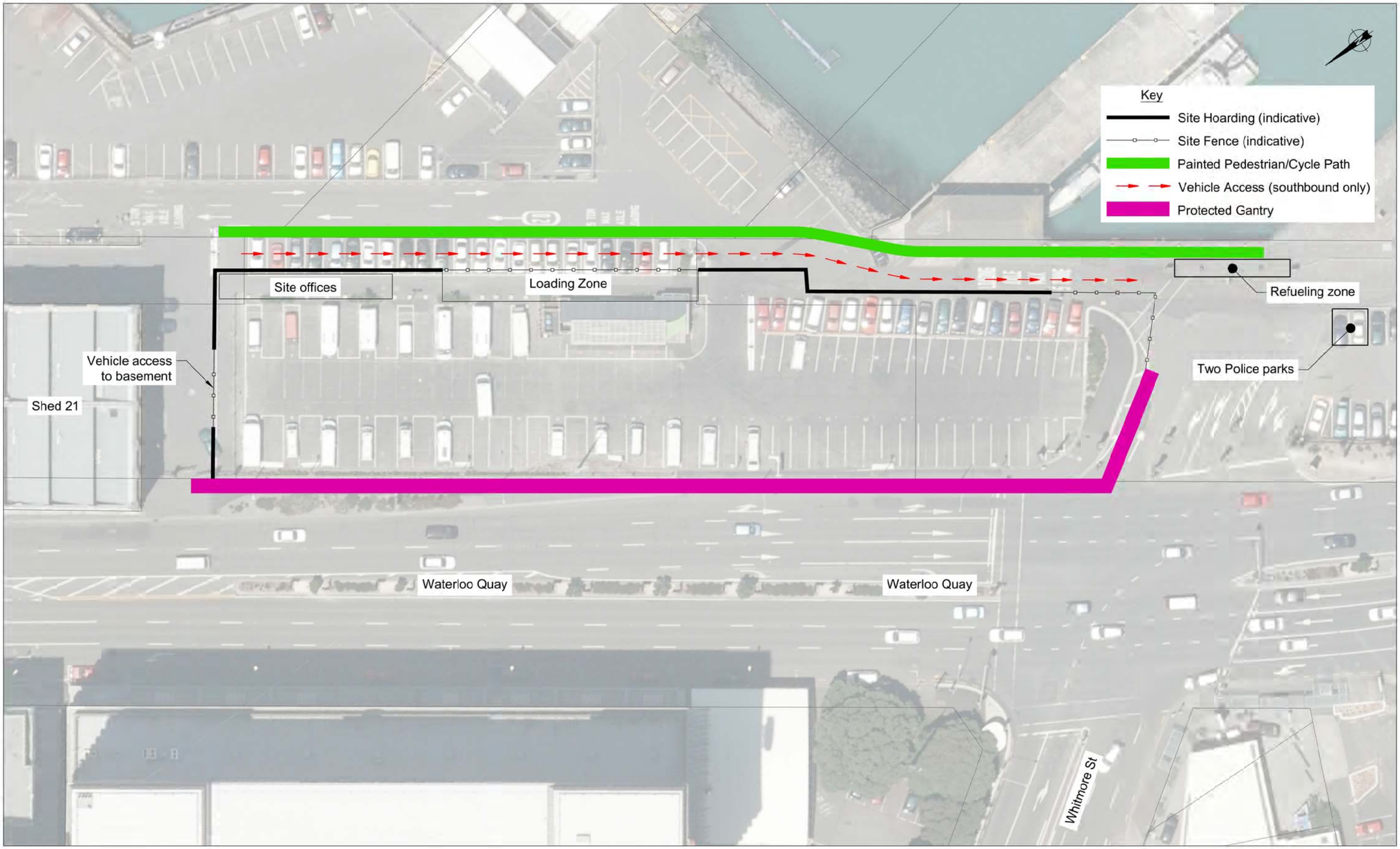

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Site 10 Construction Traffic Management Plan

Stage 2: Indicative Work Site

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For a period, a cantilevered structure is proposed to be installed at a height 4.9m above the adjacent southbound left/through lane on Waterloo Quay, to enable the façade to be constructed. This height is noted as being the absolute minimum vertical clearance within the NZTA (Transit) Bridge manual (Appendix A: Bridge widths and clearances Figure A2). Any over-height loads will therefore be required to use the outer southbound lanes, and this restriction will need to be clearly signed in advance.

3.2.3 Staff Parking

When practicable, some staff parking will be available within the work site itself. This will include the basement carpark (once it is completed).

Other staff will be directed to park elsewhere or use alternate transport.

3.3 Hours of Operation

Construction traffic movements into and out of the site will be limited to between 7am and 7pm Monday – Saturday, with heavy vehicle movements avoided during the peak pedestrian periods.

It is not expected that works on the site itself will need to be undertaken outside these hours, with the exception of some façade work on the western side of the building, which will occur during the proposed overnight lane closures.

3.4 Access to Adjacent Properties

On-going and enduring vehicular access through the area will be maintained throughout the construction period, to ensure full access to Shed 21, CentrePort and for the Maritime Police is provided. In addition, access will be ensured for pedestrians and cyclists via diverted routes and delineated pathways.

As previously described, the Waterloo Quay footpath will be closed for a period of approximately nine months, to enable piling and excavation works to be completed. Pedestrian diversion routes (either through the Waterfront area or on adjoining and nearby public footpaths) will be signed for this period.

3.5 Dust Suppression and Detritus Control

Dust suppression and detritus control is to be provided by the Contractor. The Contractor is to liaise with the Road Controlling Authority to ensure that dust suppression and the spread of detritus material (dropped from heavy vehicles carting materials to or from the site) is appropriately controlled and remedied. The Contractor is to adhere to any further guidance given by the Traffic Management Co-ordinator and/or the road controlling authorities in relation to dust suppression and removal of detritus material.

3.6 Material Storage

All materials will be stored on-site. No material will be stored within the public road reserve at any time.

3.7 Weight Restriction

A weight restriction of 5 tonne per axle is in place on the laneway adjacent to Site 10, as the lane is constructed partially on a wharf structure. This weight limit will apply to construction vehicles accessing the site as part of these works.

4. Traffic Management

The adjoining roads are classified as Principal or Arterial Streets, and as such are designed to accommodate large and heavy vehicles. The number of truck movements associated with construction will be subject to a more detailed traffic management plan to be developed prior to works being undertaken, but access by heavy vehicles will be limited to outside pedestrian peak periods, to ensure the on-going safety of the general public, and will also be subject to weight restrictions on the laneway as previously described.

4.1 Access

Given the constrained size of the development site, few heavy vehicles will be on site at any one time. All heavy vehicles entering the site will be marshalled while moving to and from the construction site to ensure pedestrian and cycle safety is maintained. The manner in which trucks can enter and exit the south end of the site was detailed previously in Figure 1.

4.1.1 Stage 1: Heavy Vehicles

Heavy vehicle access to the site will be managed principally via the Whitmore Street intersection during the initial construction period, to minimise the impact of heavy vehicle traffic around the adjoining Shed 21 residential building during the excavation works. With right turns into the waterfront excluded at this intersection, the arrival of heavy vehicles will be restricted to Waterloo Quay (north) and Whitmore Street (west). All outbound movements are permitted at the Whitmore Street gates, so the outbound route adopted by heavy vehicles will not be restricted.

Trucks will enter the site in a forward motion where possible. However, there may be the occasional need for a truck to reverse into the site from the Whitmore Street driveway area dependant on construction operations at any given point. These movements will occur under the control of gatemen to ensure the on-going safety of the public.

All movements out of the site will occur in a forward direction via the signalised intersection approach from the Waterfront.

Access to the loading zone adjacent to the laneway will be provided from Bunny Street, with egress to Whitmore Street, in accordance with the temporary one-way southbound arrangement of the laneway.

4.1.2 Stage 2: Heavy Vehicles

During subsequent periods of construction, the loading zone will be retained adjacent to the laneway. The preferred location of the zone will be identified once detailing such as the crane location is finalised, but has been shown indicatively in the previous Figures 1 and 2. During this period, all vehicles will be directed to enter the loading zone via Bunny Street and exit via Whitmore Street.

No heavy vehicles associated with the construction will be permitted during peak pedestrian periods. The timing of permitted access will be agreed with Council prior to works beginning on site.

4.1.3 General Access and Management

The laneway adjacent to Site 10 will be restricted to one way (southbound) for all traffic throughout the construction period.

Smaller vehicles associated with the construction phase (trades vans and the like) may arrive and depart via Bunny Street, and exit to Whitmore Street, as suits.

The Site and/or Project Manager will be responsible for communicating the site access limitations to all drivers and/or contractors at the initial site induction safety briefings as described in a later section of this CTMP report.

4.1.4 Maritime Police

The Maritime Police requires essential access to their operations at the former Eastbourne Ferry Terminal building.

For refuelling purposes, fuel trucks need to park adjacent the wharf to refuel the vessels. Temporarily, during construction of Site 10, three spherical bollards and a motorhome park sign will be removed to provide a new refuelling zone, as indicated in **Figure 3**. The location of the zone will be clear of other traffic, and clear of the pedestrian/cycle path.

The two Police carparks currently provided adjacent the Ferry Terminal building will be provided for in the Site 9 carpark to the south, as also identified in Figure 3.

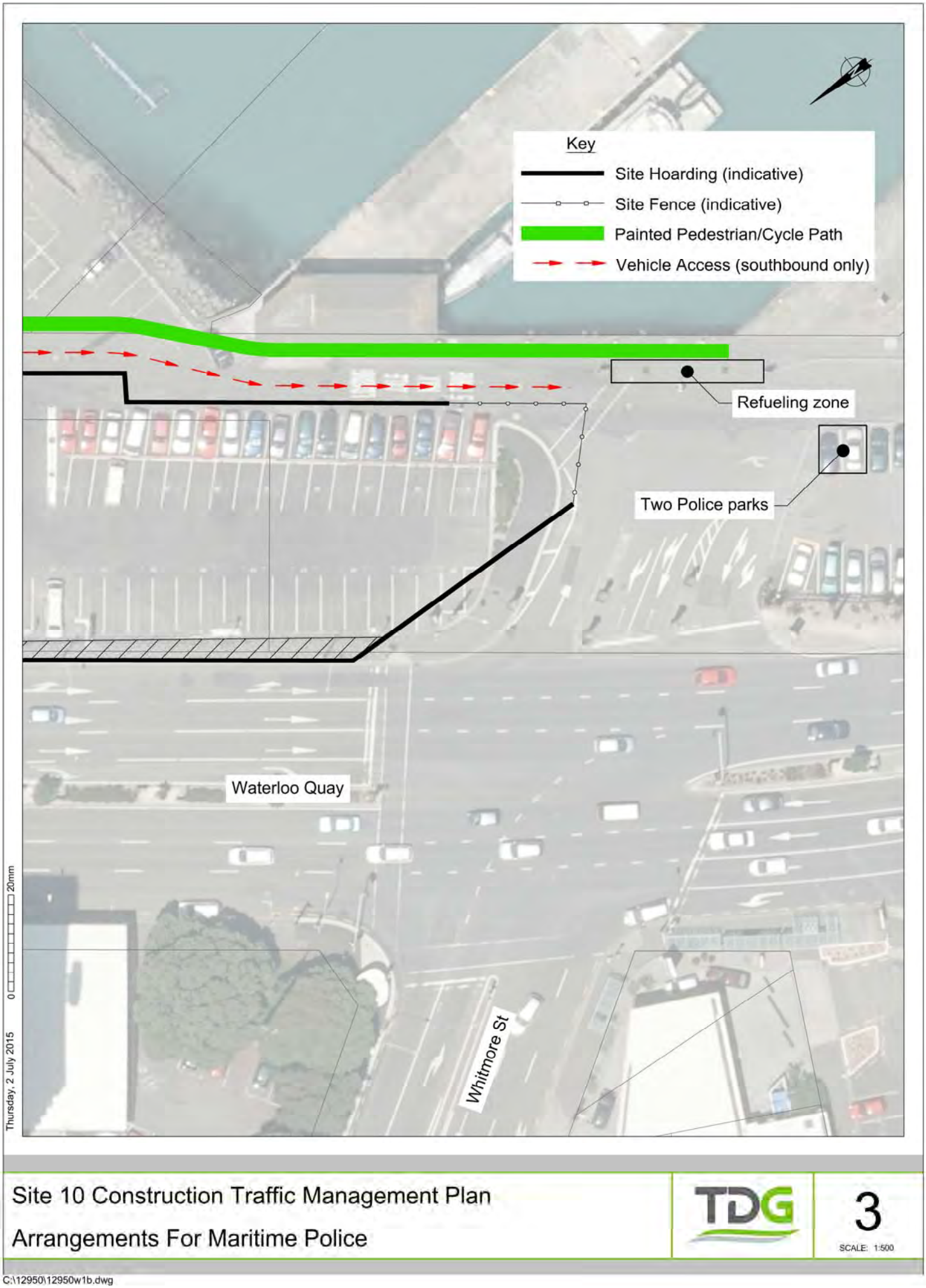
4.2 Loading

During the initial piling and excavation phase, most loading and unloading will occur within the construction site at its southern end. Some deliveries will be accommodated within the loading zone, adjacent the laneway, as required.

During the subsequent phases, as the above ground levels are constructed, loading will occur only from the loading zone adjacent to the laneway. The exact location of this loading zone will be confirmed as construction planning is finalised.

4.3 Signage

Traffic and warning signs will, wherever possible, conform to the standards specified in COPTTM. These signs may be supplemented with some specifically designed signage, particularly with respect to providing information for pedestrian diversion routes. All such specific signage will be clearly shown on plans to the approval of Council, as an integral part of the CTMP and any subsequent TTMPs.



Site 10 Construction Traffic Management Plan

Arrangements For Maritime Police

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4.4 Storage of Materials

All materials will be stored on-site. No material will be stored within the public road reserve at any time.

5. Pedestrian and Cycle Access

5.1 Stage 1

As previously described, for an initial nine month period, the Waterloo Quay footpath adjacent to the site will be closed to pedestrian traffic, to enable the piling and excavation works to be completed.

In addition, the laneway to the east of the construction site will be limited to southbound vehicle traffic only. Pedestrians and cyclists will be supported through the provision of a painted path adjacent to the traffic lane. Traffic volumes through this area are expected to be low following the closure of the existing surface level carpark and motorhome park, and in practice, pedestrians and cyclists would share the laneway area.

Pedestrians will be directed to travel either along the laneway, or use the opposite (western) footpath on Waterloo Quay. The signalised pedestrian crossing at Whitmore Street will remain fully accessible throughout. Alternative crossing points at Bunny Street and Waring Taylor Street will also remain in place, providing a number of convenient crossing points for pedestrians to walk between the waterfront and CBD.

The full extent of the signage adopted will be agreed with Council as part of the more detailed TTMP process which will be undertaken prior to construction works beginning.

5.2 Stage 2

After the initial works have been completed, a gantry will be established along the same length of Waterloo Quay to enable protected pedestrian access through this area, with construction work then able to occur safely above.

Pedestrians and cyclists will continue be able to access the laneway, using the marked path to be delineated adjacent to the southbound lane.

6. Implementation and Liaison

6.1 Project Manager Contact Details

Contact details for the Project Manager and associated personnel are provided below:

- Project Manager: Mark Mulhern;
- Site Traffic Management Supervisor: TBC.

6.2 Affected Parties

Access to Shed 21, CentrePort and for the Maritime Police will be maintained throughout the works, as will access for pedestrians, cyclists and vehicles.

Notices detailing the timing of the construction works will be provided to the owners and occupiers of Shed 21 commercial and residential units, as well as CentrePort, City Shaper and the Maritime Police. In addition, public notices will be posted in the vicinity of the site in advance of the works and remain for the duration of the works.

Liaison with representatives of the adjoining properties will be undertaken in advance of the conversion of the laneway from two-way to one-way (southbound). Informational signage will be provided in advance of the works to inform the public of the changes.

Communication with the occupants of Shed 21, CentrePort, City Shaper and the Maritime Police will be the responsibility of the Project Manager, and will be on-going through the duration of the works. A contact number will be provided within all communications, in order that any issues may be raised and dealt with promptly.

These communications will be issued at least ten working days prior to the commencement of works on site. All communication will be the responsibility of the Project Manager.

6.3 Driver Induction

The STMS is responsible to undertake a site induction with all transport operators contracted to transport materials to the site. The induction is to cover (but not be limited to):

- the route of travel;
- permissible times of deliveries;
- requirement for and use of possible communication systems;
- requirements to abide by local speed restrictions for dust and detritus management;
- requirement for courteous driving;
- requirement to report hazards on the transport route.

6.4 Utility Services

There will not be a need to restrict access to utilities providers. Should access to the site or surrounding area be required by such parties, the Project Manager should be engaged.

6.5 Complaints Procedure

Any communications issued will include contact details for the Project Manager to whom any complaints are to be directed. Any comments will be quickly communicated to the relevant project staff and a response provided and actions taken as appropriate. Should any changes be required to any approved CTMP or TTMP, a record of the change shall be kept, including by way of the Council authorisation process.

A full record of complaints and responses shall be maintained by way of a complaints register, available for inspection on site at all times.

6.6 Updates to Plans

Approved CTMPs and TTMPs will be reviewed by the Project Manager and STMS on a regular basis, to ensure that the documents remain relevant for use.

Any changes to these plans will be recorded.

The structure of and requirements for the CTMP are to be approved by the road controlling authority prior to construction, as directed by the conditions of consent.

Traffic Design Group Ltd

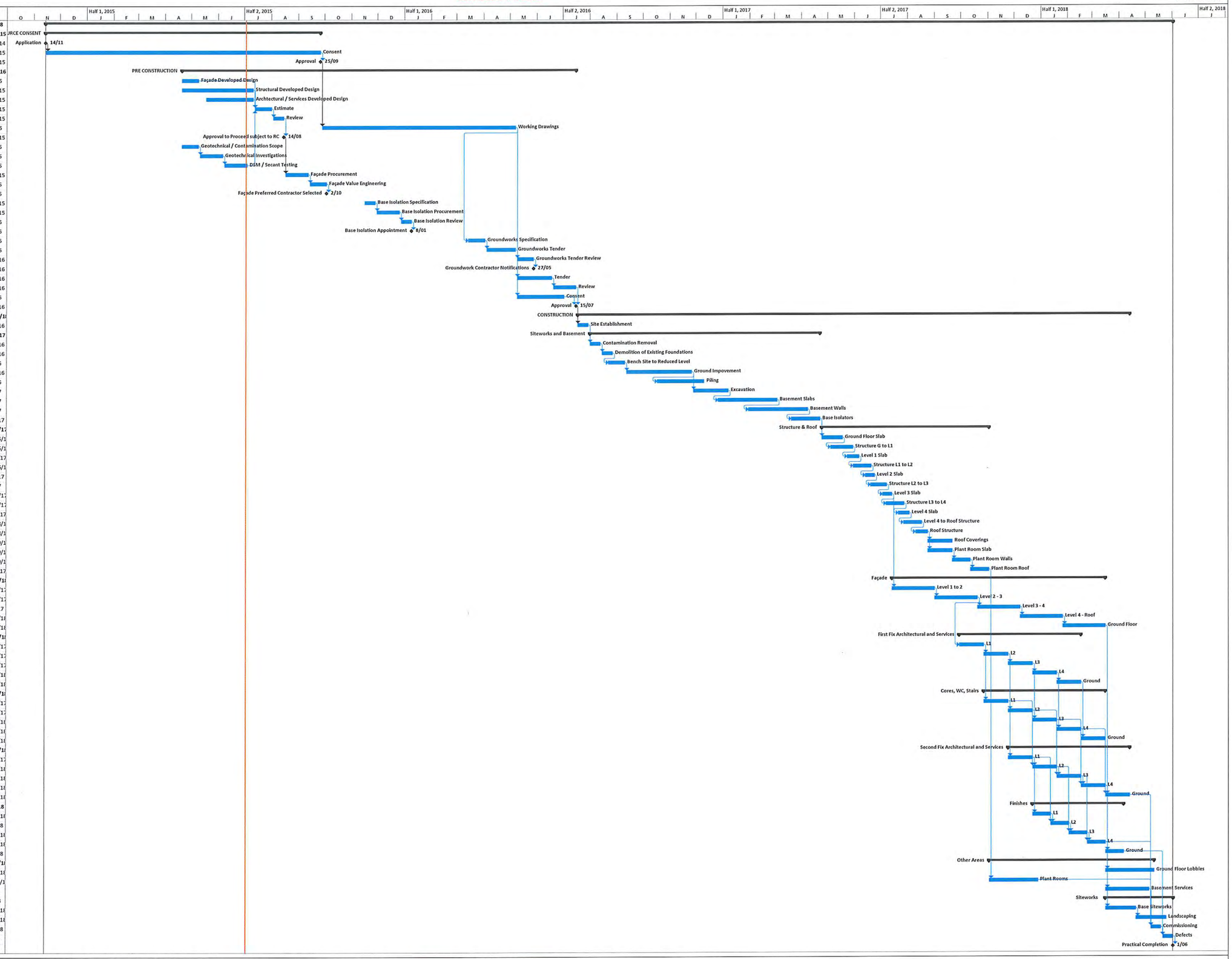
APPENDIX B
DRAFT PROGRAMME

WILLIS BOND & CO

KUMUTOTO SITE 10
DRAFT PROJECT PROGRAMME
DRAFT REVISION 8 - APRIL 2015

McGuinness BUILDING CONTRACTORS

ID	Task Name	Duration	Start	Finish
1	**SITE 10**	**926 days**	**Fri 14/11/14**	**Fri 1/06/18**
2	**RESOURCE CONSENT**	**226 days**	**Fri 14/11/14**	**Fri 25/09/15**
3	Application	0 days	Fri 14/11/14	Fri 14/11/14
4	Consent	226 days	Fri 14/11/14	Fri 25/09/15
5	Approval	0 days	Fri 25/09/15	Fri 25/09/15
6	**PRE CONSTRUCTION**	**325 days**	**Mon 20/04/15**	**Fri 15/07/16**
7	Façade Developed Design	15 days	Mon 20/04/15	Fri 8/05/15
8	Structural Developed Design	60 days	Mon 20/04/15	Fri 10/07/15
9	Archtectural / Services Developed Design	40 days	Mon 18/05/15	Fri 10/07/15
10	Estimate	15 days	Mon 13/07/15	Fri 31/07/15
11	Review	10 days	Mon 3/08/15	Fri 14/08/15
12	Working Drawings	160 days	Mon 28/09/15	Fri 6/05/16
13	Approval to Proceed subject to RC	0 days	Fri 14/08/15	Fri 14/08/15
14	Geotechnical / Contamination Scope	15 days	Mon 20/04/15	Fri 8/05/15
15	Geotechnical Investigations	20 days	Mon 11/05/15	Fri 5/06/15
16	DSM / Secant Testing	20 days	Mon 8/06/15	Fri 3/07/15
17	Façade Procurement	20 days	Mon 17/08/15	Fri 11/09/15
18	Façade Value Engineering	15 days	Mon 14/09/15	Fri 2/10/15
19	**Façade Preferred Contractor Selected**	0 days	Fri 2/10/15	Fri 2/10/15
20	Base Isolation Specification	10 days	Mon 16/11/15	Fri 27/11/15
21	Base Isolation Procurement	20 days	Mon 30/11/15	Fri 25/12/15
22	Base Isolation Review	10 days	Mon 28/12/15	Fri 8/01/16
23	**Base Isolation Appointment**	0 days	Fri 8/01/16	Fri 8/01/16
24	Groundworks Specification	15 days	Mon 14/03/16	Fri 1/04/16
25	Groundworks Tender	25 days	Mon 4/04/16	Fri 6/05/16
26	Groundworks Tender Review	15 days	Mon 9/05/16	Fri 27/05/16
27	**Groundwork Contractor Notifications**	0 days	Fri 27/05/16	Fri 27/05/16
28	Tender	30 days	Mon 9/05/16	Fri 17/06/16
29	Review	20 days	Mon 20/06/16	Fri 15/07/16
30	Consent	40 days	Mon 9/05/16	Fri 1/07/16
31	Approval	0 days	Fri 15/07/16	Fri 15/07/16
32	**CONSTRUCTION**	**454 days**	**Mon 18/07/16**	**Thu 12/04/1**
33	Site Establishment	10 days	Mon 18/07/16	Fri 29/07/16
34	**Siteworks and Basement**	**190 days**	**Mon 1/08/16**	**Fri 21/04/17**
35	Contamination Removal	10 days	Mon 1/08/16	Fri 12/08/16
36	Demolition of Existing Foundations	10 days	Mon 15/08/16	Fri 26/08/16
37	Bench Site to Reduced Level	15 days	Mon 22/08/16	Fri 9/09/16
38	Ground Impovement	55 days	Mon 12/09/16	Fri 25/11/16
39	Piling	40 days	Mon 17/10/16	Fri 9/12/16
40	Excavation	30 days	Mon 28/11/16	Fri 6/01/17
41	Basement Slabs	50 days	Mon 26/12/16	Fri 3/03/17
42	Basement Walls	50 days	Mon 30/01/17	Fri 7/04/17
43	Base Isolators	25 days	Mon 20/03/17	Fri 21/04/17
44	**Structure & Roof**	**138 days**	**Mon 24/04/17**	**Wed 1/11/1**
45	Ground Floor Slab	18 days	Mon 24/04/17	Wed 17/05/1
46	Structure G to L1	18 days	Thu 4/05/17	Mon 29/05/1
47	Level 1 Slab	10 days	Tue 23/05/17	Mon 5/06/17
48	Structure L1 to L2	15 days	Tue 30/05/17	Mon 19/06/1
49	Level 2 Slab	9 days	Tue 13/06/17	Fri 23/06/17
50	Structure L2 to L3	15 days	Mon 19/06/17	Fri 7/07/17
51	Level 3 Slab	9 days	Mon 3/07/17	Thu 13/07/1
52	Structure L3 to L4	15 days	Fri 7/07/17	Thu 27/07/1
53	Level 4 Slab	9 days	Fri 21/07/17	Wed 2/08/17
54	Level 4 to Roof Structure	15 days	Thu 27/07/17	Wed 16/08/1
55	Roof Structure	10 days	Thu 10/08/17	Wed 23/08/1
56	Roof Coverings	20 days	Thu 24/08/17	Wed 20/09/1
57	Plant Room Slab	20 days	Thu 24/08/17	Wed 20/09/1
58	Plant Room Walls	15 days	Thu 21/09/17	Wed 11/10/1
59	Plant Room Roof	15 days	Thu 12/10/17	Wed 1/11/17
60	**Façade**	**175 days**	**Fri 14/07/17**	**Thu 15/03/1**
61	Level 1 to 2	35 days	Fri 14/07/17	Thu 31/08/1
62	Level 2 - 3	35 days	Fri 1/09/17	Thu 19/10/1
63	Level 3 - 4	35 days	Fri 20/10/17	Thu 7/12/17
64	Level 4 - Roof	35 days	Fri 8/12/17	Thu 25/01/1
65	Ground Floor	35 days	Fri 26/01/18	Thu 15/03/1
66	**First Fix Architectural and Services**	**100 days**	**Fri 29/09/17**	**Thu 15/02/1**
67	L1	20 days	Fri 29/09/17	Thu 26/10/1
68	L2	20 days	Fri 27/10/17	Thu 23/11/1
69	L3	20 days	Fri 24/11/17	Thu 21/12/1
70	L4	20 days	Fri 22/12/17	Thu 18/01/1
71	Ground	20 days	Fri 19/01/18	Thu 15/02/1
72	**Cores, WC, Stairs**	**100 days**	**Fri 27/10/17**	**Thu 15/03/1**
73	L1	20 days	Fri 27/10/17	Thu 23/11/1
74	L2	20 days	Fri 24/11/17	Thu 21/12/1
75	L3	20 days	Fri 22/12/17	Thu 18/01/1
76	L4	20 days	Fri 19/01/18	Thu 15/02/1
77	Ground	20 days	Fri 16/02/18	Thu 15/03/1
78	**Second Fix Architectural and Services**	**100 days**	**Fri 24/11/17**	**Thu 12/04/1**
79	L1	20 days	Fri 24/11/17	Thu 21/12/1
80	L2	20 days	Fri 22/12/17	Thu 18/01/1
81	L3	20 days	Fri 19/01/18	Thu 15/02/1
82	L4	20 days	Fri 16/02/18	Thu 15/03/1
83	Ground	20 days	Fri 16/03/18	Thu 12/04/1
84	**Finishes**	**75 days**	**Fri 22/12/17**	**Thu 5/04/18**
85	L1	15 days	Fri 22/12/17	Thu 11/01/1
86	L2	15 days	Fri 12/01/18	Thu 1/02/18
87	L3	15 days	Fri 2/02/18	Thu 22/02/1
88	L4	15 days	Fri 23/02/18	Thu 15/03/1
89	Ground	15 days	Fri 16/03/18	Thu 5/04/18
90	**Other Areas**	**136 days**	**Thu 2/11/17**	**Thu 10/05/1**
91	Ground Floor Lobbies	40 days	Fri 16/03/18	Thu 10/05/1
92	Plant Rooms	40 days	Thu 2/11/17	Wed 27/12/1
93	Basement Services	36 days	Fri 16/03/18	Fri 4/05/18
94	**Siteworks**	**56 days**	**Fri 16/03/18**	**Fri 1/06/18**
95	Base Siteworks	25 days	Fri 16/03/18	Thu 19/04/1
96	Landscaping	25 days	Fri 20/04/18	Thu 24/05/1
97	Commissioning	10 days	Mon 7/05/18	Fri 18/05/18
98	Defects	10 days	Mon 21/05/18	Fri 1/06/18
99	Practical Completion	0 days	Fri 1/06/18	Fri 1/06/18



Project: ProgrammeREV8.04.15
Date: Fri 3/07/15

Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | Deadline | Progress

APPENDIX C
GROUND CONTAMINATION REPORT – JUNE 2014

REPORT

Willis Bond Ltd

Ground Contamination Assessment
Wellington Waterfront Sites 8, 9, 10

Report prepared for:

WILLIS BOND LTD

Report prepared by:

Tonkin & Taylor Ltd

Distribution:

WILLIS BOND LTD	1 pdf copy
Tonkin & Taylor Ltd (FILE)	1 pdf copy

February 2014

T&T Ref: 85778.001

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Appendix A: Figures

Appendix B: Window sampler logs

Appendix C: Laboratory results

Appendix D: Draft Contamination Site Management Plan

1 Introduction

Tonkin & Taylor (T&T) has been engaged by Willis Bond Ltd (WBL) to undertake a contamination investigation of Site 10, and to compile the results of that investigation with the results of an assessment of Sites 8 and 9 that was done in 2009 for Wellington Waterfront Ltd. Sites 8, 9, and 10 cover most of the area proposed to be developed (Figure 1). The results of assessments at Sites 8, 9, and 10 provide a basis for developing contamination management measures for the proposed development area.

1.1 Proposed site development

An overview of the site development is provided in Figure 1 (see Appendix A for larger version).

WBL proposes to develop Site 10 by constructing a multistorey building. The proposed works are likely to comprise of basement excavations to 3.7 m depth, and possibly deeper foundation excavations.

Landscaping works are proposed in the Landscape Areas (except Site 9 which will remain as a carpark) to create public open space areas (refer Figure 1). We understand approximately 1,000 m^3 of cut material may need to be removed from Site 8 (if it is geotechnically unsuitable), with cuts a maximum of 1 m deep. No significant cut is proposed elsewhere in the proposed Landscape Area, however, it is expected that limited soil disturbance will be required for surface preparation works. The public space areas shall be finished with either paving underlaid by imported fill or imported clean landscaping fill materials.

Previous desk studies at Site 10 (2008, 2011) and limited investigations at Sites 8 and 9 (2009) have identified potential sources of ground contamination (reclamation fill).

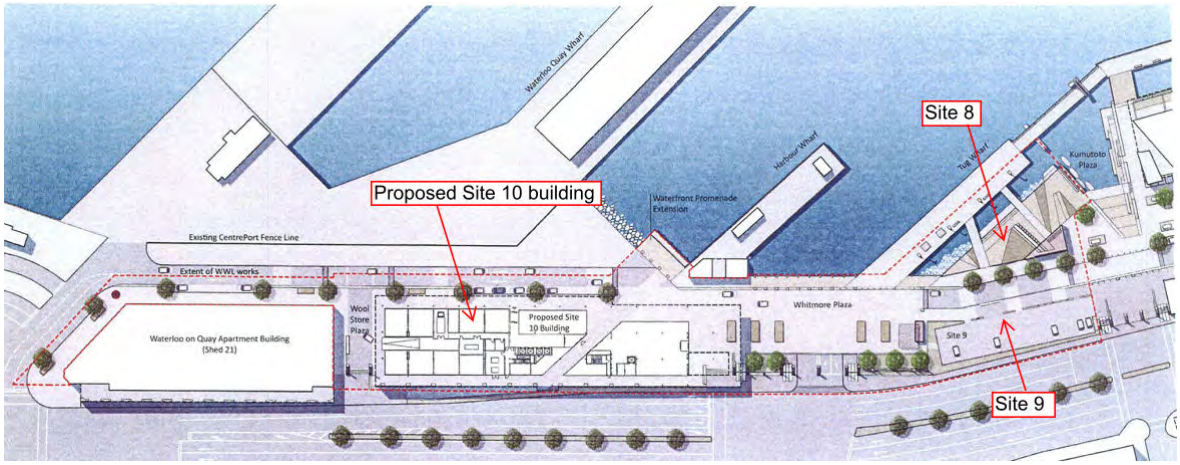

Figure 1: development master plan (Source: Isthmus)

1.2 Objective

The objective of this report is to combine the results of the Site 10 investigations with results from 2009 investigations at Sites 8 and 9 to develop a draft Contamination Site Management Plan (CSMP) for the works (see Appendix D). The objective of the Site 10 investigations is to characterise potentially contaminated material that is proposed to be excavated for the Site 10 building basement.

1.3 Scope of work

We have undertaken the following scope of works:

- Reviewed draft desk study report and limited site investigations carried out for Sites 8 and 9 in 2009 (T&T reference 84496.001, Sites 8 and 9 Geotechnical and Ground Contamination Investigation: DRAFT, prepared for Wellington Waterfront Ltd, July 2009).
- Requested information on historical pollution incidents for Sites 8, 9, and 10 from Greater Wellington Regional Council.
- Reviewed Wellington City Council (WCC) Archives files and historical aerial photographs to identify historical building locations at Site 10;
- Obtained underground service plans;
- Selected positions for 9 window sampler boreholes at Site 10;
- Collected soil samples to 3 m depth at each location to characterise the material that will be excavated to form the proposed basement;
- Tested selected samples for potential contaminants based on the site history;
- Compared laboratory results with expected background concentrations and landfill disposal criteria; and
- Provide recommendations on management and disposal method for excavated soil, including a draft Contamination Site Management Plan for the works (see Appendix D).

2 Site description

2.1 Site location

The outline of the proposed Landscape Area is shown in the development plan (Figure 1 Appendix A).

Site 10 is located to the east of Waterloo Quay in Wellington, as shown on Figure 2 (Appendix A). It is roughly rectangular in shape and has an area of approximately 0.25 ha. It covers most of Lot 102 DP 65083 and extends approximately 14.4 m into the northern end of Lot 1 DP 363596 and 3 m into the southern end of Lot 9 DP 65083.

2.2 Site description

The Landscape Areas are currently surfaced with asphalt and used as public open space, parking and access roads.

Site 10 is currently used as a car park and motor home park. It is essentially flat and entirely paved. An amenities block is located on the eastern boundary of Site 10. Access is via a paved road immediately to the south of the amenities block.

Waterloo Quay is west of the site, beyond a metal fence. To the east are access roads and further car parking areas. Shed 21 is located immediately to the north of Site 10.

2.3 Geology and hydrogeology

Based on published information, the land beneath Sites 9 and 10 and the areas between these two sites was reclaimed around 1900. Site 8 was reclaimed in the 1970s. The original seawall forms the boundary between Sites 8 and 9.

According to the published geological map[1], the site is described as reclaimed land, with fill consisting of domestic waste, sand, boulders and rock.

There are no surface water features on the site. Lambton Harbour is adjacent to Site 8, and approximately 11 m southeast of the proposed basement on Site 10 at its closest point. Based on the proximity to the harbour, general shallow groundwater flow direction is expected to be towards the southeast. Groundwater level is expected to fluctuate with the tide.

3 Site history

Site history information has been established from a variety of sources, including published information, T&T records, Wellington City Council (WCC) Archives files, Greater Wellington Regional Council records, and historical aerial photographs. All records viewed are summarised below. Key features for Site 10 are shown on Figure 2.

3.1 WCC Archives files

WCC Archives file for Site 10 was viewed on 28 May 2014. Key features are shown on Figure 2.

An 1892 survey plan indicates that the site location is unreclaimed in 1892. The closest wharf structure is referred to as Wool Wharf (currently known as Waterloo Wharf).

A 1901 contract document (titled Contract 107) contained the specification of the construction of a new building named Shed U to be erected on the site. A floor for a wool press was specified. A ground plan drawing for Shed U (Drawing 3) indicates that the wool press floor was located at ground level. This drawing also indicates a railway platform running along the full western length of the building. The purpose of the railway platform is unclear, however it is likely it would have included the movement of goods and cargo from the nearby shipping docks. An office block is located in the north western corner and public toilets in the south western corner.

A plan, dated 1902, titled Arrangement of patent hydraulic working valves for U Store Wool Presses, is located on the WCC Archives database. This plan was not viewed, but its title confirms that Shed U was likely to have been used as a wool shed.

In 1921, A Wellington Harbour Board notice was issued, which renumbered the sheds and stores along the Wellington Harbour. Shed U was renumbered Shed 17.

A 1947 contract document (titled Demolition of Parapet and re-roofing of Shed 17) contained the specifications for reroofing Shed 17 with asbestos cement roofing product. Super Six corrugated sheets were specified for the whole roof.

A building permit, dated 5 June 1986 is on the WCC Archives database. The building permit was not viewed, however its title Waterloo Quay, Demolish Wharf Shed No 17, indicates that the building was removed in 1986.

3.2 Historical certificates of title

Historical certificates of title dating back to 1894 indicate that the site was previously owned by the predecessors of Wellington Waterfront Limited (Lambton Harbour Overview Limited and Wellington Harbour Board).

[1] Begg, J.G., Johnston, M. R., (compilers), 2000, Geology of the Wellington Area, Institute of Geological and Nuclear Sciences, 1:250,000 geological map 10. 1 sheet + 64p. Lower Hutt, New Zealand, Institute of Geological and Nuclear Sciences Limited.

3.3 Historical aerial photographs

Historical aerial photographs reviewed in 2009 indicate that Sites 8 and 9 have been paved and used for car parking and access roads since sometime after 1980.

For Site 10, historical aerial photographs from WCC's GIS, and Alexander Turnbull Library (online collection) were reviewed. The key observations of Site 10 and surroundings are summarised in Table 3.1.

Table 3.1: Summary of historical aerial photographs: Site 10

Date (Source)	Onsite features	Offsite features
1905 (Alexander Turnbull Library oblique)	The corner of a large building (inferred to be Shed 17) can be seen at the inferred site location. On the south side of the site, there appears to be a pedestrian walkway between Shed 17 and the adjacent building.	The wharf structure and Wellington harbour is located east of the site. A multistorey building is located south of the site.
1934 (Alexander Turnbull Library oblique)	The roof of one large building (Shed 17) occupies the entire site, except for a small area at the southern end (inferred to be a pedestrian walkway). The use of this building is unknown, but may have included a wool shed.	No significant change A main road (currently known as Waterloo Quay) is adjacent to the western boundary.
1951 (Alexander Turnbull Library oblique)	No significant change.	No significant change.
1996 (WCC GIS)	The building has been removed. The site is fully paved and is being used as a car park.	The land adjacent to the eastern site boundary has been reclaimed as the Wellington harbour no longer directly adjacent to the eastern site boundary.
2004 (WCC GIS)	No significant change.	No significant change.
2013 (WCC GIS)	The northern half of the site is being used as a motor home park. A small building is present at the eastern side of the site (inferred to be the amenities block).	No significant change.

3.4 Reclamation history

Based on published information[2], the majority of the land beneath Sites 9 and 10 and the area between these two sites was reclaimed in the early 1900s. The source of this reclamation fill is unknown. We understand Site 8 was reclaimed in the 1970s, using quarried gravel.

[2] S.B Semmens (2010). An Engineering Geological Investigation of the seismic subsoil classes in the Central Wellington Commercial Area. Volume One: Thesis.

3.5 Greater Wellington Regional Council files

Site 10 is not listed on GWRC's database of potentially contaminated sites (the Selected Land Use Register (SLUR)).

Small parts of the public space area intersect with part of a "Queens Wharf" area that is listed on GWRC's SLUR database (see purple area marked on Figure 3, below). The Queens Wharf area is listed on the SLUR due to a 10,000 litre aboveground fuel tank used by Rick Lucas Helicopters. No further information regarding the age or condition of the tank is held by GWRC. This is not expected to affect landscaping earthworks.

GWRC does not hold any records of pollution events or ground contamination at the site.

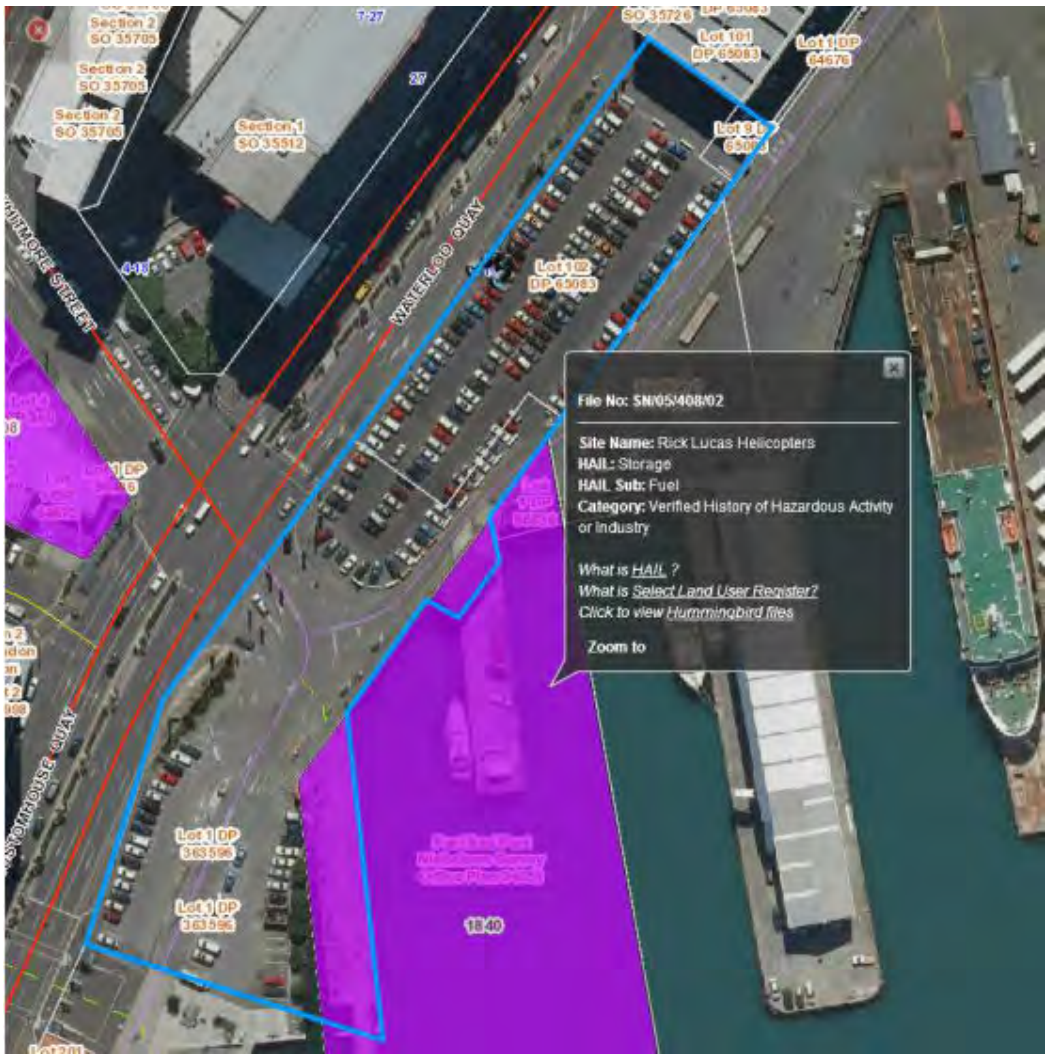

Figure 3: parts of site that intersect the Queens Wharf SLUR listing (purple zone). Source: GWRC

4 Potential for contamination

The source of the reclamation fill at Sites 9 and 10 and the area between is unknown. Contaminants typically associated with reclamation fill encountered elsewhere on the Wellington waterfront include metals, polycyclic aromatic hydrocarbons (PAH) and asbestos.

Site 10 has been used as a wool store. There is potential for hydrocarbon contamination at the base of lift shafts. Asbestos-containing building material was identified in the Shed 17 re-roofing specifications (Super Six corrugated sheets). This building was demolished in 1986, and surface soil contamination from asbestos is possible resulting from the demolition.

4.1 Conceptual site model

For there to be an effect from the proposed activity there has to be a contamination source and a mechanism (pathway) for contamination to affect human health or the environment (receptor). Table 4.1 summarises potential sources, pathways, and receptors in order to assess possible environmental and human health risks associated with the known site conditions.

Table 4.1: Summary of potential effects of proposed site use

	Source	Pathway	Onsite Receptors	Offsite Receptors
During construction works	Contaminated fill	Inhalation (dust), dermal contact, incidental ingestion	Construction workers	Surrounding commercial workers General public –road, pedestrians Discharge via stormwater runoff
	Contaminated groundwater generated during dewatering	Discharge to harbour via stormwater network	Construction workers	Flora and fauna of Wellington Harbour Recreational harbour users
On completion of works	Contaminated soil beneath basement and beneath paving	Inhalation (dust), dermal contact, incidental ingestion	Maintenance workers No other receptors as site is likely to be fully paved.	None - site is likely to be fully paved.

4.2 Relevant guidelines

Guidelines are summarised in the results tables, included in Appendix C. Sources of all guideline values are provided in the footnotes to each table.

4.2.1 Soil

Based on the proposed site use (commercial – Site 10 and public open space – Landscape Areas), soil test results have been compared with:

- Expected background concentrations, selected from Determination of Common Pollutant Background Soil Concentrations for the Wellington Region, August 2003, prepared by URS for GWRC (URS 2003). Because the source of fill is unknown, results have been compared with the full range of expected background concentrations for the Wellington Region.
- Human health guidelines for commercial site use (unpaved), selected in accordance with the hierarchy set out in the Ministry for the Environment (MfE)'s Contaminated Land

Management Guidelines No. 2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (Revised 2011). The hierarchy requires use of New Zealand risk-based values where these exist. The Soil Contaminant Standards referred to in the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (the NES Soil) take precedence. International risk-based guidelines are used where no New Zealand guidelines exist. There is potential for construction workers to have direct exposure to contaminated material during the construction of building foundations and service trenches. The guidelines for commercial site use is considered appropriate for the period of construction.

Note: There are no guidelines for maintenance workers under the NES Soil. Instead, good health and safety practices are recommended.

- Guidelines for offsite soil disposal:
  - Clean fill: contaminant concentrations must be consistent with expected background concentrations. Greater Wellington Regional Council relies on the interpretation of clean fill provided in the MfE's Guide to Management of Clean Fills (2002); concentrations above background or the detection of PAHs precludes waste from disposal at clean fill. We note that Wellington soils do contain a detectable background level of PAH (refer URS 2003).
  - Landfill: MfE's Waste Acceptance Criteria for Class A Landfills (2003). If the landfill acceptance criteria are exceeded, material may require pre-treatment, either onsite or at a specialist waste treatment facility (e.g. Transpacific, Seaview) prior to being accepted at landfill.

We are not aware of any defined acceptance value for asbestos fibre in soil. To date no method has been formed that reliably predicts the concentration of asbestos in air given the concentration of asbestos in the source. The approach adopted is to implement health and safety controls when friable asbestos is present in soil and monitor for the presence of asbestos in air during works which could disturb the fibres. If surplus soil containing asbestos has to be disposed off-site, it must be disposed to an appropriately consented landfill. Landfills in the Wellington region that can accept asbestos-containing soil include Southern Landfill and Silverstream Landfill.

4.2.2 Groundwater

Groundwater results are assessed against the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Conservation Council (ANZECC) 2000, Volume 1; Marine water, 80% protection of species. This level of protection is considered appropriate as stormwater discharges to the Wellington Harbour, which is considered to be a moderately disturbed environment.

Based on expected dilution in the harbour, for the purposes of assessing the effects of discharge of groundwater to the harbour via stormwater (e.g., during dewatering), it would be appropriate to apply a dilution factor to results. An appropriate dilution factor can be developed by evaluation of discharge volumes and dispersion by a contaminated land specialist, once discharge volumes are known.

5 Previous investigations: Sites 8 and 9

Limited soil sampling and testing was conducted in 2009 to investigate the potential for contamination in fill material at Sites 8 and 9.

5.1 Sample locations

Samples were collected using clean gloves from SPT samples retrieved during geotechnical investigations. Boreholes for sampling were selected to provide coverage of the site. Sample depths were selected to target specific layers within the fill material. At Site 8, 2 soil samples were collected from 1 borehole (2 samples). At Site 9, 2 soil samples were collected from each of 2 boreholes and 2 window sampler holes (i.e., a total of 8 samples from Site 9). All samples were tested for a suite of 7 metals, and 3 samples were tested for polycyclic aromatic hydrocarbons (PAH).

5.2 Observations

No visual or olfactory evidence of contamination was noted in fill material on Site 8 (1970s fill). Fill materials in Site 8 were consistent across the site, which is consistent with the reclamation history of Site 8 (placement of quarried fill). Fill material on site 9 (1903 fill) was more variable, with some layers having a slight hydrocarbon odour.

5.3 Results: Sites 8 and 9

Results are provided in Table C1 in Appendix C.

All results for Sites 8 and 9 were well below guidelines for commercial use of the site. Therefore, there is no requirement to remove soil from the site due to contamination. However, if fill material is exported from the site, there are implications for management and disposal.

Fill material from Site 8 (1970s fill) can potentially be managed as clean fill. Concentrations of metals and PAH in the two samples of fill material on Site 8 (1970s fill) were consistent with expected background. These results and the consistency of materials observed across Site 8 indicates fill in Site 8 is likely to be suitable to be managed as clean fill. If fill material from Site 8 is to be excavated and disposed offsite, additional testing should be done on excavated material (or prior to excavation, when proposed excavation locations are known), to confirm this.

Fill material from Site 9 (1903 fill) is not clean and would need to be managed at a consented landfill. Metals and PAH exceeded expected background concentrations in 3 of the 6 samples of fill material from Site 9 (1903 fill material), and 2 of the samples exceeded landfill acceptance criteria. Because only limited testing was conducted in the area of 1903 fill, and because of the variability of the fill, it is possible that some of the fill is clean. However, we understand that Site 9 is to continue to operate as a car park and therefore no fill material from Site 9 will be disturbed nor removed from the site.

Remainder of Landscape Area (1903 fill): no testing has been done in the remainder of the Landscape Area, but based on the fill history (1903 fill), materials are expected to be variably contaminated, similar to Site 9. Testing of materials to be disturbed would be required to assess contamination. This testing could be done either before excavation begins, or on materials stockpiled before disposal offsite. If a large quantity of the 1903 fill is to be exported from the site, it may be worthwhile to carry out delineation testing to identify if any of the material is clean. In the absence of further testing, the 1903 fill must be presumed to be non-clean fill, and must be managed at a consented landfill (e.g., Southern Landfill). A formal application to the

landfill would be required. Because some metals exceed landfill acceptance criteria, the landfill manager may require leaching testing to confirm that the fill is acceptable for landfill disposal

6 Site 10 investigations

6.1 Soil sample collection: Site 10

Intrusive investigations were carried out at Site 10 on 23-24 April 2014, at the locations shown on Figure 2 (Appendix A).

The investigations comprised 9 window sampler boreholes (WS1 – WS9) to a maximum depth of 3 m. Samples were collected from each layer of material encountered. WS1 and WS3 refused at depths of 1.2 m and 1.0 m respectively on what appeared to be concrete, and deeper fill was not tested. Window sampler logs are provided in Appendix B.

Samples were collected using a hand trowel and clean gloves. The hand trowel was cleaned between sample locations and fresh gloves were used for each sample. All samples were collected using clean latex gloves and placed into clean jars provided by Hill Laboratories. All samples were placed on ice and transferred to the laboratory under chain of custody documentation.

Based on site history and observations, selected samples of fill were tested for polycyclic aromatic hydrocarbons (PAH), total petroleum hydrocarbons (TPH), asbestos, and metals.

6.2 Groundwater sample collection: Site 10

Groundwater was encountered at WS2 and in WS49. The depth to groundwater was approximately 1.6m – 2m. A standpipe was installed in WS2 (P2, refer Figure 2 in Appendix A). An existing standpipe (P1, refer Figure 2 in Appendix A) was also sampled.

Groundwater level was measured once the water level had been given time to stabilise. P1 was dipped at approximately high tide on 6 May 2014 at 1.72m and P2 was dipped at mid-tide on 12 May 2014 at 1.55m below ground level. Monitoring groundwater level at different tides would confirm the range of depths to groundwater.

A groundwater sample was collected from P1 on 6 May 2014. The standpipe was purged in 2L intervals using a peristaltic pump, until pH and conductivity stabilised for three consecutive readings. A total of 8L was purged prior to collecting a sample.

A groundwater sample was collected from P2 on 12 May 2014. The standpipe was purged in 2L intervals using a peristaltic pump, until pH and conductivity stabilised for three consecutive readings. A total of 10L was purged prior to collecting a sample.

The groundwater extracted for both samples was clear and no odour or surface sheen was noted.

All samples were placed into clean sample bottles prepared by the laboratory. The sample was sent to Hill Laboratories under chain of custody documentation.

Groundwater samples were filtered at the laboratory and tested for trace metals and PAH. The laboratory report is appended as Appendix C.

6.3 QA/QC: Site 10 sampling

Four duplicate soil samples and one groundwater sample were tested to check the variability of the samples. The results are provided in Tables C6 and C7 (Appendix C). In general, the results agreed well (most within 40%). Those results greater than 40% were generally low concentrations

(typically less than 1 mg/kg), relative to which a large percentage difference was seen. This variability indicates heterogeneity in the fill material, and must be considered when interpreting the data.

For metals, the only duplicate pairs with relative percent difference greater than 50% were in the more highly contaminated layer of fill (WS5 2.65 m/Duplicate 2 and WS6 1.5 m/Duplicate 3). The variability in PAH concentrations was much higher, as expected in fill. The variability in the results does not have a material effect on the proposed management of this material (landfill disposal).

The variability in the duplicate pair of samples considered "clean" (WS9 2.75 m/ Duplicate 4) was less than 50% for metals, but ranged up to 67% for PAH. The PAH concentrations were low in both samples of the pair, and therefore the variability does not materially affect the proposed management of this material (disposal to landfill, or cleanfill only after testing confirms the material is clean).

6.4 Results and implications: Site 10 basement excavation

Soil results are summarised in Tables C2-C3 (Appendix C). Interpretation is based on selected samples from 9 window sampler holes, as shown on Figure 2 (Appendix A). The nature and continuity of subsoil away from the sample locations is inferred but it must be appreciated that actual ground conditions could vary from the assumed model.

Within the Site 10 basement excavation (0-3.7 m depth) we have identified potential zones with different contamination present (see Figure 2, Appendix A). Contamination management methods are provided in the draft Contamination Site Management Plan (Appendix D).

Zone 1:

- 0-1 m depth: potentially clean, pending confirmatory testing (before or after excavation) ~~if any unexpected material is encountered~~.
  - The upper 0.5 m of fill at WS8 and WS9 was visually consistent with material at the same depth at WS5, and the sample from 0.45 m depth at WS5 was consistent with expected background.
  - Below 0.5 m and to approximately 1.5 m, material at WS8 is sand with gravels and some silt, yellowish brown, and containing brick fragments (cement fragments become present only below 1.5 m). This fill at WS8 was tested at 1.2 m and was consistent with expected background.
  - The material at WS9 is similar to WS8 to 1.5 m depth. (Below 1.9 m depth at WS9 soil is sand with some gravel, and has elevated PAH, as characterised by WS9 1.5 m.)
  - We have therefore conservatively assumed that up to 1 m within this area is potentially clean.
- 1-2 m depth: contaminated (metals and PAH). This material cannot be disposed as clean fill. However, all results are within commercial use guidelines, and the material is expected to be acceptable for landfill disposal (at an appropriately consented landfill, e.g., Southern Landfill or Silverstream Landfill) without pre-treatment.
- 2-3 m depth: potentially clean, pending confirmatory testing (before or after excavation) ~~if any unexpected material is encountered~~.
- 3-3.7 m depth: unknown. Potentially clean, pending confirmatory testing.

Zone 2:

- 0-0.75 m depth: potentially clean, pending confirmatory testing (before or after excavation) ~~if any unexpected material is encountered~~.

  - This area has 0.1-0.2 m of asphalt and basecourse underlain by sand fill with some silt and greywacke gravel to 1.6-1.9 m deep. This fill is characterised by samples WS4 0.85 m and WS5 0.45 m. While some results were slightly higher than background, given the variability demonstrated by the QA results, the fill is considered to be generally consistent with background.
  - Some brick fragments are present in some of the fill (at WS2, WS4, and WS6). Sample WS2 0.6 m was collected from this material. PAH and zinc in this sample are higher than background (other metals are considered generally consistent with background).
  - Due to the presence of more brick material at WS6 below 0.75 m depth, we conservatively assigned a depth to this potentially clean layer of 0.75 m.
- 0.75-2.75 m depth: contaminated (metals and PAH). This material is expected to be suitable for disposal to landfill without pre-treatment (e.g., Southern or Silverstream). Most soil in this layer is within commercial use guidelines, with the exception of a layer approximately 50-100mm thick at 1.7-1.8m depth, which had a strong hydrocarbon odour and had the appearance of cold-mix. Although total PAH within this layer exceed preliminary landfill screening criteria, because PAH compounds bind strongly to soil, it is expected this material would be acceptable without pre-treatment. The PAH concentrations in this thin layer exceeded the commercial use guidelines. However, as it is to be removed from the site, this is not a constraint for site development.
- 2.75-3 m depth: potentially clean, pending confirmatory testing ~~if any unexpected material is encountered during excavation~~.
  - A yellow, coarse sand layer was present at depth at some locations (WS2 below 2.7 m, WS4 below 2.5 m; WS5 below 2.75 m). This material was also present at WS9 (from 2.55 m). Samples characterising this yellow sand are WS2 2.9 m, WS5 2.85 m, and WS9 2.75 m. All of these are generally consistent with background.
  - At WS4, a grey silty sand is present below 2.5 m, and at WS6, a coarse dark reddish brown sand is present below 1.9 m. These materials are characterised by WS4 2.7m and WS6 2.5 m, which are generally consistent with background.
  - At WS7, a dark silty sand with coarse brick fragments is present below 2.6 m. This material contains elevated PAH.
  - We have conservatively selected a depth of 2.75 m as the top of the potentially clean material.
- 3-3.7 m depth: unknown. Potentially clean, pending confirmatory testing.

Zone 3:

- 0-1.2 m depth: elevated metals, PAH, and asbestos. The asbestos is described as bundles and loose fibres, indicating it is friable. Metals and PAH are above expected background concentrations. This material is expected to be suitable for disposal to landfill, but would have to be disposed as special waste due to the presence of asbestos. Special waste requires special handling at a landfill, and typically attracts a higher disposal rate to reflect this.
- 1.2-3.7 m depth: unknown – could not be accessed, due to a concrete slab. Based on the nature of fill encountered at other locations of the site, we would expect fill below the concrete slab may contain contamination above background, but is unlikely to contain asbestos. This material is expected to be suitable for disposal to landfill. Further testing after removal below the concrete slab would be required to confirm this. It would be appropriate to do this testing during the works after the concrete slab has been removed. This testing is set out in the draft CSMP (Appendix D).

6.5 Groundwater results

Fill around and below groundwater level has elevated metal and PAH concentrations. Therefore there is the potential for elevated concentrations of metals and PAH in groundwater. If groundwater contamination is present on the site, there may be constraints on dewatering during earthworks and the discharge of groundwater to stormwater. PAH and the metals detected in fill are strongly adsorbed to soil, therefore removal of sediment from the water before discharge is typically effective in removing these contaminants. The draft CSMP (Appendix D) includes requirements for confirmatory testing and, if contaminants are potentially present, measures to treat discharges for sediment removal. Preliminary testing in one borehole on site indicates no significant contamination is present in groundwater: all PAHs and most metals are within the ANZECC (2000) guidelines for 80% protection of marine species. Copper and zinc detection limits were above the ANZECC guideline value, but the laboratory reported that lower detection limits were not possible due to the sample matrix.

Sulphate is below the WCC trade waste bylaw guidelines at P1, but exceeds these guidelines at P2. The variability of these results reflects the variability of the fill material located onsite. Further testing of groundwater would be required during dewatering if discharge to trade waste is to occur.

6.6 Groundwater management

Groundwater generated during dewatering at Site 10 is expected to be:

- Suitable for discharge to stormwater, however this would require resource consent from GWRC (for discharge of groundwater to stormwater) and a stormwater permit from WCC.
- Suitable for discharge to trade waste – permit required from WCC.

Controls for discharge of dewatering water are set out in the draft CSMP (Appendix D) and generally include:

- Sampling and testing groundwater collected from shallow piezometers prior to excavation to assess groundwater quality. Samples shall be tested for total and dissolved metals and PAH.
  - To identify appropriate controls for discharge to stormwater, initial results will be compared with ANZECC guidelines for protection of marine species, applying an appropriate dilution factor that should be developed by a contaminated land specialist once discharge volumes are known;
  - To assess whether dewatering discharge can be discharged to trade waste, results shall be compared with trade waste guidelines.
- Good erosion and sediment control measures to minimise:
  - Sediment entrained in dewatering discharge.
  - The amount of stormwater entering the excavation area (i.e., to minimise the volume of water requiring discharge to stormwater).
- Treatment for sediment removal (if required), which may include:
  - Detention to allow sediment to settle before water is decanted off for discharge.
  - Treatment with chemical flocculants (the need for chemical treatment to remove sediment can only be determined when the sediment load of dewatering water is known).
  - Monitoring of suspended sediment prior to discharge.
  - Depending on the results of groundwater testing carried out prior to works beginning, additional laboratory testing for metals and PAH may be required before discharge (this is considered unlikely based on groundwater results to date).

7 Soil management

7.1 Off-site disposal of soil

Material that is consistent with background and does not contain asbestos is expected to be suitable for disposal to clean fill. Material that exceeds background concentrations and/or contains asbestos must be managed as contaminated material. Details for management are set out in the draft CSMP (Appendix D).

At Site 8 (1970 fill) and in some layers within the Site 10 basement, testing indicates fill is clean. However, based on the variability within the fill at Site 10 and limited testing at Site 8, we recommend that if soil at Site 8 or outside the layers identified as clean at Site 10 is to be disposed to clean fill, additional testing (metals and PAH; 1 sample per 100 m^3) should be carried out on potentially clean material to confirm it is indeed clean. Testing could be done in situ before works begin, or on stockpiled material if space is available to hold material pending the results of testing (5-7 working days). Care would be needed to ensure clean material does not become mixed with contaminated material during stockpiling. Requirements for testing and controls are set out in the draft CSMP (Appendix D).

Material that exceeds background should be acceptable to an appropriately consented landfill (e.g., Southern or Silverstream) without pre-treatment. However, acceptance would be the decision of the landfill manager. Approval from the landfill manager should be sought before works begin, using the results of testing carried out as part of this investigation.

The material that contains asbestos should be acceptable at an appropriately consented landfill (e.g., Southern or Silverstream), but would have to be handled as special waste, which would attract a higher disposal fee. Approval from the landfill manager should be sought before works begin, using the results of testing carried out as part of this investigation.

7.2 On-site management

Due to the presence of contamination, procedures will be required during the excavation works to protect site workers, the public, and the environment. This would include works to minimise discharges and prevent contact with contaminants. Procedures are set out in the draft CSMP (Appendix D).

8 Regulatory requirements

8.1 Land use consents

Based on the presence of contamination and the volumes of earthworks required, resource consent is expected to be required from WCC under the National Environmental Standard for Contaminants in Soil to Protect Human Health (NES Soil), for disturbing soil and change of use. Resource consent is also likely required under the Wellington District Plan for works on a contaminated site. This is for both Site 10 (the proposed building) and for the Landscaping Areas.

The NES Soil either allows (as a permitted activity) or controls (through resource consents) these activities on land affected or potentially affected by soil contaminants. The focus of the NES Soil is to protect human health, and therefore only relates to the actual or potential adverse effects of contaminants on human health. It does not address the wider adverse effects of contaminants on the environment, or relate to assessing or managing the actual or potential adverse effects of contaminants on other receptors such as ecology, water and amenity values.

The activity status of activities is then set by the NES depending upon the nature and scale of the activity and its potential risks to human health, and ranges from permitted activities through to discretionary activities. In this instance, site investigations have shown that contaminant concentrations are mostly below guidelines for the proposed site use (commercial).

However at Site 10, a layer of soil exceeds the human health guidelines for polycyclic aromatic hydrocarbons. Therefore, the soil disturbance and change of use at Site 10 would be restricted discretionary activities under the NES Soil.

The investigations at Sites 8 and 9 completed in 2009 do not constitute a DSI for the earthworks in the public space areas. Therefore a discretionary activity consent would be required for the works on Site 8 and the rest of the Landscaping Areas.

Overall for the Project, a discretionary activity consent is required for earthworks under the NES.

The following plans are recommended as a condition of resource consent for the works:

- A Contamination Site Management Plan (CSMP). A draft CSMP is provided in Appendix D. It would sets out controls to minimise discharges during the works, health and safety procedures for site workers, and inspection/monitoring and reporting requirements (e.g., tracking loads of contaminated soil disposed to landfill).
- A Site Validation Report (SVR) to be provided to WCC (and GWRC) on completion of the works, documenting the works carried out, collating inspection and monitoring records, and landfill receipts.

8.2 Regional Council consents

A consent will be required for the potential discharge of contaminants to land, including to the reticulated stormwater system, and for the potential discharge of contaminants to ground water. Consent is required for a discharge permit for a Discretionary Activity under Rule 2 of the Regional Discharges to Land Plan, and Rule 5 of the Regional Freshwater Plan.

If any contaminated soil is discharged offsite anywhere other than a consented landfill, resource consent would be required from GWRC.

8.3 Trade waste and stormwater permits

If groundwater generated during dewatering is to be disposed to stormwater or trade waste, a permit will be required from WCC.

9 Conclusions

The proposed development involves excavation at Site 10 for a basement and foundations. Excavated fill and groundwater extracted during dewatering at Site 10 will be disposed off-site. Soil disturbance will also be required at Site 8 and possibly other parts of the Landscape Areas for landscaping works. We understand approximately 1,000 m^3 of cut material may need to be removed from Site 8 (if it is geotechnically unsuitable), with cuts a maximum of 1 m deep. No significant cut is proposed elsewhere in the public space areas, however, it is expected that limited soil disturbance will be required for surface preparation works. The public space areas shall be finished with either paving underlaid by imported fill or imported clean landscaping fill materials. There will be no earthworks on Site 9.

No contaminated material has been identified at Site 8 (1970s fill), but contaminated fill is present at Sites 9 and 10 (1903 reclamation: metals, polycyclic aromatic hydrocarbons). Similar material is expected to be present in the remainder of the Landscape Areas, which are also on the 1903 reclamation. In addition, asbestos has been identified in part of Site 10. A Contamination Site Management Plan (CSMP) will be implemented to control discharges of contaminants during the works to minimise potential effects on human health and the environment. A draft CSMP is appended (Appendix D).

Investigations have confirmed that after removal of the excavated basement material at Site 10, concentrations of contaminants will be below human health guidelines for the proposed site use (commercial, paved site).

As some of the fill to be excavated contains contaminants above background levels (metals, polycyclic aromatic hydrocarbons, asbestos), it must be disposed to an appropriately consented landfill (e.g., Southern Landfill or Silverstream Landfill). This investigation indicates that fill should be acceptable to landfill without pre-treatment, but this would have to be approved by the landfill manager. The draft CSMP (Appendix D) includes controls to minimise discharges during the works (e.g., dust, runoff in stormwater).

Some of the fill to be excavated from Site 10 is clean. If additional areas are to be checked for suitability as clean fill (either at Site 10 or in the Landscape Areas), additional testing would be needed to confirm it is clean. This testing can be done either in situ before excavation, or in stockpiled soil if the excavation programme and space permits. Controls will need to be in place during the works to ensure no cross-contamination of clean material occurs.

Because the excavated fill will be disposed off-site and the site will be paved on completion, there is minimal potential for exposure of future site users to contaminated fill at the site.

Preliminary groundwater testing at two boreholes on the site has not identified significant contamination in shallow groundwater, which is consistent with the type of contaminants present in the fill. Further groundwater testing is required to confirm this for the remainder of the site.

Preliminary groundwater testing at two boreholes on the site has not identified significant contamination in shallow groundwater, which is consistent with the type of contaminants present in the fill. Further groundwater testing is required to confirm this for the remainder of the site. Groundwater extracted during dewatering may need treatment before discharge to stormwater or trade waste. The type of treatment (if any) would be dependent on the results of further testing, as set out in the draft CSMP (Appendix D). Implementing appropriate controls (based on the results of testing) would ensure that effects of the discharge on harbour water quality are less than minor.

10 Applicability

This report has been prepared for the benefit of Willis Bond Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement. The work was undertaken in accordance with our proposal of 8 April 2014.

Tonkin & Taylor LTD

Environmental and Engineering Consultants

Report prepared by:	Authorised for Tonkin & Taylor Ltd by:
.....	.....
Sharon Parackal	Stuart Palmer
Environmental Engineer	Project Director

Technical Review: Penny Kneebone, Senior Environmental Scientist

SPP

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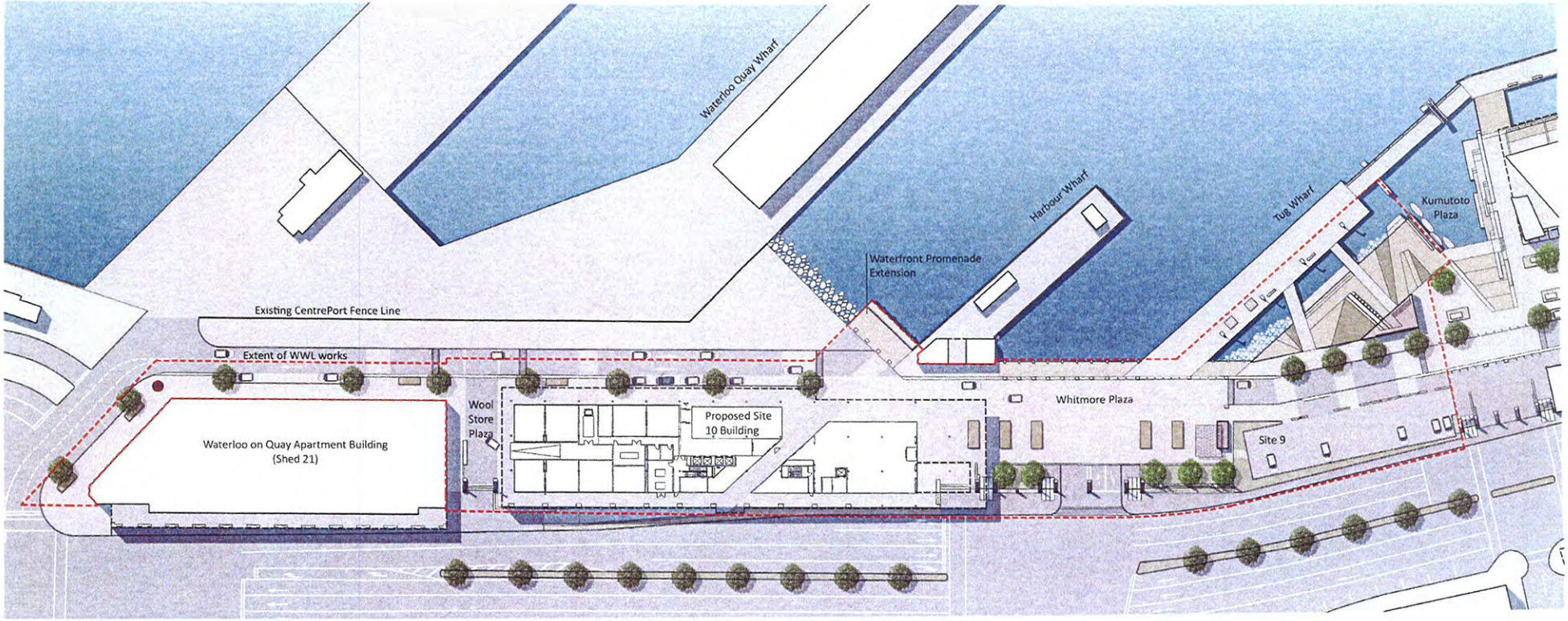
Appendix A: Figures

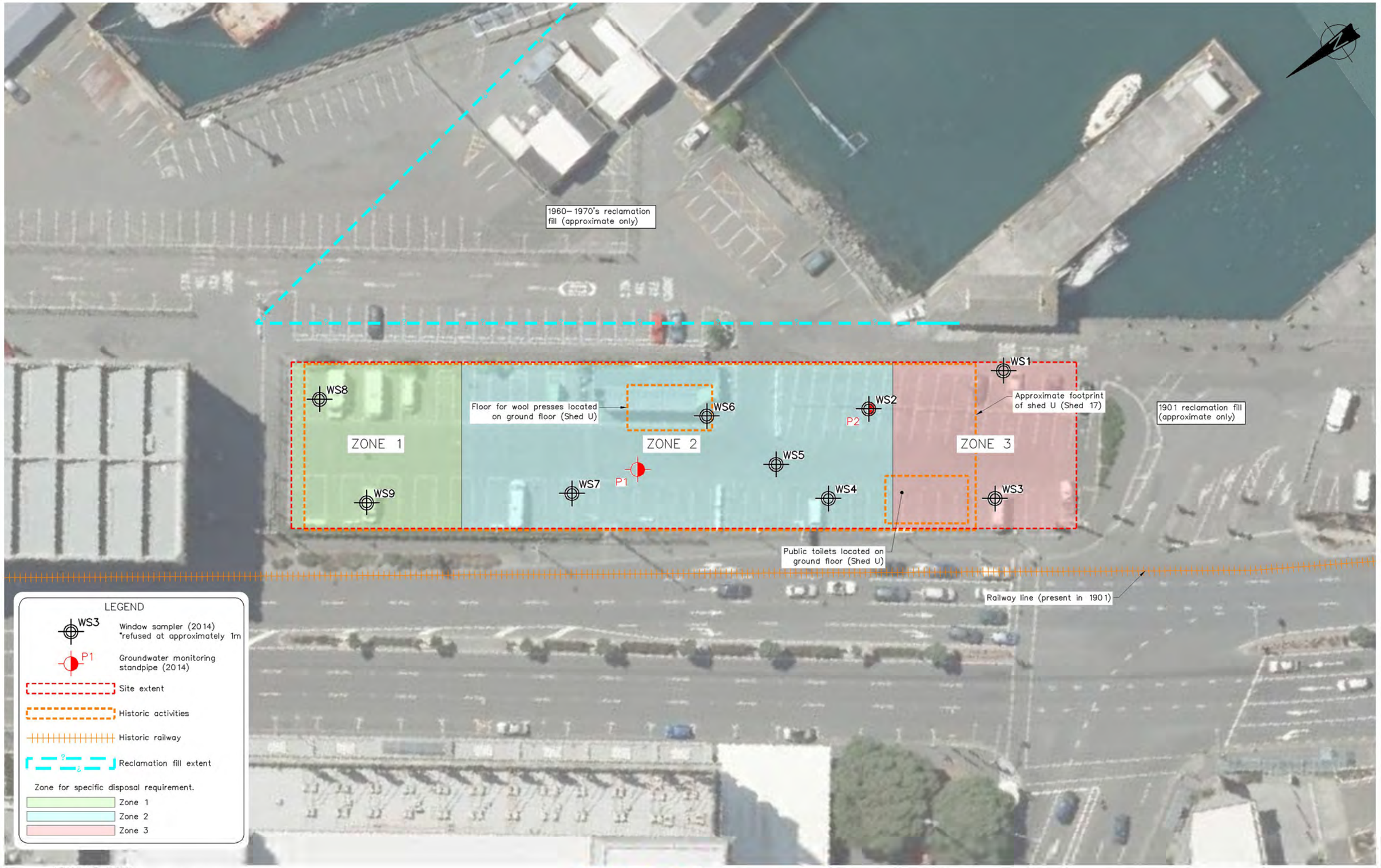
- Figure 1: Development Masterplan (Isthmus)
- Figure 2: Site 10 Historic Activities, Sample location and Soil Contamination Characterisation



KUMUTOTO MASTERPLAN

27.08.2014

isthmus



NOTES:

1. Aerial photo sourced from Wellington City Council

ORIGINAL IN COLOUR

Tonkin & Taylor
Environmental and Engineering Consultants
Level 4, 2 Hunter St, Wellington
www.tonkin.co.nz

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DRAFTING CHECKED		
APPROVED		
CADFILE	\\85778.00 10–F02.dwg	
SCALES (AT A3 SIZE)	1:500	
PROJECT No.	85778.00 1	

WILLIS BOND LTD.

GROUND CONTAMINATION ASSESSMENT WELLINGTON WATERFRONT SITE 10

Key Historic Activities, Sample Location and Soil Contamination Characterisation

FIG. No: Figure 2 REV. 0

P:\85778\85778.0010\WorkingMaterial\CAD\02-FIG\85778.0010-F02.dwg, F0 2, 17/06/2014 10:26:50 a.m., nat, A3, 1:1

Appendix B: Window sampler logs

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No:WS1
Hole Location: Refer Figure 2

SHEET 1 OF 1

PROJECT: Site 10 Ground contamination assessment | LOCATION: Site 10, Wellington Waterfront | JOB No: 85778.001

CO-ORDINATES: Refer Figure 2 for approximate location
R.L.:
DATUM:

DRILL TYPE: Window Sampler
DRILL METHOD: Window Sampler
DRILL FLUID: N/A

HOLE STARTED: 23/4/14
HOLE FINISHED: 23/4/14
DRILLED BY: Geotechnics Ltd
LOGGED BY: SPP CHECKED: NCP

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.

FLUID LOSS | WATER | CORE RECOVERY (%) | METHOD | CASING | TESTS | SAMPLES | R.L. (m) | DEPTH (m) | GRAPHIC LOG | CLASSIFICATION SYMBOL | MOISTURE CONDITION / WEATHERING | STRENGTH/DENSITY CLASSIFICATION | SHEAR STRENGTH (kPa) 10 25 50 100 200 | COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250 | DEFECT SPACING (mm) 50 250 600 2000

SOIL DESCRIPTION
Soil type, minor components, plasticity or particle size, colour.
ROCK DESCRIPTION
Substance: Rock type, particle size, colour, minor components.
Defects: Type, inclination, thickness, roughness, filling.

FILL

RECLAMATION FILL

NA

Not encountered

NA

NA

0.0 Asphalt

Base course

Silty coarse SAND with some angular gravels. Orange brown. Tightly packed. Dry. Fine to coarse gravel sized brick fragments and white plaster or cement material.

0.5

1.0

Silty fine to coarse SAND. Dark brown. Moist. Medium to fine gravel size brick fragments present.

Refusal at 1.2m depth

1.5 2.0 2.5 3.0 3.5 4.0 4.5 5

T+T DATATEMPLATE.GDT mirb

Log Scale 1:25

BORELOG WS LOGS.GPJ 26-Feb-2015

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No:WS2
Hole Location: Refer Figure 2

SHEET 1 OF 1

PROJECT: Site 10 Ground contamination assessment	LOCATION: Site 10, Wellington Waterfront	JOB No: 85778.001
CO-ORDINATES: Refer Figure 2 for approximate location	DRILL TYPE: Window Sampler	HOLE STARTED: 23/4/14
	DRILL METHOD: Window Sampler	HOLE FINISHED: 23/4/04
R.L.:		DRILLED BY: Geotechnics Ltd
DATUM:	DRILL FLUID: N/A	LOGGED BY: SPP CHECKED: NCP

GEOLOGICAL									ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250	DEFECT SPACING (mm) 50 250 600 2000	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
FILL																	Asphalt
																	Base course
RECLAMATION FILL																	Silty fine SAND with some angular medium to coarse greywacke gravel. Dark Brown. Dry. Fine to coarse gravel sized brick fragments. Crushed brick. 0.5
	NA								0.5								Interbedded silty fine sand. Blue. At 0.75m: 150mm thick lense of organic silt. 1.0
		nferred at time of drilling				NA			1.0								SILT with fine sand and fine gravel. Brownish yellow. Moist. Fine gravel sized brick fragments. 1.5
									1.5				NA				
									2.0								2.0
									2.5								SILT with some fine to medium greywacke gravel. Greyish orange and black. Wet 2.5
																	Sandy SILT with fine to coarse gravel. Brown. Wet. Becoming coarse sand. Yellow. Wet.
									3.0								3.0 Target depth at 3.0m
									3.5								3.5
									4.0								4.0
									4.5								4.5
									5								

T+T DATATEMPLATE.GDT mirb

Log Scale 1:25

BORELOG WS LOGS.GPJ 26-Feb-2015

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No:WS3
Hole Location: Refer Figure 2

SHEET 1 OF 1

PROJECT: Site 10 Ground contamination assessment	LOCATION: Site 10, Wellington Waterfront	JOB No: 85778.001
CO-ORDINATES: Refer Figure 2 for approximate location	DRILL TYPE: Window Sampler	HOLE STARTED: 24/4/14
	DRILL METHOD: Window Sampler	HOLE FINISHED: 24/4/14
R.L.:		DRILLED BY: Geotechnics Ltd
DATUM:	DRILL FLUID: N/A	LOGGED BY: SPP CHECKED: NCP

GEOLOGICAL									ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250	DEFECT SPACING (mm) 50 250 1000 2000	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
FILL									0								Asphalt
																	Base course
RECLAMATION FILL	NA	Not encountered				NA							NA				Lost core
									0.5								Coarse silty SAND and coarse greywacke gravel with minor silt. Dark brown. Dry. Coarse to fine gravel sized brick fragments and white plaster or cement material.
									1.0								Refusal at 1.0m depth
									1.5								
									2.0								
									2.5								
									3.0								
									3.5								
									4.0								
									4.5								
									5								

T+T DATATEMPLATE.GDT mirb

Log Scale 1:25

BORELOG WS LOGS.GPJ 26-Feb-2015

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No:WS4
Hole Location: Refer Figure 2

SHEET 1 OF 1

PROJECT: Site 10 Ground contamination assessment	LOCATION: Site 10, Wellington Waterfront	JOB No: 85778.001
CO-ORDINATES: Refer Figure 2 for approximate location	DRILL TYPE: Window Sampler	HOLE STARTED: 24/4/14
	DRILL METHOD: Window Sampler	HOLE FINISHED: 24/4/14
R.L.:		DRILLED BY: Geotechnics Ltd
DATUM:	DRILL FLUID: N/A	LOGGED BY: SPP CHECKED: NCP

GEOLOGICAL									ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250	DEFECT SPACING (mm) 50 250 1000 2000	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
FILL									0								Asphalt
RECLAMATION FILL																	Base course
																	At 0.35m: Fine to medium angular gravel with fine to coarse sand. Grey.
									0.5								Interbedded fine to coarse angular greywacke GRAVEL and fine to coarse SAND. Some silt. Grey brown. Dry. Fine to medium gravel sized brick fragments.
	NA																Coarse SAND with minor silt and greywacke gravel. Light Grey. Dry.
		nferred at time of drilling				NA			1.0								
									1.5					NA			SILT with fine to coarse sand and greywacke gravel. Brown with orange mottling. Fine gravel size crushed brick. Interbedded with fine sand lenses.
									2.0								
BEACH DEPOSITS									2.5								Silty fine to coarse SAND and some medium size greywacke gravel. Grey. Wet to saturated. Fine shell fragments present.
									3.0								Target depth at 3.0m
									3.5								
									4.0								
									4.5								
									5								

T+T DATATEMPLATE.GDT mirb

Log Scale 1:25

BORELOG WS LOGS.GPJ 26-Feb-2015

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No:WS5
Hole Location: Refer Figure 2

SHEET 1 OF 1

PROJECT: Site 10 Ground contamination assessment	LOCATION: Site 10, Wellington Waterfront	JOB No: 85778.001
CO-ORDINATES: Refer Figure 2 for approximate location	DRILL TYPE: Window Sampler	HOLE STARTED: 24/4/14
R.L.:	DRILL METHOD: Window Sampler	HOLE FINISHED: 24/4/14
DATUM:	DRILL FLUID: N/A	DRILLED BY: Geotechnics Ltd
		LOGGED BY: SPP CHECKED: NCP

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.

FLUID LOSS | WATER | CORE RECOVERY (%) | METHOD | CASING | TESTS | SAMPLES | R.L. (m) | DEPTH (m) | GRAPHIC LOG | CLASSIFICATION SYMBOL | MOISTURE CONDITION / WEATHERING | STRENGTH/DENSITY CLASSIFICATION | SHEAR STRENGTH (kPa) 10 25 50 100 200 | COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250 | DEFECT SPACING (mm) 50 250 1000 2000

SOIL DESCRIPTION
Soil type, minor components, plasticity or particle size, colour.

ROCK DESCRIPTION
Substance: Rock type, particle size, colour, minor components.
Defects: Type, inclination, thickness, roughness, filling.

Geological unit	Depth (m)	Description
FILL		Asphalt
RECLAMATION FILL		Base course
	0.5	Silty fine SAND with some greywacke gravel. Yellowish brown and grey. Dry
	1.0	Silty medium SAND with medium greywacke gravel. Yellowish brown. Dry. Black organic matter (roots, twigs).
	1.5	Medium rounded gravel. Dark grey black. Moist. Strong hydrocarbon odour.
		Silty medium SAND with medium gravel. Yellowish brown. Moist. Black organic matter.
	2.0	SILT with some gravel. Grey. Moist to Wet.
		SILT with interbedded coarse sand and some greywacke gravel. Grey black. Wet.
	2.5	Coarse sand. Orange and mottled black. At 2.65m: Slight hydrocarbon odour.
		Coarse Sand. Yellow orange. Saturated.
	3.0	Target depth at 3.0m

Water: NA; Inferred at time of drilling

Tests: NA

Shear strength: NA

Depth scale: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5

T+T DATATEMPLATE.GDT mjrb

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No:WS6
Hole Location: Refer Figure 2

SHEET 1 OF 1

PROJECT: Site 10 Ground contamination assessment	LOCATION: Site 10, Wellington Waterfront	JOB No: 85778.001
CO-ORDINATES: Refer Figure 2 for approximate location	DRILL TYPE: Window Sampler	HOLE STARTED: 24/4/14
	DRILL METHOD: Window Sampler	HOLE FINISHED: 24/4/14
R.L.:		DRILLED BY: Geotechnics Ltd
DATUM:	DRILL FLUID: N/A	LOGGED BY: SPP CHECKED: NCP

GEOLOGICAL									ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250	DEFECT SPACING (mm) 50 250 600 2000	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
FILL									0								Asphalt
																	Base course
RECLAMATION FILL																	Fine SAND with silt and coarse greywacke gravel. Light grey. Dry.
									0.5								0.5 Silty SAND and fine greywacke gravel. Dark brown Dry.
	NA																Sandy SILT and some medium greywacke gravel. Orange and mottled black. Dry to moist. Coarse sand sized brick fragments and black organic matter (twigs, roots).
									1.0								1.0
		nferred at time of drilling															Coarse SAND with minor silt. Orange. Moist.
						NA			1.5				NA				1.5 At 1.5m: Fine powdered cement or plaster material. At 1.8m: Faint hydrocarbon odour
									2.0								2.0 Coarse SAND. Dark reddish brown. At 2.0m: Some coarse round greywacke gravel. Reddish brown with orange and light brown mottling. Saturated.
									2.5								2.5
									3.0								3.0 Target depth at 3.0m
									3.5								3.5
									4.0								4.0
									4.5								4.5
									5								

T+T DATATEMPLATE.GDT mirb

Log Scale 1:25

BORELOG WS LOGS.GPJ 26-Feb-2015

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No:WS7
Hole Location: Refer Figure 2

SHEET 1 OF 1

PROJECT: Site 10 Ground contamination assessment | LOCATION: Site 10, Wellington Waterfront | JOB No: 85778.001

CO-ORDINATES: Refer Figure 2 for approximate location

R.L.:

DATUM:

DRILL TYPE: Window Sampler

DRILL METHOD: Window Sampler

DRILL FLUID: N/A

HOLE STARTED: 24/4/14

HOLE FINISHED: 24/4/14

DRILLED BY: Geotechnics Ltd

LOGGED BY: SPP CHECKED: NCP

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.

FLUID LOSS | WATER | CORE RECOVERY (%) | METHOD | CASING | TESTS | SAMPLES | R.L. (m) | DEPTH (m) | GRAPHIC LOG | CLASSIFICATION SYMBOL | MOISTURE CONDITION / WEATHERING | STRENGTH/DENSITY CLASSIFICATION | SHEAR STRENGTH (kPa) 10 25 50 100 200 | COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250 | DEFECT SPACING (mm) 50 250 600 2000

SOIL DESCRIPTION

Soil type, minor components, plasticity or particle size, colour.

ROCK DESCRIPTION

Substance: Rock type, particle size, colour, minor components.

Defects: Type, inclination, thickness, roughness, filling.

FILL
RECLAMATION FILL

NA

Inferred at time of drilling

NA

NA

Asphalt

Base course

Silty coarse SAND with fine to coarse greywacke gravels. Brownish yellow and grey. Dry.

0.5

Sandy SILT with fine to medium graywacke gravel. Yellowish brown. Dry.

At 1.0m: White cement or plaster material

1.0

SAND with some silt and graywacke gravels. Yellowish dark brown. Moist

1.5

Coarse sand and crushed brick. Red. Moist

2.5

Silty SAND. Dark greyish blue. Wet to saturated. Coarse sand sized brick fragments.

3.0

Target depth at 3m.

3.5

4.0

4.5

5

T+T DATATEMPLATE.GDT mirb

Log Scale 1:25

BORELOG WS LOGS.GPJ 26-Feb-2015

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No:WS8
Hole Location: Refer Figure 2

SHEET 1 OF 1

PROJECT: Site 10 Ground contamination assessment	LOCATION: Site 10, Wellington Waterfront	JOB No: 85778.001
CO-ORDINATES: Refer Figure 2 for approximate location	DRILL TYPE: Window Sampler	HOLE STARTED: 24/4/14
R.L.:	DRILL METHOD: Window Sampler	HOLE FINISHED: 24/4/14
DATUM:	DRILL FLUID: N/A	DRILLED BY: Geotechnics Ltd
		LOGGED BY: SPP CHECKED: NCP

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.

FLUID LOSS | WATER | CORE RECOVERY (%) | METHOD | CASING | TESTS | SAMPLES | R.L. (m) | DEPTH (m) | GRAPHIC LOG | CLASSIFICATION SYMBOL | MOISTURE CONDITION / WEATHERING | STRENGTH/DENSITY CLASSIFICATION | SHEAR STRENGTH (kPa) 10 25 50 100 200 | COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250 | DEFECT SPACING (mm) 50 250 1000 2000

SOIL DESCRIPTION
Soil type, minor components, plasticity or particle size, colour.

ROCK DESCRIPTION
Substance: Rock type, particle size, colour, minor components.
Defects: Type, inclination, thickness, roughness, filling.

Geological unit	Depth (m)	Description
FILL		Asphalt
RECLAMATION FILL		Base course
		SAND and silt with fine to coarse greywacke gravels. Dark Brown. Dry.
	0.5	Silty SAND with fine to coarse greywacke gravels. Yellow brown. Dry. Fine to coarse gravel sized brick fragments.
	1.0	
	1.5	White cement or plaster material. Becoming moist.
	2.0	
	2.5	White cement or plaster material.
		Becoming wet.
		SILT with coarse sand and fine greywacke gravel. Blue grey and brown. Wet.
	3.0	Target depth at 3m.
	3.5	
	4.0	
	4.5	
	5	

NA

Inferred at time of drilling

NA

NA

T+T DATATEMPLATE.GDT mjrb

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No:WS9
Hole Location: Refer Figure 2

SHEET 1 OF 1

PROJECT: Site 10 Ground contamination assessment	LOCATION: Site 10, Wellington Waterfront	JOB No: 85778.001
CO-ORDINATES: Refer Figure 2 for approximate location	DRILL TYPE: Window Sampler	HOLE STARTED: 24/4/14
R.L.:	DRILL METHOD: Window Sampler	HOLE FINISHED: 24/4/14
DATUM:	DRILL FLUID: N/A	DRILLED BY: Geotechnics Ltd
		LOGGED BY: SPP CHECKED: NCP

GEOLOGICAL | ENGINEERING DESCRIPTION

GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.

FLUID LOSS | WATER | CORE RECOVERY (%) | METHOD | CASING | TESTS | SAMPLES | R.L. (m) | DEPTH (m) | GRAPHIC LOG | CLASSIFICATION SYMBOL | MOISTURE CONDITION / WEATHERING | STRENGTH/DENSITY CLASSIFICATION | SHEAR STRENGTH (kPa) 10 25 50 100 200 | COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250 | DEFECT SPACING (mm) 50 250 1000 2000

SOIL DESCRIPTION
Soil type, minor components, plasticity or particle size, colour.

ROCK DESCRIPTION
Substance: Rock type, particle size, colour, minor components.
Defects: Type, inclination, thickness, roughness, filling.

Geological unit	Depth (m)	Description
FILL		Asphalt
RECLAMATION FILL		Base course. Some fine to medium gravel sized brick fragments present.
		Silty fine SAND with medium to coarse greywacke gravel. Brown. Dry
	0.5	Coarse SAND with medium greywacke gravel. Grey. Dry
	1.0	SAND with silt and medium angular and rounded greywacke gravels. Yellow and mottled black. Dry. Coarse sand sized brick fragments.
	1.5	SAND with some medium to coarse greywacke gravel. Orange and mottled black. Moist. Becoming wet.
	2.0	Wet.
	2.5	Cobble sized angular greywacke gravel. Weathered. Reddish brown. Wet.
		Coarse SAND and silt with fine to coarse greywacke gravel. Yellow, brown and black. Saturated.
		Lost core.
	3.0	Target depth at 3.0m.

FLUID LOSS: NA
WATER: Inferred at time of drilling
CORE RECOVERY: NA
STRENGTH/DENSITY CLASSIFICATION: NA

Depth scale: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5

T+T DATATEMPLATE.GDT mjrb

TONKIN & TAYLOR LTD

BOREHOLE LOG

BOREHOLE No:WS9
Hole Location: Refer Figure 2

SHEET 1 OF 1

PROJECT: Site 10 Ground contamination assessment	LOCATION: Site 10, Wellington Waterfront	JOB No: 85778.001
CO-ORDINATES: Refer Figure 2 for approximate location	DRILL TYPE: Window Sampler	HOLE STARTED: 24/4/14
	DRILL METHOD: Window Sampler	HOLE FINISHED: 24/4/14
R.L.:		DRILLED BY: Geotechnics Ltd
DATUM:	DRILL FLUID: N/A	LOGGED BY: SPP CHECKED: NCP

GEOLOGICAL									ENGINEERING DESCRIPTION							
GEOLOGICAL UNIT, GENERIC NAME, ORIGIN, MINERAL COMPOSITION.	FLUID LOSS	WATER	CORE RECOVERY (%)	METHOD	CASING	TESTS	SAMPLES	R.L. (m)	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MOISTURE CONDITION / WEATHERING	STRENGTH/DENSITY CLASSIFICATION	SHEAR STRENGTH (kPa) 10 25 50 100 200	COMPRESSIVE STRENGTH (MPa) 1 5 20 50 100 250	DEFECT SPACING (mm) 50 250 1000 2000	SOIL DESCRIPTION: Soil type, minor components, plasticity or particle size, colour. ROCK DESCRIPTION: Substance: Rock type, particle size, colour, minor components. Defects: Type, inclination, thickness, roughness, filling.
FILL																	Asphalt
RECLAMATION FILL																	Base course. Some fine to medium gravel sized brick fragments present.
																	Silty fine SAND with medium to coarse greywacke gravel. Brown. Dry
																	Coarse SAND with medium greywacke gravel. Grey. Dry 0.5
	NA					NA			0.5								SAND with silt and medium angular and rounded greywacke gravels. Yellow and mottled black. Dry. Coarse sand sized brick fragments.
									1.0								1.0
									1.5				NA				1.5 SAND with some medium to coarse greywacke gravel. Orange and mottled black. Moist. Becoming wet.
									2.0								2.0 Wet.
									2.5								2.5 Cobble sized angular greywacke gravel. Weathered. Reddish brown. Wet.
																	Coarse SAND and silt with fine to coarse greywacke gravel. Yellow, brown and black. Saturated.
									3.0								3.0 Lost core. Target depth at 3.0m.
									3.5								3.5
									4.0								4.0
									4.5								4.5
									5								

T+T DATATEMPLATE.GDT mirb

Log Scale 1:25

BORELOG WS LOGS.GPJ 26-Feb-2015

Appendix C: Laboratory results

Table C1: Laboratory results Sites 8 and 9 (mg/kg)

ID	BH3 (Site 8)		BH5 (Site 9)		BH9 (Site 9)		WS4 (Site 9)	WS3 (Site 9)	Wellington	Commercial	Landfill
Sample depth	0.5m	2.5m	0.5m	4m	0.5m	4.5m	3.5m	2.1m	Background[2]	<1m/1-4m	Acceptance [5]
Arsenic	9.7	8.3	6.2	6.1	2.9	3.8	6.3	11	7 | 7	70 [3]	100
Cadmium	< 0.10	< 0.10	< 0.10	0.28	< 0.10	< 0.10	0.11	0.44	0.1 | 0.2	1,300 [3]	20
Chromium	24	21	15	18	17	19	19	20	16 |21	6,300 [3]	100
Copper	21	25	22	64	12	20	21	1,700	25 |25	>10,000 [3]	100
Lead	26	18	96	120	31	46	160	550	79 |180	3,300 [3]	100
Nickel	19	17	13	13	10	14	13	34	13 | 21	990 [4]	200
Zinc	81	82	100	250	56	96	120	900	105 |201	31,000 [4]	200
Acenaphthene	< 0.026	< 0.027	-	-	-	-	0.035	0.19			
Acenaphthylene	< 0.026	< 0.027	-	-	-	-	0.14	0.21			
Anthracene	< 0.026	< 0.027	-	-	-	-	0.25	0.68	0.05 | 0.05		
Benzo[a]anthracene	< 0.026	< 0.027	-	-	-	-	0.63	1.5			
Benzo[a]pyrene (BAP)	< 0.026	< 0.027	-	-	-	-	1.1	2.8	0.27 | 0.033		
Benzo[b]+[j]fluoranthene	< 0.026	< 0.027	-	-	-	-	1.8	4.8			
Benzo[g,h,i]perylene	< 0.026	< 0.027	-	-	-	-	0.63	1.7			
Benzo[k]fluoranthene	< 0.026	< 0.027	-	-	-	-	0.83	1.8			
Chrysene	< 0.026	< 0.027	-	-	-	-	1.2	2.6			
Dibenzo[a,h]anthracene	< 0.026	< 0.027	-	-	-	-	0.28	0.64			
Fluoranthene	< 0.026	< 0.027	-	-	-	-	2.1	3.6	0.55 | 0.57		
Fluorene	< 0.026	< 0.027	-	-	-	-	0.084	0.14			
Indeno(1,2,3-c,d)pyrene	< 0.026	< 0.027	-	-	-	-	1	2.5			
Naphthalene	< 0.13	< 0.14	-	-	-	-	< 0.16	0.43	0.01 | 0.02		200
Phenanthrene	< 0.026	< 0.027	-	-	-	-	1.1	2.1	0.26 | 0.35		
Pyrene	< 0.026	< 0.027	-	-	-	-	2.3	4.2	0.57 | 0.60		
Total PAH	<0.52	<0.55					13	30			
BaP(eq) [1]	<0.06	<0.07					1.8	4.5		35 [3]	

Values in bold exceed expected background values. Shaded exceed landfill acceptance guidelines. 1. BaP_{eq} is sum of PAH multiplied by toxicity equivalence factors. 2. URS. 2003. Determination of common pollutant background soil concentrations for the Wellington region, Greywacke (applies to Site 8) | maximum in Wellington Region (Site 9; unknown fill source). 3. MfE, 2011, Soil Contaminant Standards, Commercial unpaved. 4. US EPA 2013, Regional Screening Level summary table. 5. MfE. 2004. Hazardous Waste Guidelines - Landfill Waste Acceptance Criteria and Landfill Classification

Table C2: Asbestos and Metals; Site 10

Site 10	Depth (m)	Asbestos	Metals (mg/kg)							TCLP Extract (g/m^3)		
			Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Zinc	Copper	Lead
	0.6	Present	< 2	0.18	13	9	166	17	104			
WS1	1.1	-	4	< 0.10	9	7	161	11	110			
	0.6	-	8	0.23	23	38	141	15	300			
	1.5	-	3	0.42	18	19	62	9	520	<0.021		
WS2	2.9	-	5	0.18	17	29	116	14	260			
WS3	0.8	Present	7	0.51	13	24	300	12	320			
	0.85	-	5	< 0.10	22	18	23	15	77			
	1.8	-	4	0.16	18	26	145	14	118			
WS4	2.7	-	3	< 0.10	8	2	8.3	3	8			
	0.45	-	5	< 0.10	15	14	19.1	12	63			
	1.7	-	7	0.16	14	39	360	11	460			
	2.65	-	9	0.51	17	87	2,800	13	500			
WS5	2.85	-	< 2	< 0.10	< 2	2	14.8	< 2	15			
	1.5	Absent	3	0.33	10	51	290	21	125			
	1.8	-	4	0.2	19	36	260	12	200			
WS6	2.5	-	< 2	< 0.10	3	5	12.7	< 2	18			
WS7	1.25	Absent	6	0.57	14	1,260	1,020	16	2,200	7.6	2.5	0.062
	2.7	-	7	0.11	17	35	94	15	155			
	1.2	-	6	0.12	17	28	186	14	200			
WS8	1.6	Absent	6	0.14	14	28	230	16	470			
	2.5	Absent	5	0.14	12	16	43	13	123			
WS9	1.5	-	3	< 0.10	22	10	25	11	64			
	2.75	-	6	0.14	24	23	46	16	103			
Background [1]			7 | 7	0.1 | 0.2	16 | 21	25 | 25	79 | 180	13 | 21	105 | 201	-	-	-
Landfill Acceptance Criteria [2]			100	20	100	100	100	200	200	10	5	5
Commercial [3]			70	1300	>10,000	>10,000	3300	990 [4]	31000 [4]	-	-	-

Bold exceeds maximum background for Wellington Region. Shaded exceeds human health guidelines. Underline exceeds landfill screening criteria. 1. URS, 2003, Determination of Common Pollutant Background Soil Concentrations for the Wellington Region, Greywacke (underlying reclamation) | maximum for Wellington Region (unknown fill source). 2. MfE, 2003, Waste Acceptance Criteria for Class A Landfills. 3. MfE, 2011, Soil Contaminant Standards, Commercial unpaved. 4. US EPA 2013, Regional Screening Level summary table

Table C3: PAH & TPH, Site 10

Site 10	Depth (m)	PAH (mg/kg)						TPH (mg/kg)			
		Anthracene	Benzo[a]pyrene	Fluoranthene	Naphthalene	Pyrene	BAP (eq)	C_7 - C_9	C_{10} - C_{14}	C_{15} - C_{36}	Total (C_7 - C_{36})
	0.6	0.07	0.59	0.72	< 0.13	0.81	0.9	-	-	-	-
WS1	1.1	6.1	33	60	1.2	67	48	-	-	-	-
	0.6	0.29	0.84	1.52	0.12	1.6	1.3	-	-	-	-
	1.5	0.03	0.16	0.23	< 0.14	0.29	< 0.25	-	-	-	-
WS2	2.9	0.17	0.28	0.73	< 0.13	0.77	0.4	-	-	-	-
WS3	0.8	0.89	10.2	11.1	0.72	11.5	15	-	-	-	-
	0.85	< 0.03	< 0.03	< 0.03	< 0.12	0.02	< 0.07	-	-	-	-
	1.8	0.17	0.59	0.97	< 0.13	1.29	0.9	-	-	-	-
WS4	2.7	< 0.03	< 0.03	< 0.03	< 0.14	< 0.03	< 0.07	-	-	-	-
	0.45	< 0.03	< 0.03	< 0.03	< 0.12	< 0.03	< 0.07	-	-	-	-
	1.7	230	270	860	38	800	406	< 8	163	12,800	12,900
	2.65	0.15	0.41	0.99	< 0.15	0.79	0.6	-	-	-	-
WS5	2.85	0.14	0.18	0.61	< 0.14	0.51	< 0.28	-	-	-	-
	1.5	0.29	1.65	1.69	< 0.13	1.85	2.4	-	-	-	-
	1.8	5.9	10.1	16	1.61	18	15	< 8	< 20	320	320
WS6	2.5	< 0.03	< 0.03	0.03	< 0.14	0.04	< 0.07	-	-	-	-
	1.25	0.16	0.31	0.79	< 0.14	0.75	0.5	-	-	-	-
WS7	2.7	0.19	0.61	1.16	0.14	1.16	0.9	-	-	-	-
	1.2	0.08	0.36	0.59	< 0.12	0.55	0.5	-	-	-	-
WS8	2.5	< 0.03	0.05	0.07	< 0.13	0.08	< 0.097	-	-	-	-
	1.5	0.13	1.11	1.49	< 0.13	1.44	1.7	-	-	-	-
WS9	2.75	< 0.03	0.07	0.09	< 0.13	0.13	< 0.12	-	-	-	-
Background [1]		0.05 | 0.05	0.27 | 0.33	0.55 | 0.57	0.01 | 0.02	0.57 | 0.60	-	-	-	-	190
Landfill [2]		-	300	-	200	-	300	-	-	-	-
Commercial		-	-	-	270 [4]	NL [4]	35 [3]	500[5]	1,700 [5]	>20,000 [5]	>20,000 [5]

Bold exceeds maximum background for Wellington Region. Shaded exceeds human health guidelines. Underline exceeds landfill screening criteria. 1. URS, 2003, Determination of Common Pollutant Background Soil Concentrations for the Wellington Region, Greywacke (underlying reclamation) | maximum for Wellington Region (unknown fill source). 2. MfE, 2003, Waste acceptance criteria for Class A Landfills. 3. MfE 2011. Soil Contaminant Standards for commercial use. 4. MfE, 2011, Guidelines for assessing and managing petroleum hydrocarbon contaminated sites in NZ; Commercial/Industrial, sandy silt. 5. MfE. 1999. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand, industrial/commercial site use, silty/sand soil, <1m deep

Table C4: Groundwater inorganics: Site 10 (mg/L; dissolved concentrations)

Site 10	pH	Sulphate	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc
P1	7.2	750	<0.10	<0.005	<0.05	<0.05 *	<0.010	<0.05	<0.10 *
P2	7.2	3400	<0.10	<0.005	<0.05	<0.05 *	<0.010	<0.05	<0.10 *
ANZECC Guidelines [1]	-	-	0.0045	0.036	0.0906	0.008 *	0.012	0.56	0.043 *
Trade waste [2]	-	1500	-	-	-	-	-		-

Bold exceeds ANZECC guidelines. Underline exceeds trade waste guidelines. *Detection Limits could not be lowered due to matrix effects.

1. ANZECC 80% species protection for marine water. 2. WCC (2004). Trade waste bylaw Table 1 – Sulphate with good mixing.

Table C5: Groundwater organics: Site 10 (mg/L; dissolved concentrations)

Site 10	Anthracene	Benzo(a)pyrene	Fluoranthene	Naphthalene	Phenanthrene
P1	<0.00010	0.00014	0.00022	<0.0005	<0.0004
P2	<0.00010	<0.00010	<0.00010	<0.0005	<0.0004
ANZECC Guidelines: protection of 80% of marine species	0.007	0.0007	0.002	0.05	0.008

Table C6: QA/QC results: Site 10 groundwater

Site 10	pH	Sulphate	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Anthracene	Benzo(a)pyrene	Fluoranthene	Naphthalene	Phenanthrene
P1 (mg/L)	7.2	750	<0.10	<0.005	<0.05	<0.05	<0.010	<0.05	<0.10	<0.00010	0.00014	0.00022	<0.0005	<0.0004
Dup (mg/L)	7.2	740	<0.10	<0.005	<0.05	<0.05	<0.010	<0.05	<0.10	<0.00010	<0.00010	<0.00010	<0.0005	<0.0004
Relative % difference	0	1.3%	-	-	-	-	-	-	-	-	33%	75%	-	-

Table C7: QA/QC results: Site 10 inorganics in soil (mg/kg)

	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Asbestos
WS1 - 0.6m (mg/kg)	< 2	0.18	13	9	166	17	104	Present
Duplicate 1 (mg/kg)	2	0.21	10	9	196	11	144	Present
Relative % difference	0%	15%	26%	0%	17%	43%	32%	0%
WS5 - 2.65m (mg/kg)	9	0.51	17	87	2,800	13	500	-
Duplicate 2 (mg/kg)	7	0.29	18	60	1,590	11	450	-
Relative % difference	25%	55%	5.7%	37%	55%	17%	11%	-
WS6 - 1.5m (mg/kg)	3	0.33	10	51	290	21	125	Absent
Duplicate 3 (mg/kg)	< 2	0.4	8	26	240	18	88	Absent
Relative % difference	40%	19%	22%	65%	19%	15%	35%	0%
WS9 - 2.75m (mg/kg)	6	0.14	24	23	46	16	103	-
Duplicate 4 (mg/kg)	5	0.2	29	21	34	16	100	-
Relative % difference	40%	35%	19%	9.1%	30%	0%	3%	-

Table C8: QA/QC results: Site 10 organics in soil (mg/kg)

	WS1 0.6 m	Dup 1	RPD (%)	WS5 2.65 m	Dup 2	RPD (%)	WS6 1.5 m	Dup 3	RPD (%)	WS9 2.75 m	Dup 4	RPD (%)
Acenaphthene	< 0.03	< 0.03	-	0.04	< 0.04	-	< 0.03	< 0.03	-	< 0.03	< 0.03	-
Acenaphthylene	0.07	0.04	55%	0.03	< 0.04	-	0.08	0.06	29%	< 0.03	< 0.03	-
Anthracene	0.07	0.16	78%	0.15	0.11	31%	0.29	0.16	58%	< 0.03	< 0.03	-
Benzo[a]anthracene	0.41	0.81	66%	0.42	0.26	47%	1.16	0.49	81%	0.06	0.03	67%
Benzo[a]pyrene	0.59	0.99	51%	0.41	0.23	56%	1.65	0.74	76%	0.07	0.04	55%
Benzo[b]fluoranthene + Benzo[j]fluoranthene	0.66	1.15	54%	0.5	0.3	50%	1.76	0.83	72%	0.08	0.05	46%

	WS1 0.6 m	Dup 1	RPD (%)	WS5 2.65 m	Dup 2	RPD (%)	WS6 1.5 m	Dup 3	RPD (%)	WS9 2.75 m	Dup 4	RPD (%)
Benzo[g,h,i]perylene	0.54	0.91	51%	0.28	0.17	49%	1.31	0.61	73%	0.09	0.07	25%
Benzo[k]fluoranthene	0.27	0.47	54%	0.2	0.12	50%	0.7	0.34	69%	0.03	< 0.03	-
Chrysene	0.41	0.72	55%	0.39	0.24	48%	1.03	0.41	86%	0.06	0.03	67%
Dibenzo[a,h]anthracene	0.09	0.2	76%	0.07	0.05	33%	0.3	0.12	86%	< 0.03	< 0.03	-
Fluoranthene	0.72	1.47	68%	0.99	0.58	52%	1.69	0.65	89%	0.09	0.05	57%
Fluorene	< 0.03	< 0.03	-	0.07	0.03	80%	0.03	0.05	50%	< 0.03	< 0.03	-
Indeno(1,2,3-c,d)pyrene	0.55	0.69	23%	0.22	0.13	51%	1.07	0.46	80%	0.04	0.03	29%
Naphthalene	< 0.13	< 0.13	-	< 0.15	< 0.16	-	< 0.13	< 0.14	-	< 0.13	< 0.12	-
Phenanthrene	0.21	0.51	83%	0.76	0.43	55%	0.36	0.32	12%	0.05	0.03	50%
Pyrene	0.81	1.38	52%	0.79	0.46	53%	1.85	0.78	81%	0.13	0.08	48%

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ANALYSIS REPORT

Client:	Tonkin & Taylor	**Lab No:**	1267739	SPv2
Contact:	Sharon Parackal	**Date Registered:**	29-Apr-2014	
	C/- Tonkin & Taylor	**Date Reported:**	29-May-2014	
	PO Box 2083	**Quote No:**		
	WELLINGTON 6140	**Order No:**	85788.001	
		Client Reference:	85788.001	
		Submitted By:	Sharon Parackal	

Amended Report

This report replaces an earlier report issued on the 08 May 2014 at 4:10 pm
TCLP testing has been added to 2 samples as requested by the client.

Sample Type: Soil

Sample Name:		WS1 - 0.6m 23-Apr-2014 2:10 pm	WS1 - 1.1m 23-Apr-2014 2:25 pm	WS2 - 0.6m 23-Apr-2014 3:00 pm	WS2 - 1.5m 23-Apr-2014 3:10 pm	WS2 - 2.9m 23-Apr-2014 3:20 pm
Lab Number:		1267739.2	1267739.3	1267739.4	1267739.6	1267739.8
Individual Tests						
Dry Matter	g/100g as rcvd	88	89	87	80	87
TCLP Weight of Sample Taken	g	-	-	-	100	-
TCLP Initial Sample pH	pH Units	-	-	-	7.5	-
TCLP Acid Adjusted Sample pH	pH Units	-	-	-	1.5	-
TCLP Extractant Type*		-	-	-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-
TCLP Extraction Fluid pH	pH Units	-	-	-	4.9	-
TCLP Post Extraction Sample pH	pH Units	-	-	-	5.0	-
Qualitative Identification of Asbestos		See attached report	-	-	-	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	< 2	4	8	3	5
Total Recoverable Cadmium	mg/kg dry wt	0.18	< 0.10	0.23	0.42	0.18
Total Recoverable Chromium	mg/kg dry wt	13	9	23	18	17
Total Recoverable Copper	mg/kg dry wt	9	7	38	19	29
Total Recoverable Lead	mg/kg dry wt	166	161	141	62	116
Total Recoverable Nickel	mg/kg dry wt	17	11	15	9	14
Total Recoverable Zinc	mg/kg dry wt	104	110	300	520	260
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	0.21	0.05	< 0.03	0.03
Acenaphthylene	mg/kg dry wt	0.07	5.9	0.11	< 0.03	0.03
Anthracene	mg/kg dry wt	0.07	6.1	0.29	0.03	0.17
Benzo[a]anthracene	mg/kg dry wt	0.41	28	0.79	0.14	0.30
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.59	33	0.84	0.16	0.28
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.66	34	1.01	0.17	0.30
Benzo[g,h,i]perylene	mg/kg dry wt	0.54	30	0.61	0.14	0.22
Benzo[k]fluoranthene	mg/kg dry wt	0.27	11.8	0.41	0.08	0.13
Chrysene	mg/kg dry wt	0.41	20	0.65	0.13	0.26
Dibenzo[a,h]anthracene	mg/kg dry wt	0.09	3.4	0.11	< 0.03	0.03
Fluoranthene	mg/kg dry wt	0.72	60	1.52	0.23	0.73
Fluorene	mg/kg dry wt	< 0.03	0.57	0.11	< 0.03	0.05
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.55	30	0.66	0.13	0.22
Naphthalene	mg/kg dry wt	< 0.13	1.20	0.12	< 0.14	< 0.13
Phenanthrene	mg/kg dry wt	0.21	27	0.79	0.09	0.70

823 365 laboratory

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Soil						
Sample Name:		WS1 - 0.6m 23-Apr-2014 2:10 pm	WS1 - 1.1m 23-Apr-2014 2:25 pm	WS2 - 0.6m 23-Apr-2014 3:00 pm	WS2 - 1.5m 23-Apr-2014 3:10 pm	WS2 - 2.9m 23-Apr-2014 3:20 pm
Lab Number:		1267739.2	1267739.3	1267739.4	1267739.6	1267739.8
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Pyrene	mg/kg dry wt	0.81	67	1.60	0.29	0.77

Sample Name:		WS3 - 0.8m 24-Apr-2014 9:35 am	WS4 - 0.85m 24-Apr-2014 10:10 am	WS4 - 1.8m 24-Apr-2014 10:30 am	WS4 - 2.7m 24-Apr-2014 10:30 am	WS5 - 0.45m 24-Apr-2014 12:15 pm
Lab Number:		1267739.9	1267739.11	1267739.13	1267739.14	1267739.15
Individual Tests						
Dry Matter	g/100g as rcvd	88	96	86	81	97
Qualitative Identification of Asbestos		See attached report	-	-	-	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	7	5	4	3	5
Total Recoverable Cadmium	mg/kg dry wt	0.51	< 0.10	0.16	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	13	22	18	8	15
Total Recoverable Copper	mg/kg dry wt	24	18	26	2	14
Total Recoverable Lead	mg/kg dry wt	300	23	145	8.3	19.1
Total Recoverable Nickel	mg/kg dry wt	12	15	14	3	12
Total Recoverable Zinc	mg/kg dry wt	320	77	118	8	63
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	0.07	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	mg/kg dry wt	0.75	< 0.03	0.06	< 0.03	< 0.03
Anthracene	mg/kg dry wt	0.89	< 0.03	0.17	< 0.03	< 0.03
Benzo[a]anthracene	mg/kg dry wt	7.9	< 0.03	0.57	< 0.03	< 0.03
Benzo[a]pyrene (BAP)	mg/kg dry wt	10.2	< 0.03	0.59	< 0.03	< 0.03
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	13.3	< 0.03	0.66	< 0.03	< 0.03
Benzo[g,h,i]perylene	mg/kg dry wt	9.0	< 0.03	0.43	< 0.03	< 0.03
Benzo[k]fluoranthene	mg/kg dry wt	4.2	< 0.03	0.28	< 0.03	< 0.03
Chrysene	mg/kg dry wt	6.5	< 0.03	0.46	< 0.03	< 0.03
Dibenzo[a,h]anthracene	mg/kg dry wt	1.45	< 0.03	0.07	< 0.03	< 0.03
Fluoranthene	mg/kg dry wt	11.1	< 0.03	0.97	< 0.03	< 0.03
Fluorene	mg/kg dry wt	0.08	< 0.03	0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	9.0	< 0.03	0.46	< 0.03	< 0.03
Naphthalene	mg/kg dry wt	0.72	< 0.12	< 0.13	< 0.14	< 0.12
Phenanthrene	mg/kg dry wt	2.7	< 0.03	0.26	< 0.03	< 0.03
Pyrene	mg/kg dry wt	11.5	0.02	1.29	< 0.03	< 0.03

Sample Name:		WS5 - 2.85m 24-Apr-2014 12:40 pm	WS5 - 2.65m 24-Apr-2014 12:30 pm	WS5 - 1.7m 24-Apr-2014 12:25 pm	WS6 - 1.5m 24-Apr-2014 11:40 am	WS6 - 1.8m 24-Apr-2014 11:45 am
Lab Number:		1267739.17	1267739.18	1267739.19	1267739.22	1267739.23
Individual Tests						
Dry Matter	g/100g as rcvd	82	73	90	82	85
Qualitative Identification of Asbestos		-	-	-	See attached report	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	< 2	9	7	3	4
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.51	0.16	0.33	0.20
Total Recoverable Chromium	mg/kg dry wt	< 2	17	14	10	19
Total Recoverable Copper	mg/kg dry wt	2	87	39	51	36
Total Recoverable Lead	mg/kg dry wt	14.8	2,800	360	290	260
Total Recoverable Nickel	mg/kg dry wt	< 2	13	11	21	12
Total Recoverable Zinc	mg/kg dry wt	15	500	460	125	200
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	0.04	0.04	78	< 0.03	0.48
Acenaphthylene	mg/kg dry wt	0.03	0.03	76	0.08	0.82
Anthracene	mg/kg dry wt	0.14	0.15	230	0.29	5.9

Sample Type: Soil						
Sample Name:		WS5 - 2.85m 24-Apr-2014 12:40 pm	WS5 - 2.65m 24-Apr-2014 12:30 pm	WS5 - 1.7m 24-Apr-2014 12:25 pm	WS6 - 1.5m 24-Apr-2014 11:40 am	WS6 - 1.8m 24-Apr-2014 11:45 am
Lab Number:		1267739.17	1267739.18	1267739.19	1267739.22	1267739.23
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Benzo[a]anthracene	mg/kg dry wt	0.22	0.42	300	1.16	9.3
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.18	0.41	270	1.65	10.1
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.22	0.50	290	1.76	10.9
Benzo[g,h,i]perylene	mg/kg dry wt	0.13	0.28	159	1.31	7.7
Benzo[k]fluoranthene	mg/kg dry wt	0.09	0.20	122	0.70	4.7
Chrysene	mg/kg dry wt	0.20	0.39	240	1.03	9.4
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	0.07	34	0.30	1.89
Fluoranthene	mg/kg dry wt	0.61	0.99	860	1.69	16
Fluorene	mg/kg dry wt	0.05	0.07	101	0.03	0.21
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.10	0.22	200	1.07	6.4
Naphthalene	mg/kg dry wt	< 0.14	< 0.15	38	< 0.13	1.61
Phenanthrene	mg/kg dry wt	0.58	0.76	1,170	0.36	1.74
Pyrene	mg/kg dry wt	0.51	0.79	800	1.85	18
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	< 8	-	< 8
C10 - C14	mg/kg dry wt	-	-	163	-	< 20
C15 - C36	mg/kg dry wt	-	-	12,800	-	320
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	12,900	-	320

Sample Name:		WS6 - 2.5m 24-Apr-2014 11:55 am	WS7 - 1.25m 24-Apr-2014 2:20 pm	WS7 - 2.7m 24-Apr-2014 2:35 pm	WS8 - 1.2m 24-Apr-2014 3:15 pm	WS8 - 1.6m 24-Apr-2014 3:20 pm
Lab Number:		1267739.24	1267739.26	1267739.28	1267739.30	1267739.31
Individual Tests						
Dry Matter	g/100g as rcvd	83	83	85	92	-
TCLP Weight of Sample Taken	g	-	45 #1	-	-	-
TCLP Initial Sample pH	pH Units	-	9.2	-	-	-
TCLP Acid Adjusted Sample pH	pH Units	-	1.7	-	-	-
TCLP Extractant Type*		-	NaOH/Acetic acid at pH 4.93 +/- 0.05	-	-	-
TCLP Extraction Fluid pH	pH Units	-	4.9	-	-	-
TCLP Post Extraction Sample pH	pH Units	-	6.4	-	-	-
Qualitative Identification of Asbestos		-	-	-	-	See attached report
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	< 2	6	7	6	6
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.57	0.11	0.12	0.14
Total Recoverable Chromium	mg/kg dry wt	3	14	17	17	14
Total Recoverable Copper	mg/kg dry wt	5	1,260	35	28	28
Total Recoverable Lead	mg/kg dry wt	12.7	1,020	94	186	230
Total Recoverable Nickel	mg/kg dry wt	< 2	16	15	14	16
Total Recoverable Zinc	mg/kg dry wt	18	2,200	155	200	470
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	0.05	0.04	0.02	-
Acenaphthylene	mg/kg dry wt	< 0.03	0.05	0.03	< 0.03	-
Anthracene	mg/kg dry wt	< 0.03	0.16	0.19	0.08	-
Benzo[a]anthracene	mg/kg dry wt	< 0.03	0.32	0.52	0.31	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.03	0.31	0.61	0.36	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.03	0.38	0.70	0.43	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.03	0.23	0.48	0.27	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.03	0.16	0.27	0.17	-
Chrysene	mg/kg dry wt	< 0.03	0.27	0.44	0.29	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	0.06	0.10	0.06	-
Fluoranthene	mg/kg dry wt	0.03	0.79	1.16	0.59	-

Sample Type: Soil						
Sample Name:		WS6 - 2.5m 24-Apr-2014 11:55 am	WS7 - 1.25m 24-Apr-2014 2:20 pm	WS7 - 2.7m 24-Apr-2014 2:35 pm	WS8 - 1.2m 24-Apr-2014 3:15 pm	WS8 - 1.6m 24-Apr-2014 3:20 pm
Lab Number:		1267739.24	1267739.26	1267739.28	1267739.30	1267739.31
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Fluorene	mg/kg dry wt	< 0.03	0.07	0.05	< 0.03	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.03	0.18	0.37	0.21	-
Naphthalene	mg/kg dry wt	< 0.14	< 0.14	0.14	< 0.12	-
Phenanthrene	mg/kg dry wt	< 0.03	0.91	0.57	0.30	-
Pyrene	mg/kg dry wt	0.04	0.75	1.16	0.55	-

Sample Name:		WS8 - 2.5m 24-Apr-2014 3:25 pm	WS9 - 1.5m 24-Apr-2014 4:00 pm	WS9 - 2.75m 24-Apr-2014 4:10 pm	Duplicate 1 24-Apr-2014	Duplicate 2 24-Apr-2014
Lab Number:		1267739.32	1267739.34	1267739.35	1267739.36	1267739.37
Individual Tests						
Dry Matter	g/100g as rcvd	86	88	87	88	74
Qualitative Identification of Asbestos		See attached report	-	-	See attached report	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	5	3	6	2	7
Total Recoverable Cadmium	mg/kg dry wt	0.14	< 0.10	0.14	0.21	0.29
Total Recoverable Chromium	mg/kg dry wt	12	22	24	10	18
Total Recoverable Copper	mg/kg dry wt	16	10	23	9	60
Total Recoverable Lead	mg/kg dry wt	43	25	46	196	1,590
Total Recoverable Nickel	mg/kg dry wt	13	11	16	11	11
Total Recoverable Zinc	mg/kg dry wt	123	64	103	144	450
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.04
Acenaphthylene	mg/kg dry wt	< 0.03	0.06	< 0.03	0.04	< 0.04
Anthracene	mg/kg dry wt	< 0.03	0.13	< 0.03	0.16	0.11
Benzo[a]anthracene	mg/kg dry wt	0.04	1.02	0.06	0.81	0.26
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.05	1.11	0.07	0.99	0.23
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.06	1.23	0.08	1.15	0.30
Benzo[g,h,i]perylene	mg/kg dry wt	0.04	0.63	0.09	0.91	0.17
Benzo[k]fluoranthene	mg/kg dry wt	0.03	0.53	0.03	0.47	0.12
Chrysene	mg/kg dry wt	0.04	0.94	0.06	0.72	0.24
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	0.20	< 0.03	0.20	0.05
Fluoranthene	mg/kg dry wt	0.07	1.49	0.09	1.47	0.58
Fluorene	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	0.03
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.03	0.57	0.04	0.69	0.13
Naphthalene	mg/kg dry wt	< 0.13	< 0.13	< 0.13	< 0.13	< 0.16
Phenanthrene	mg/kg dry wt	0.03	0.29	0.05	0.51	0.43
Pyrene	mg/kg dry wt	0.08	1.44	0.13	1.38	0.46

Sample Name:		Duplicate 3 24-Apr-2014	Duplicate 4 24-Apr-2014			
Lab Number:		1267739.38	1267739.39			
Individual Tests						
Dry Matter	g/100g as rcvd	81	89	-	-	-
Qualitative Identification of Asbestos		See attached report	-	-	-	-
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	< 2	5	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.40	0.20	-	-	-
Total Recoverable Chromium	mg/kg dry wt	8	29	-	-	-
Total Recoverable Copper	mg/kg dry wt	26	21	-	-	-
Total Recoverable Lead	mg/kg dry wt	240	34	-	-	-
Total Recoverable Nickel	mg/kg dry wt	18	16	-	-	-
Total Recoverable Zinc	mg/kg dry wt	88	100	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						

Sample Type: Soil							
Sample Name:		Duplicate 3 24-Apr-2014	Duplicate 4 24-Apr-2014			
Lab Number:		1267739.38	1267739.39			
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Acenaphthene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Acenaphthylene	mg/kg dry wt	0.06	< 0.03	-	-	-
Anthracene	mg/kg dry wt	0.16	< 0.03	-	-	-
Benzo[a]anthracene	mg/kg dry wt	0.49	0.03	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.74	0.04	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.83	0.05	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.61	0.07	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	0.34	< 0.03	-	-	-
Chrysene	mg/kg dry wt	0.41	0.03	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	0.12	< 0.03	-	-	-
Fluoranthene	mg/kg dry wt	0.65	0.05	-	-	-
Fluorene	mg/kg dry wt	0.05	< 0.03	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.46	0.03	-	-	-
Naphthalene	mg/kg dry wt	< 0.14	< 0.12	-	-	-
Phenanthrene	mg/kg dry wt	0.32	0.03	-	-	-
Pyrene	mg/kg dry wt	0.78	0.08	-	-	-

Sample Type: Miscellaneous						
Sample Name:		WS3 - 0.5m Brick 24-Apr-2014				
Lab Number:		1267739.40				
Individual Tests						
Qualitative Identification of Asbestos		See attached report	-	-	-	-

Sample Type: Aqueous						
Sample Name:		WS2 - 1.5m [TCLP extract]	WS7 - 1.25m [TCLP extract			
Lab Number:		1267739.41	1267739.42			
Individual Tests						
Total Copper	g/m^3	-	2.5	-	-	-
Total Lead	g/m^3	-	0.062	-	-	-
Total Zinc	g/m^3	< 0.021	7.6	-	-	-

Analyst's Comments

#1 It should be noted that the TCLP extraction has been scaled down because of small sample size. The ratio of solid to extractant has been kept constant (1:20).

Appendix No.1 - Dowdell & Associates Report

Appendix No.2 - Total Petroleum Hydrocarbon Chromatograms

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	2-4, 6, 8-9, 11, 13-15, 17-19, 22-24, 26, 28, 30-32, 34-39
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	2-4, 6, 8-9, 11, 13-15, 17-19, 22-24, 26, 28, 30, 32, 34-39

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	2-4, 6, 8-9, 11, 13-15, 17-19, 22-24, 26, 28, 30-32, 34-39
Composite Environmental Solid Samples*	Individual sample fractions mixed together to form a composite fraction.	-	18, 37
Qualitative Identification of Asbestos	150-200g, sealed plastic bag. Polarised Light Microscopy and dispersion staining techniques. Subcontracted to Dowdell & Associates, 4 Cain Road, Penrose, Auckland. AS 4964 (2004) - Method for the Qualitative / Semi-Quantitative Identification of Asbestos in Bulk Samples.	-	2, 9, 22, 31-32, 36, 38, 40
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines [KBIs:5786,2805,10734;2695]	0.010 - 60 mg/kg dry wt	19, 23
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	0.10 - 4 mg/kg dry wt	2-4, 6, 8-9, 11, 13-15, 17-19, 22-24, 26, 28, 30-32, 34-39
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample. [KBIs:5786,2805,2695]	0.010 - 0.05 mg/kg dry wt	2-4, 6, 8-9, 11, 13-15, 17-18, 22, 24, 26, 28, 30, 32, 34-39
TCLP Profile*	Extraction at 30 +/- 2 rpm for 18 +/- 2 hours, (Ratio 1g sample : 20g extraction fluid). US EPA 1311	-	6, 26
TCLP Profile			
TCLP Weight of Sample Taken	Gravimetric. US EPA 1311.	0.1 g	6, 26
TCLP Initial Sample pH	pH meter. US EPA 1311.	0.1 pH Units	6, 26
TCLP Acid Adjusted Sample pH	pH meter. US EPA 1311.	0.1 pH Units	6, 26
TCLP Extractant Type*	US EPA 1311.	-	6, 26
TCLP Extraction Fluid pH	pH meter. US EPA 1311.	0.1 pH Units	6, 26
TCLP Post Extraction Sample pH	pH meter. US EPA 1311.	0.1 pH Units	6, 26

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Total Digestion of Extracted Samples*	Nitric acid digestion. APHA 3030 E 22nd ed. 2012 (modified).	-	41-42
Total Copper	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22nd ed. 2012.	0.011 g/m^3	42
Total Lead	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22nd ed. 2012.	0.0021 g/m^3	42
Total Zinc	Nitric acid digestion, ICP-MS, screen level. APHA 3125 B 22nd ed. 2012.	0.021 g/m^3	41-42

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

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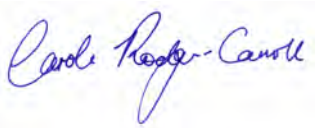


Carole Rodgers-Carroll BA, NZCS
Client Services Manager - Environmental Division

DOWDELL & ASSOCIATES LTD

OCCUPATIONAL HEALTH ANALYSTS & CONSULTANTS

4 Cain Rd, Penrose, PO Box 112-017 Auckland 1642, Phone (09) 5260-246. Fax (09) 5795-389.

5th May 2014

Hill Laboratories
Private Bag 3205
Waikato Mail Centre
Hamilton 3240

Dear Sir/Madam

Re: **Bulk Fibre Analysis**

Sampled by	: Client
Date received	: 5th May 2014
Laboratory no.	: 55358
Description	: 9x soil sample(s)
Reference	: 1267739
Purchase order	: 138209
Method	: AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples

We examined the following sample(s) using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including Dispersion Staining Techniques. The following result(s) relate(s) to the sample(s) as received**:**

Reg no: J1405 **Labelled as:** 2
Sample size: 51g
Result: Chrysotile *(White Asbestos)* detected (loose bundles).

Reg no: J1406 **Labelled as:** 9
Sample size: 50g
Result: Chrysotile *(White Asbestos)* detected (loose bundles + large clumps).

Reg no: J1407 **Labelled as:** 22
Sample size: 38g
Result: Asbestos **NOT** detected.

Reg no: J1408 **Labelled as:** 26
Sample size: 50g
Result: Asbestos **NOT** detected.

Reg no: J1409 **Labelled as:** 31
Sample size: 50g
Result: Asbestos **NOT** detected.

Reg no: J1410 **Labelled as:** 32
Sample size: 49g
Result: Asbestos **NOT** detected.

Reg no: J1411 **Labelled as:** 36
Sample size: 50g
Result: Chrysotile *(White Asbestos)* detected (loose fibre bundles).

Reg no: J1412 **Labelled as:** 38
Sample size: 29g
Result: Asbestos **NOT** detected.

Reg no: J1413 **Labelled as:** 40
Sample size: 45g
Result: Asbestos **NOT** detected.

Yours faithfully
DOWDELL & ASSOCIATES LTD

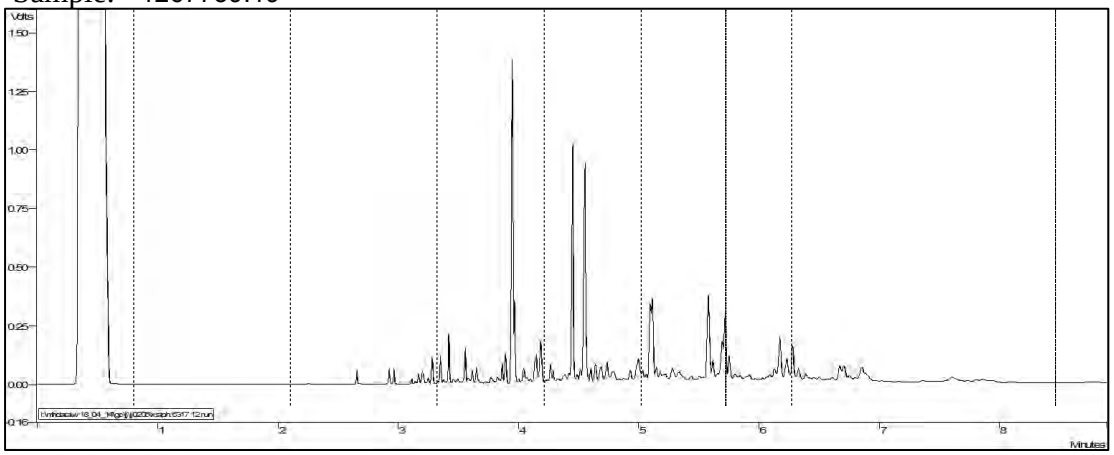
E.Sheldon BSc (Hons)
Analyst

Imtiaz Damani MSc
Analyst

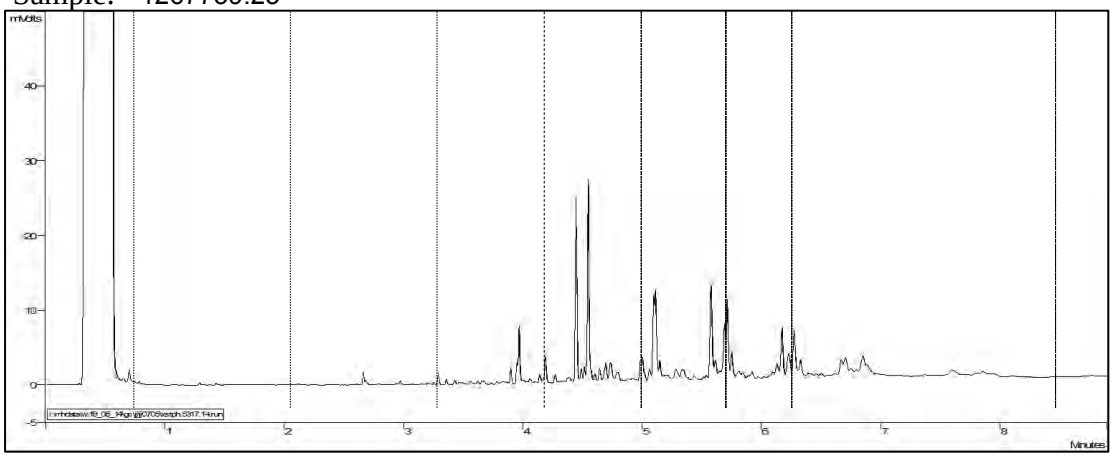
Q.E. Dowdell NZCS MNZMS
Director

NOTE: This report must not be altered, or reproduced except in full.

Sample: 1267739.19



Sample: 1267739.23



C7 C10 C15 C20 C25 C30 C34 C44

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ANALYSIS REPORT

Client:	Tonkin & Taylor	**Lab No:**	1274242	SPv1
Contact:	Sharon Parackal	**Date Registered:**	13-May-2014	
	C/- Tonkin & Taylor	**Date Reported:**	20-May-2014	
	PO Box 2083	**Quote No:**		
	WELLINGTON 6140	**Order No:**	85778.001	
		Client Reference:	85778.001	
		Submitted By:	Sharon Parackal	

Sample Type: Aqueous

Sample Name:		P1 06-May-2014 3:20 pm	WS2-P2 12-May-2014 2:15 pm	Dup		
Lab Number:		1274242.1	1274242.2	1274242.3		
Individual Tests						
pH	pH Units	7.2	7.7	7.2	-	-
Sulphate	g/m³	750	3,400	740	-	-
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn						
Dissolved Arsenic	g/m³	< 0.10	< 0.10	< 0.10	-	-
Dissolved Cadmium	g/m³	< 0.005	< 0.005	< 0.005	-	-
Dissolved Chromium	g/m³	< 0.05	< 0.05	< 0.05	-	-
Dissolved Copper	g/m³	< 0.05	< 0.05	< 0.05	-	-
Dissolved Lead	g/m³	< 0.010	< 0.010	< 0.010	-	-
Dissolved Nickel	g/m³	< 0.05	< 0.05	< 0.05	-	-
Dissolved Zinc	g/m³	< 0.10	< 0.10	< 0.10	-	-
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq						
Acenaphthene	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Acenaphthylene	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Anthracene	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Benzo[a]anthracene	g/m³	0.00014	< 0.00010	< 0.00010	-	-
Benzo[a]pyrene (BAP)	g/m³	0.00014	< 0.00010	< 0.00010	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	g/m³	0.00024	< 0.00010	< 0.00010	-	-
Benzo[g,h,i]perylene	g/m³	0.00011	< 0.00010	< 0.00010	-	-
Benzo[k]fluoranthene	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Chrysene	g/m³	0.00010	< 0.00010	< 0.00010	-	-
Dibenzo[a,h]anthracene	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Fluoranthene	g/m³	0.00022	< 0.00010	< 0.00010	-	-
Fluorene	g/m³	< 0.0002	< 0.0002	< 0.0002	-	-
Indeno(1,2,3-c,d)pyrene	g/m³	< 0.00010	< 0.00010	< 0.00010	-	-
Naphthalene	g/m³	< 0.0005	< 0.0005	< 0.0005	-	-
Phenanthrene	g/m³	< 0.0004	< 0.0004	< 0.0004	-	-
Pyrene	g/m³	0.0003	< 0.0002	< 0.0002	-	-

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Aqueous

Test	Method Description	Default Detection Limit	Sample No
Heavy metals, dissolved, trace As,Cd,Cr,Cu,Ni,Pb,Zn	0.45µm filtration, ICP-MS, trace level. APHA 3125 B 21st ed. 2005.	0.00005 - 0.0010 g/m³	1-3

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised.
The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked *, which are not accredited.

Sample Type: Aqueous			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Polycyclic Aromatic Hydrocarbons Screening in Water, By Liq/Liq	Liquid / liquid extraction, SPE (if required), GC-MS SIM analysis [KBIs:4736,2695]	0.00010 - 0.0005 g/m^3	1-3
Filtration, Unpreserved	Sample filtration through 0.45µm membrane filter.	-	1-3
pH	pH meter. APHA 4500-H^+ B 22nd ed. 2012.	0.1 pH Units	1-3
Filtration for dissolved metals analysis	Sample filtration through 0.45µm membrane filter and preservation with nitric acid. APHA 3030 B 22nd ed. 2012.	-	1-3
Sulphate	Filtered sample. Ion Chromatography. APHA 4110 B 22nd ed. 2012.	0.5 g/m^3	1-3

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This report must not be reproduced, except in full, without the written consent of the signatory.

Peter Robinson MSc (Hons), PhD, FNZIC
Client Services Manager - Environmental Division

Appendix D: Draft Contamination Site Management Plan

REPORT

Willis Bond Ltd

Sites 8, 9, and 10
DRAFT Contamination Site Management Plan

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Report prepared for:

Willis Bond Ltd

Report prepared by:

Tonkin & Taylor Ltd

Distribution:

Willis Bond Ltd	2 copies
RCP	1 copy
Tonkin & Taylor Ltd (FILE)	1 copy

February 2015

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Document control

Report Date	Version	Prepared by:
September 2014	1	Penny Kneebone

Report certified by a suitably qualified and experienced practitioner as prescribed under the NES Soil.

.....

Penny Kneebone
Principal Environmental Scientist

Authorised for Tonkin & Taylor Ltd by:

.....

Stuart Palmer
Project Director

pek

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1 Introduction

Tonkin & Taylor Ltd (T&T) has been commissioned by Willis Bond Ltd to prepare a Contamination Site Management Plan for earthworks in contaminated soil at Site 10, 10 Waterloo Quay Wellington (Site 10) and the other open space areas shown within the red line in Figure 1 below (referred to collectively as Landscape Areas in this Plan).

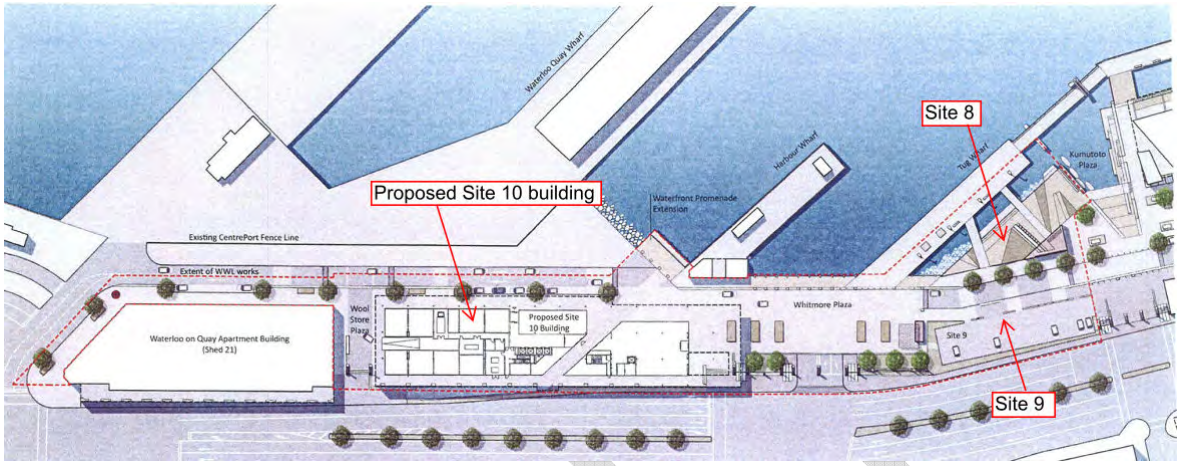

Figure 1: proposed development master plan (Source: Isthmus)

This Contamination Site Management Plan (CSMP) provides Willis Bond and their Contractors with procedures that must be implemented during earthworks in contaminated soil.

1.1 Background

WBL proposes to develop Site 10 by constructing a multistorey building. The proposed Site 10 works are likely to comprise of basement excavations to 3.7 m depth, and possibly deeper foundation excavations. The basement excavation works will generate groundwater which will require disposal offsite (dewatering).

Wellington Waterfront Limited proposes to carry out earthworks and landscaping works within the Landscape Areas (with the exception of the Site 9 space which will not be developed through the Open Space works and will remain as a carpark) to create public open space areas. We understand approximately 1,000 m^3 of cut material may need to be removed from Site 8 (if it is geotechnically unsuitable), with cuts to a maximum of 1 m deep. No significant cut is proposed elsewhere in the public space areas, however it is expected that limited soil disturbance will be required for surface preparation. The public space areas shall be finished with either paving underlaid by imported fill or imported clean landscaping fill materials.

The development area is on reclaimed land, and historical structures were formerly present on some parts of the site. Site investigations have identified some of the material used for the reclamation is contaminated, and asbestos is present in soil on part of Site 10.

This CSMP has been prepared to document excavation procedures, monitoring, management and health and safety requirements during earthworks in contaminated soil at Site 10 and the Landscape Areas.

1.2 Scope of report

It sets out procedures for:

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- establishing Site 10 and the Landscape Areas and associated management structures/systems;
- handling and managing contaminated materials, including soil that contains asbestos;
- health and safety controls to augment the Contractor health and safety plans;
- monitoring of the effectiveness of mitigation measures implemented during the works; and
- validation of the site following removal of material containing asbestos.

1.3 Regulatory compliance

Resource consents are required from Wellington City Council (WCC) and Greater Wellington Regional Council (GWRC). It is anticipated that a CSMP would be a requirement of these consents. This draft CSMP has been prepared to support the application for consents, and would need to be updated to reflect any additional requirements of the resource consents.

This CSMP has been prepared in general accordance with Ministry for the Environment Contamination Land Management Guidelines No.1 – Guidelines for Reporting on Contaminated Sites in New Zealand. Sampling procedures provided in the plan generally comply with the MfE Contamination Land Management Guidelines No.5 – Site Investigation and Analysis of Soils.

The plan is also prepared in general accordance with the soil disturbance related controls referred to in the National Environmental Standards for Contaminants in Soil to Protect Human Health Regulations (NES Soil). The persons preparing and certifying this CSMP are suitably qualified and experienced practitioners as required by the NES Soil and defined in the NES Soil Users' Guide.

1.4 Applicability

This CSMP provides a framework for managing contamination hazards on site by identifying potential hazards and suggesting mitigation measures relevant to site conditions at the time of writing. This CSMP provides information and recommendations to augment this process but is not intended to relieve the controller of the place of work of either their responsibility for the health and safety of their workers, contractors and the public, or their responsibility for protection of the environment.

The provisions of this CSMP are mandatory for all persons (employees, contractor and sub-contractors) who will be involved in undertaking any of the proposed works.

It is recommended that any persons undertaking controlled activities develop a site-specific health and safety plan (SSSP) to complement this CSMP and to address other health and safety requirements that may be applicable to their particular works. This document should also be modified to address any specific health, safety or environmental issues that may arise during the works.

From time to time, statutory requirements, site ownership or occupation, operating procedures or site conditions may vary and will require that this plan be amended or updated.

The plan has been prepared on the basis of information available at the date of preparation, principally data from samples collected by Tonkin & Taylor and based on our observations during investigations in 2009 (Sites 8 and 9) and 2014 (Site 10). The nature and continuity of subsoil away from sample locations are inferred and it must be appreciated that actual conditions could vary from the assumed model.

This report has been prepared for the benefit of Willis Bond Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without

our prior review and agreement. This draft CSMP has been prepared in accordance with our proposal of 8 April 2014.

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2 Roles and Responsibilities

2.1 Distribution

A copy of the CSMP shall be kept onsite at all times. It is Willis Bond's responsibility to distribute the plan to their Contractor, the person holding a certificate of competence for restricted work involving asbestos under the Health and Safety in Employment (Asbestos) Regulations 1998 (approved asbestos remover), Worksafe, WCC, and GWRC.

It is Willis Bond's responsibility for distribution of the CSMP to any other sub-contractors or parties carrying out the remedial works.

2.2 Review and update

Any variations to the CSMP proposed by the Contractor shall be approved by Willis Bond, WCC and GWRC prior to works commencing, or the variation being implemented if works have already commenced.

It is the responsibility of Willis Bond to distribute any changes to the plan to the relevant parties involved in the remedial works and update the site copy.

2.3 Implementation

Responsibility for the implementation of the CSMP lies with Willis Bond's appointed Contractor.

A contaminated land specialist (i.e., a "suitably qualified and experienced practitioner" as required by the NES Soil regulations) will be required to carry out inspections and provide advice as required during the works (refer Section 5).

The approved asbestos remover must supervise all asbestos management works on Site 10.

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2.4 Personnel contact details

Contact details for key staff involved in the works are provided in Table 1. These contact details shall also be provided on the site hazard board as per Section 5.2 and 8.

Table 1: Personnel contact details

Person (Organisation)	Role	Contact number
TBC (Willis Bond)	Project Director	
TBC (TBC)	Project Manager	
TBC (TBC)	Contractor Site Manager	
TBC (TBC)	Operations Manager Managing site and project Certificate of Competence holder (Asbestos Regulations (1998))	
TBC (TBC)	Air monitoring	
TBC (TBC)	Contaminated Land Specialist -Site observation and sampling	

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3 Site Condition

The condition of the site described in the following sections has been compiled based on investigations in 2009 (on Sites 8 and 9) and 2014 (Site 10).

3.1 Site identification

The outline of the proposed Landscape Area is shown in the development plan (Figure 1).

The proposed Site 10 basement excavation is roughly rectangular in shape and has an area of approximately 0.25 ha. (as can also be seek on Figure 1)

3.2 Site layout

The Landscape Areas are currently surfaced with asphalt and used as public open space, parking and access roads.

Site 10 is currently used as a car park and motor home park. It is essentially flat and entirely paved. An amenities block is located on the eastern boundary of Site 10. Access is via a paved road immediately to the south of the amenities block.

3.3 Contamination

Contamination has been characterised at Site 10. This CSMP includes detailed requirements for excavation, management and disposal of soil from the Site 10 basement.

Only limited testing has previously been done at Sites 8 and 9, and no testing has been completed specifically in other public space areas (ie, Whitmore Plaza). When the location (area and depth) of earthworks for the Landscape Areas are confirmed, further testing will be carried out in these areas to characterise soil and assess appropriate soil management measures.

Site 8 was reclaimed in the 1970s using quarried fill. Geotechnical investigations in 2009 indicated relatively consistent material across Site 8. Limited laboratory testing indicated the fill is clean, however due to the limited scope of testing in 2009, additional testing is required to confirm this.

Site 9 and Site 10 were reclaimed in the early 1900s. Investigation in Site 9 (2009) and Site 10 (2014) indicate variable fill materials, with variable levels of contamination (metals, polycyclic aromatic hydrocarbons) present. Results from many samples exceed expected background concentrations. Some samples also exceeded human health guidelines for commercial site use, however these were either from deep, subsurface soil (Site 9) that will not be exposed during the works (as Site 9 is to remain as a carpark), or from soil that will be excavated and disposed offsite during construction of the Site 10 basement. Furthermore, some fill at Site 10, where historical buildings were present, contains asbestos.

The Site 10 basement has been divided into three “zones” (see Figure 2 and Table 2).

- Limited testing in Zone 3 indicates asbestos containing fill in the upper 1.2 m. Deeper soil has not been tested (and so may also contain asbestos), and further testing may decrease (or increase) the northward extent of Zone 3.
- A contaminated layer is present in Zones 1 and 2. Limited testing above and below this layer indicates fill is potentially clean. If material is to be disposed as clean fill, it ~~should~~ must be tested to confirm it is clean (either before excavation or on stockpiled material).

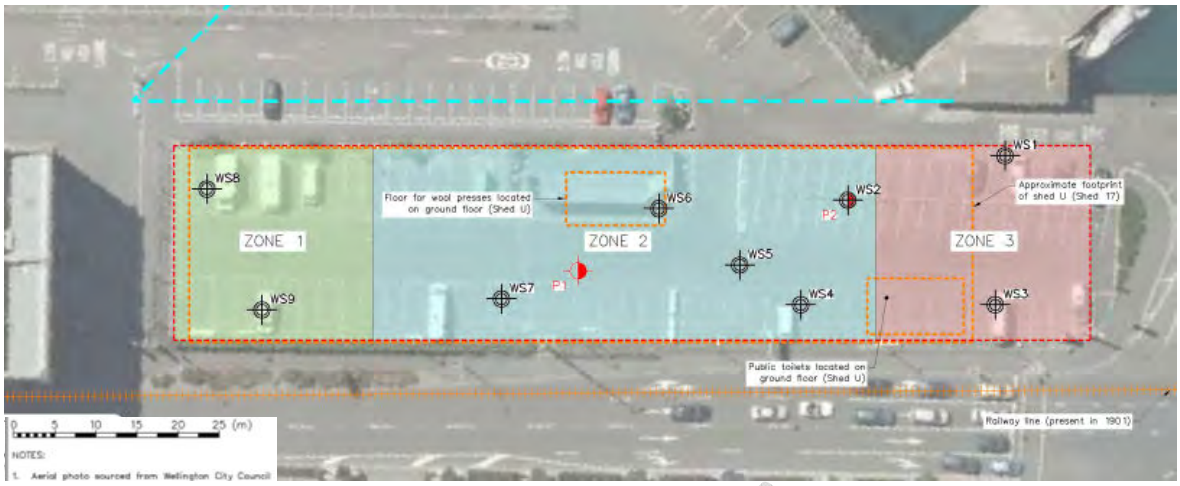

Figure 2: excavation zones within Site 10 basement

Table 2: excavation zones within Site 10 basement

Site 10 zone	Depth to top of layer (m)	Depth to bottom of layer (m)	Thickness of layer (m)	Contamination present?
Zone 1	0	1	1	Potentially clean ~~no~~
	1	2	1	Yes – elevated metals and PAH
	2	3	1	Potentially clean ~~no~~
Zone 2	0	0.75	0.75	Potentially clean ~~no~~
	0.75	2.75	2	Yes – elevated metals and PAH
	2.75	3	0.25	Potentially clean ~~no~~
Zone 3	0	1.2	1.2	Yes – metals, PAH, and asbestos
	1.2	3	1.8	Unknown – not yet tested

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4 Proposed works

Proposed earthworks in contaminated (or potentially contaminated) material include excavation of a basement to 3.7 m depth for the Site 10 building and earthworks for landscaping within the public space Landscape Area.

Cut to a maximum of 1 m deep are anticipated on Site 8. The specific areas and depths of earthworks within other parts of the Landscape Area will be finalised at the detailed design stage.

4.1 Removal of asbestos containing material (Site 10)

Willis Bond's appointed Contractor is to remove the asbestos-containing fill from the Site 10 basement. The removal of the asbestos-containing fill and disposal at a licensed landfill will remove the potential for future asbestos related health effects on workers and users of the site. Commercial premises and public walkways are adjacent or close to the site and thus monitoring shall be undertaken to confirm effects are being managed in respect of offsite receptors.

Approximately 700 m^3 of fill has been confirmed to contain asbestos. Deeper soil underlying this was inaccessible (beneath a concrete slab). It is assumed this material does not contain asbestos, but testing must be carried out to confirm this.

The following sets out the method to be used for identification and removal of asbestos containing soil at Site 10. Procedures for undertaking the works are set out in Sections 5 – 9. In summary the materials will be removed by:

- Following removal of the asphalt surface, a visual inspection shall be carried out for potential asbestos containing materials. Suspected asbestos-containing material shall be sampled and tested to confirm the extent of asbestos contaminated surface soil.
- Excavating materials to the concrete slab at 1.2 m depth.
- Following removal of the fill:
  - if intact the underlying concrete slab shall be water blasted; or
  - if the concrete slab is not intact the underlying surface shall be skimmed, with the excavator taking around 50 mm from the underlying surface (the excavator shall not track back onto the cleaned surface); and
- Disposing the excavated materials to a consented landfill (e.g., Southern Landfill) as asbestos-containing waste.

The works will be observed by a person holding an appropriate certificate of competence under the Asbestos Regulations 1998.

4.2 Excavation of remainder of Site 10 basement

Soil beneath the concrete slab in Zone 3 must be tested (metals, asbestos, PAH) and the appropriate disposal location selected based on the results of testing.

The remainder of the Site 10 basement (Zones 1 and 2) shall be excavated and managed based on the contamination identified in Section 3. A contaminated layer is present across Zones 1 and 2. This has been conservatively estimated as 1 m thick in Zone 1 and 2 m thick in Zone 2. The contaminated soil must be disposed to an appropriately consented landfill (e.g., Southern or Silverstream). If clean material either side of the contaminated layer is to be segregated for clean fill disposal, it must be tested before disposal to confirm it is indeed clean. ~~clean material outside the contaminated layer may be disposed to clean fill without further testing, unless any unusually stained or odorous material is encountered that was not encountered during the investigations~~.

Material from 3 to 3.7 m has not been tested. Based on results for soil from 2.75 to 3 m, this deeper material is potentially clean. It may only be disposed to clean fill if testing is done (before or after excavation) that confirms it is clean.

4.3 Excavations in public space area

When details of the proposed earthworks in the public space Landscape Areas are confirmed at the detailed design stage, testing shall be carried out to assess the appropriate management controls for the earthworks and disposal location for any surplus soil (if any).

- Samples shall be collected by the contaminated land specialist in the soil to be disturbed.
- Samples shall be tested for potential contaminants in the fill material (metals and PAH).
- Results shall be compared to expected background concentrations, guidelines for the proposed site use (commercial), and disposal criteria.
- An updated site plan shall be prepared (analogous to Figure 2 for the Site 10 basement) setting out the extent and depth of contaminated material (if any) and any additional management controls (if any) required.

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5 Site Management Procedures

The procedures below are procedures for managing dust, sediment and surface water during removal of asbestos-containing fill and contaminated soil from the Site 10 basement excavation, and earthworks in fill at the Landscape Areas. The procedures below include actions to be taken by the Contractor.

These procedures have been developed to provide a framework for managing potential contamination related effects at the site, however, these protocols are not intended to relieve the owner or controller of the place of work of either their responsibility for the health and safety of their workers, contractors and the public, or their responsibility for protection of the environment. The key requirements of site management are summarised on the Contractor checklist in Appendix B.

All procedures employed by the Contractor shall comply with conditions of existing (if any) resource consent(s) held by Willis Bond Ltd.

5.1 Site establishment

The following shall be established prior to works commencement:

- Stabilised site access shall be maintained for the duration of removal of contaminated materials;
- Site sheds containing worker amenities, decontamination facilities and PPE equipment stores shall be as described in Section 8.2.
- Surface water containment on the western and northern sides of the excavation and any material temporarily stockpiled on site.
- Establishment of a bin loading and unloading area in a designated area of the site. The bin loading area shall be maintained so that trucks do not contact contaminated materials. Geotextile bidim cloth shall be lain over the loading area to capture spilt materials.
- A site Hazard Board with information pertaining to the presence of asbestos as detailed in Section 8. The contact details of the contaminated land specialist shall also be provided on the Hazard Board.

WCC and GWRC shall be advised on the works programme, and shall be updated if the programme duration extends beyond the estimated duration.

Willis Bond shall advise staff on the adjacent properties prior to works commencement.

5.2 Unforeseen contamination procedures

Investigations to date have identified layers of contaminated material between potentially clean material in Zones 1 and 2 of Site 10 (and in Site 9 – although no works are proposed on this site). It is possible (albeit unlikely) that unforeseen contamination may be encountered in areas that are assumed to be clean. Visual and olfactory indicators of contamination could include the following:

- Odour (petroleum hydrocarbons, oil);
- Discoloured soil (black, green staining most common);
- Potentially asbestos containing materials (e.g., plasterboard, cement board, lagging);

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- Inclusions of deleterious materials not included in Table 4.1 of the MfE Cleanfill Guidelines[1] (refer Appendix C).

The following is a "first response" checklist for the Contractor to follow should visual or olfactory evidence of contamination be encountered during the works onsite to ensure contamination is appropriately contained while decisions about its management are being made by Willis Bond.

First Response Checklist:	
Stop work in the immediate vicinity of the contamination discovery and isolate the area by taping, coning or fencing off.	☐
Advise the Contractor's Site Manager.	☐
Update the site Hazard Board and prevent unnecessary access to the area by personnel.	☐
The Contractor's Site Manager is to contact a contaminated land specialist to inspect, sample and advise of specific controls if appropriate.	☐
The Contractor's Site Manager is to contact Willis Bond.	☐
Contain surface water/ sediment and dust as per Section 6.	☐

5.3 Plant and equipment use

Plant and equipment utilised onsite shall be kept to a minimum to minimise post-works decontamination, to lower the potential for tracking and fragmentation of asbestos and contaminated soil around the site and to minimise generation of dust.

5.4 Asbestos-containing soil removal procedures ~~(Zone 3)~~

The removal of asbestos containing soil shall be carried out using an excavator operated by the Contractor. The following shall be adhered in Zone 3, and anywhere else on site where visual inspection (following removal of asphalt) indicates potential presence of asbestos containing materials in surface soil:

- An approved asbestos remover shall inspect the works methods during excavation of asbestos.
- Procedures for handling asbestos-contaminated material (Section 8.1) shall be implemented at all times.
- Project-relevant earthworks controls, including dust control procedures, shall be in place during excavation per Section 6.
- The swale/surface water bund shall be skimmed on a daily basis to remove any asbestos that may have accumulated in it.
- Excavated materials shall be placed directly into clip-bins, loaded and positioned end facing towards the loading zone.
- The bin sides shall be brushed down and covered by well secured tarps before being positioned adjacent to the truck loading area.

[1] Ministry for the Environment, 2002: A Guide to Management of Cleanfills.

- If the bin loads are dry they shall be sprayed with water before securing the tarps.

5.5 Contaminated soil removal

These controls apply to Zones 1 and 2 in the Site 10 basement, and anywhere in the Landscape Area where testing (refer Section 4.3) shows contaminated soil will be disturbed. Additional controls are required for Zone 3 (i.e., wherever asbestos-contaminated soil is encountered).

- Excavated materials shall be placed directly into trucks.
- Loads shall be covered by well secured tarps before transport.
- If the loads are dry they shall be sprayed with water before securing the tarps, taking care not to generate runoff water.

5.6 Transportation procedures

The following procedure shall be used during transportation of contaminated soil and asbestos containing soil:

- Trucks shall be loaded within the loading area of the site. Spills during loading shall be controlled and contained.
- Trucks shall remain within the loading zone or alternatively a vehicle wash can be established for wheel washing if trucks are required to drive onto the site for the purposes of loading.
- Trucks shall have their wheels maintained clean of debris and there shall be no tracking of material (including soil) onto public roads.
- Each truck shall have a tracking document signed out onsite and collected at the landfill to track each load of material. Onsite records shall include the truck registration number, the number of bins per load and the time the truck left site.

5.7 Disposal procedures

All asbestos-containing material and material contaminated with metals and hydrocarbons shall be disposed of offsite at a licensed landfill (e.g., Southern Landfill).

Authority to dispose of the contaminated materials must be obtained from the receiving landfill prior to the works commencing. The landfill may request that further testing is carried out.

5.8 Plant and equipment decontamination

Plant and equipment utilised within the site shall be decontaminated prior to its removal from site and following removal of bidim from the loading area.

A vehicle wash shall be established within the loading area utilising the following method:

- Sweeping of the asphalt surface to remove sharp objects that may rip the geotextile;
- Laying a suitably sized pad of bidim (of sufficient thickness to prevent ripping by the machinery) on the swept surface, minimum of 2.5m wide by 3 m long.
- Placement of sandbags around the perimeter of the geotextile and lapping the geotextile over and fix under the sandbag on the outside to secure the geotextile.
- Placement of two steel plates or timber planks for driving the excavator onto.
- Establishment of a high pressure misting spray truck unit.

The operation of the machinery wash shall be as follows:

- The wash shall only operate in conditions where no or only very light wind prevails.
- The tracks and tyres of machinery entering the ramp shall be inspected for asbestos fragments by Contactor staff and if found removed and bagged for disposal offsite.
- The high pressure water blaster truck shall operate with as little water as possible to prevent overflow of the wash area.
- Cleaned machinery shall drive onto the seal and directly onto awaiting transporters.

On completion of vehicle washing the geotextile shall be bagged and disposed to a suitably consented landfill (e.g., Southern Landfill).

5.9 Reinstatement

Any material imported to the site for the purposes of reinstatement shall be shown to be appropriate for use as cleanfill. Testing at a rate of 1 sample for every 100 m^3, sampled by a contaminated land specialist shall be provided with in-coming material. Hard fill, if sourced directly from a quarry, does not require testing.

5.10 Excavation sampling procedures

There are sufficient test results to characterise the materials for disposal permitting to landfill. However, should additional testing be required by the landfill operator then the methodology indicated in Appendix A shall be used by the contaminated land specialist.

The contaminated land specialist shall report the results of any testing to Willis Bond, WCC, GWRC, and the receiving landfill.

As noted in Section 3.3 (bullet 2), if potentially clean soil is to be segregated for cleanfill disposal, it must be tested to confirm it is clean before it is taken off site. Sampling shall be done at a rate of 1 for every 100 m^3. Results shall be compared with clean fill acceptance criteria.

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6 Earthworks Controls

The following earthworks controls shall be put in place by the Contractor prior to and for the duration of the proposed works.

6.1 Dust control procedures

From a human health perspective, any dust generated in Zone 3 (and anywhere else that asbestos containing soil is identified, if anywhere) may have the potential to contain friable asbestos. If not suppressed during windy conditions or during vehicular movement over contaminated soil, discharge of airborne asbestos fibres may occur. In works in contaminated soil, ~~Zones 1 and 2,~~ generation of dust could transport contaminants offsite.

To avoid dust generation in dry conditions and to mitigate against dust generation associated with vehicle movement, the following control and monitoring systems shall be put in place by the Contractor:

- Frequent spraying of water over the excavation and truck loading area to ensure the working surfaces remain damp;
- Wetting of the loaded material once placed in the bins (Zone 3) or trucks (Zones 1 and 2);
- Use of a water truck or portable water sprays in trafficked areas to dampen dust;
- Mesh shall be secured on site fencing to reduce the impact of wind. The contractor shall be responsible for maintaining the fencing for the duration of the contract;
- Works shall cease if the contaminated land specialist deems wind conditions to be too strong to continue in a safe manner;
- Stockpiles awaiting removal of material (if any) shall be covered or wetted; and
- Air monitoring devices shall be monitored as per Section 7.

6.2 Erosion and sediment control

Erosion and sediment control during construction shall be in accordance with the GWRC "Erosion and Sediment Control Guidelines for the Wellington Region" (2002). Erosion and sediment control measures shall include:

- Avoid work in heavy rain.
- Keeping the site clean.
- Temporary stockpiles shall be dampened or covered (with bidum geotextile or similar) if left overnight. Any stockpiles shall not be placed in an area where runoff cannot be controlled.
- A stabilised entry/exit point, shall be established so sediment is not tracked on and off the site. This will be made of aggregate and shall be removed off site once work has been completed.
- Bunding shall be placed to prevent clean stormwater running into contaminated areas, and to contain runoff from contaminated areas. Silt fences and runoff diversion bunds shall be utilised where appropriate to capture sediment in surface water runoff. Excess ponded water shall be removed by sucker truck and disposed to an appropriate liquid waste processing facility.

Erosion and sediment controls shall be checked regularly and made sure that are in good working condition.

To ensure good practice:

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- The entry/exit point shall be reapplied with aggregate if excessive sediment build up occurs.
- Erosion and sediment control measures shall be upgraded/ modified where necessary. Sediment fences shall be replaced if the fabric is ripped or otherwise damaged. They shall be retrenched if needed.
- The weather conditions along with the performance of the erosion and sediment control measures shall be monitored.

Erosion and sediment control measures shall remain in place until surface reinstatement cover is established.

6.3 Groundwater management

Groundwater extracted during dewatering of the Site 10 basement may require treatment prior to disposal. Preliminary testing from 2 piezometers indicates no contaminants are present in groundwater. If groundwater is to be disposed to stormwater, follow resource consent (GWRC) and stormwater permit (WCC) conditions for discharge of groundwater to stormwater. If groundwater is to be disposed to trade waste, follow conditions of WCC trade waste permit.

The following steps are required before works begin:

- Install 2 additional piezometers to the depth of the proposed basement excavation.
- Collect groundwater samples and test for metals (total and dissolved) and PAH.
- Compare results (dissolved metals only) with ANZECC guidelines for protection of 80% of marine species, applying an appropriate dilution factor, to assess whether treatment is required before discharge. The dilution factor should be determined by the contaminated land specialist once discharge volumes are known.
- Compare results with trade waste guidelines to assess whether discharge can be discharged to trade waste.

If treatment for removal of sediment is required before discharge, it may comprise one or more of the following:

- Good erosion and sediment control to prevent clean stormwater entering the excavation, thereby minimising the volume of water requiring dewatering.
- Appropriate detention to remove sediment. This may be a series of decanting sedimentation containers.
- Chemical treatment with flocculants.
- Monitoring the decant (discharge) for total suspended solids, prior to discharge.
- Laboratory testing for potential contaminants (dissolved metals, PAH) prior to discharge.

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7 Air quality monitoring

This section shall be reviewed and updated, if necessary, when the conditions and method to remove ACM from the site are known. This will be after removal of asphalt from the site, visual inspection of surface soil, and targeted testing for potential ACM.

There are workers on site and on adjacent properties in close proximity to the remediation area, thus activity-based sampling shall be undertaken at intervals during the earthworks to confirm asbestos fibre mobilisation in air is negligible.

7.1 Collection method

Stationary air monitoring shall be undertaken on a daily basis for the first 3 days of earthworks involving asbestos materials to establish baseline conditions. Additional monitoring shall be carried out if conditions change significantly on site (e.g., higher winds, larger areas of asbestos contaminated material exposed).

The sampling shall be undertaken at two locations on the perimeter of the site (upwind and downwind).

The monitoring shall utilise a Gilian® BDX-II personal sampling pump calibrated by the laboratory prior to being installed in the field. The before and after flow rates shall be collected and used to determine an average flow rate. The average flow rate shall be recorded on field data documentation.

The sampling shall be undertaken by the contaminated land specialist and shall be in general accordance with USEPA (5 October 2007) Standard Operating Procedures: Activity-Based Air Sampling for Asbestos, Rev 0.0, SOP 2084.

7.2 Analytical method

The personal and stationary air monitoring cassettes shall be analysed by Dowdell & Associates (Dowdell). Dowdell shall use an analytical method developed by the National Occupational Health and Safety Commission Australia - NOHSC: 3003(2005) Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition.

7.3 Reporting

Air monitoring results shall be evaluated on receipt. If asbestos fibres are detected works shall cease until dust and other earthworks controls are reviewed and modified where necessary. Amendments to the earthworks procedures shall be reported to Willis Bond, WCC, and GWRC.

All air monitoring results shall be reported in the validation report (refer Section 10).

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8 Health and Safety Plan – Asbestos and contaminated soil

8.1 Introduction

This section provides suggested health and safety plan procedures for Contractor staff removing contaminated soil, including soil containing asbestos, and has been prepared in general accordance with:

- Department of Labour Health and Safety Guidelines on the Cleanup of Contaminated Sites (March 1994);
- Asbestos Regulations (1998); and
- New Zealand Demolition and Asbestos Association (NZDAA), March 2011: New Zealand Guidelines for the Management and removal of Asbestos, 3rd Edition.

These procedures have been developed to provide a framework for managing potential asbestos contamination related effects at the site; however, these protocols are not intended to relieve the owner or controller of the place or work of either their responsibility for the health and safety of their workers, contractors and the public, or their responsibility for protection of the environment.

General health & safety procedures based on the requirements of the Health and Safety in Employment Act, 1992 are to be covered by the Contractor and Willis Bond's Health and Safety Plans.

The purpose of these contaminated land-related Health and Safety procedures are to:

- Provide and maintain a safe working environment for workers during removal of asbestos contaminated soil and contaminated fill.
- Document safety facilities and procedures to prevent exposure to contaminated material by workers and visitors to the site;
- Identify and ensure awareness of potential contaminated land-related hazards; and
- Describe emergency procedures.

The contaminated land-related Health & Safety procedures shall be implemented while contaminated material is exposed on the site.

8.2 Site establishment (health and safety)

The Contractor shall include the following with respect to contamination-related health and safety during site establishment works set out in Section 5.1:

- Hazard identification signage (hazard board and on eastern access point) to warn sub-Contractors that asbestos containing materials are present; and
- Establishing a change and washing facility for workers;
- Establishing a personal protective equipment (PPE) store for workers; and
- Establish a personnel decontamination process/unit. The decontamination process shall include provision of:
  - Boot wash bins;
  - Hand held spray bottle for wetting down tyvek suits;
  - Bin for disposal of masks and tyvek suits; and
  - Mat for stepping out of the decontamination process onto.

The person holding the certificate of competence under the Asbestos regulations shall ensure the workers are familiar with the decontamination unit and process, and that the process is adequate.

The Contractor is responsible for the implementation these Health and Safety procedures. The key requirements of this plan are summarised on the Contractor checklist in Appendix B.

The health and safety procedures outlined below have been prepared based on differing work areas being established. These are defined as the following:

"Exclusion zone"	Works areas that contain contamination, including a clear area around them; and
"Support zone"	Designated areas including site offices, washing/decontamination areas, toilet facilities, designated lunch and smoking areas and loading area.

8.3 Identification of hazards

Asbestos fragments or free fibres may be identified in soils on site. There is no odour indicator of asbestos contamination.

Hydrocarbon contaminated soils are discoloured (black, blue/green staining) and odorous.

8.3.1 Identification of new hazards

Further hazards may be identified during the course of the works. Potential hazards could include, but are not limited to, contaminated materials with characteristics such as an oily sheen, odours (petroleum, oil), discolouration (black, green/blue staining most common), and/or inclusions of non-cleanfill allowable (refer Appendix C) deleterious materials (i.e. plastic, rubber, metal).

The Contractor is responsible for reviewing any new work element and assessing whether there are any new associated hazards, and whether these can be eliminated, isolated or minimised. The contractor shall advise Willis Bond, the approved asbestos remover and seek review by the contaminated land specialist if necessary. The Contractor shall then instruct all staff on the health and safety procedures associated with the new hazard.

8.3.2 Hazard management

The asbestos, metals, and hydrocarbon contamination hazards shall be managed by the minimisation methods set out in Section 5. The primary hazard management method is minimising exposure to contaminated materials and dust during the removal. Maintenance of earthworks controls (Section 6) is a key component of contaminated material hazard management.

8.4 General safety requirements and training

8.4.1 Health and safety officer

The Contractor's Site Manager shall be appointed the role of environmental health and safety officer (HSO) for the duration of the works to ensure that contaminated land-related health and safety procedures are adhered to, alongside of those required under the Contractors and Willis Bond's Health and Safety Plans.

The Contractor's Site Manager shall have basic first aid training.

8.4.2 Site induction

All relevant staff shall be required to undergo a contaminated soil safety induction before commencing work. The induction shall be conducted by the Contractor Site Manager/ HSO.

The purpose of the safety induction is to make sure the worker is aware of the hazards related to contaminated soil (asbestos, metals, and hydrocarbons), safe working procedures, safety equipment and requirements, and the action plan in case of an emergency.

The HSO shall ensure that all relevant personnel are familiar with the application and use of the PPE and procedures specified in this CSMP before commencement of site work.

8.4.3 General requirements

The following general safety procedures shall be followed by all staff entering and/or working in the "exclusion zone" (refer Section 8.2 for definition):

- Any incidents shall be reported to the HSO;
- Site workers shall avoid unnecessary contact with contaminated soil or potential contaminated soil; and
- Site workers shall wear gloves, Tyvek suits and dust masks at all times.

8.5 Hazard minimisation procedures

8.5.1 Inhalation of dust

Dust controls shall be in place throughout the works. Dust shall be managed according to procedures set out in Section 6.1.

8.5.2 Inhalation of asbestos fibres

Respiratory protection shall be worn at all times as there is a constant risk of asbestos exposure during the excavation works. The minimum requirement is a P2 dust mask. Half face respirators with asbestos fibre filters may also be required depending on review of the nature and extent of asbestos present by the contaminated land specialist.

P2 dust masks shall be worn within the clean (backfill) zone whilst contaminated soil remains on the balance of the site.

Work involving the excavation of asbestos shall be observed by a person certified under the Asbestos Regulations (1998).

8.5.3 Dermal contact and ingestion

The following shall be implemented to ensure skin contact and ingestion of contaminants is minimised:

- Disposable gloves shall be worn by workers who need to have contact with contaminated material during their work. Gloves shall be replaced regularly.
- Tyvek suits shall be worn to prevent contaminated material contacting other parts of the body, i.e. legs and arms, and preventing asbestos fibres collecting within the folds of clothing.
- Boot covers shall be used to prevent asbestos fibres being tracked offsite on the soles of workers/ visitors boots, or alternatively a boot wash shall be established at the entrance to the contaminated area from the loading area.

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- No eating, drinking or smoking in the works area to prevent contaminated material contacting food or being ingested directly via soiled hands.

A key factor in controlling dermal contact and ingestion of contaminated soil is through maintaining good personal hygiene. The following shall be observed for works involving contaminated materials:

- Hand to mouth and hand to face contact shall be avoided during work.
- Hands shall be washed before eating, drinking and smoking.
- Eating, drinking and smoking shall only be permitted where site personnel are offsite or in designated areas.
- Tyvek suits worn within the "works area" shall be removed onsite and disposed of at the end of the working day and replaced with new ones the following day.

8.5.4 Personal protective equipment (PPE) provisions

Based on the hazard minimisation procedures above the Contractor shall ensure availability and supply of the following contaminated land-related PPE:

- P2 dust masks.
- Half face respirators (if required following review by the ccontaminated land sspecialist).
- Tyvek suits.
- Boot covers (or use boot wash as per Section 8.5.3 above).
- Disposable latex/rubber gloves.

Protective equipment shall be replaced as appropriate.

8.6 Emergency procedures

The following procedures apply for incidents involving contaminated soil or groundwater:

- Any incident or potential emergency situation shall be reported to the HSO for immediate assessment and action. To minimise the impact of an emergency situation at least one other field personnel besides the HSO shall have immediate access to a first aid kit.
- If an incident occurs within a contaminated site, immediately isolate and immobilise the relevant equipment.

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9 Contingency Measures

In the event that unforseen contamination is identified during the works the first response procedures outlined in Section 5.2 shall be followed. In the event of an uncontrolled discharge of other contaminants or potentially contaminated soil/ hardfill or water to the environment, the following notification process shall be used:

- Cease work immediately and take all practical steps to contain the discharge and prevent further discharge.
- The Contractor shall notify Willis Bond and the contaminated land specialist.
- Willis Bond shall notify WCC and GWRC.
- A strategy to remedy the situation is to be determined by the contaminated land specialist in consultation with Willis Bond, WCC, and GWRC. The agreed strategy shall be implemented by the Contractor.
- All details of the discharge (volume, type, location), and procedures taken to remedy the situation, are to be recorded and included with the SVR to be submitted to all parties at the completion of works.

If there is any doubt as to whether or not a discharge of contaminants has occurred, the Contractor shall contact the contaminated land specialist for further advice.

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10 Validation

Validation is the process of confirming the objectives of the works have been achieved, being:

- Contaminated soil from the Site 10 basement is disposed at an appropriate location.
- Potential contamination in earthworks carried out in the Landscape Areas is identified and managed appropriately.
- Confirmation from the Contractor that works were undertaken according to agreed procedures.
- Reporting on any incidents.

10.1 Remediation monitoring requirements

The contaminated land specialist will need to visit the site once daily during the removal of asbestos contaminated soil to check this CSMP is being implemented, to undertake monitoring, and respond to contamination-related queries.

On completion of the works, the contaminated land specialist shall include a log of all visits to the site and actions taken in the validation report described in Section 10.3.

The Contractor shall record all off-site deliveries of contaminated soil, including time, destination, and truck registration, and will perform a cross check against landfill weighbridge receipts to ensure all contaminated material reached the appropriate destination.

10.2 Post-remediation validation

Validation is to be undertaken progressively as asbestos containing fill is removed as follows:

- Before removal: additional testing in north half of Zone 3 to confirm the extent of asbestos contaminated soil, and whether the extent of Zone 3 can be decreased.
- On reaching the concrete slab: testing beneath the concrete slab after it has been removed. If no asbestos is detected, sampling shall be carried out on a 15 x 15 m grid across Zone 3. If asbestos is detected beneath the concrete slab, samples will be collected at depth.
- On reaching the depth where no further asbestos has been detected in pre-excavation samples: sampling on a 15 m x 15 m grid across Zone 3. In the event that a sample returns a positive test for asbestos a further 50 – 100 mm thickness of material shall be removed from the surface of the grid square containing the positive sample (if asphalt is absent) and a second (B) sample collected.

Samples shall be collected from the approximate centre of the grid square and the location confirmed by GPS. Sample locations shall be plotted on a site validation plan. Samples shall be tested for asbestos presence/absence at Dowdell & Associates laboratory.

No validation testing is proposed on the walls and base of the basement excavation, unless unexpected conditions are encountered. Contaminated reclamation fill is expected to remain in place around the excavation, and the proposed works will pave and prevent exposure to the contaminated fill. Validation sampling may be needed if unexpected conditions are encountered. The need for this would be assessed by the contaminated land specialist (see Section 9).

10.3 Validation reporting

The contaminated land specialist shall provide a validation report which includes the following:

- Confirmation that the asbestos removal works are complete.

- Confirmation that works were completed according to this CSMP and documenting any variations to the procedures during the works.
- Confirmation that there were no environmental or human health incidents during the works. If there were any incidents then the letter shall detail the nature of the incidents and the measures taken to mitigate effects.
- Confirmation of the disposal destination of contaminated materials, based on documentation provided by the Contractor.
- Verification test results undertaken for disposal permitting.
- Record of daily site visits and actions taken (as described in Section 7.1).

The validation report shall be provided to Willis Bond, WCC, and GWRC within one month after receipt of the final validation data.

10.4 Ongoing monitoring and management

All asbestos will be removed from the excavation and the site will be paved or covered with imported landscaping fill on completion. Therefore, there will be no ongoing requirement for monitoring or management with respect of ground contamination pertaining to these materials.

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11 Applicability

This report has been prepared for the benefit of Willis Bond Ltd with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement. The work was undertaken in accordance with our proposal of 8 April 2014.

Tonkin & Taylor LTD

Environmental and Engineering Consultants

Report prepared by: Authorised for Tonkin & Taylor Ltd by:

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Appendix A: Soil sampling method

- **Methodology**

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A.1 Soil sampling procedures

Sampling undertaken by the contaminated land specialist shall be in accordance with requirements of the NES (Soil) Regulations, the Western Australian Guidelines, the "Australian/ New Zealand Standard AS/NZS 5667 11:1998" and the MfE Contaminated Land Management Guidelines No.5[2].

This method applies to:

- Potentially asbestos contaminated soil: pre-works delineation and post-works confirmation.
- Potentially clean soil: either in situ before excavation or stockpiled soil pending disposal.
- Soil from below 3 m depth: to confirm appropriate for disposal to landfill.

Samples ~~of potentially asbestos contaminated soil (Zone 3)~~ shall be collected according to the following procedure:

- The materials encountered were described in accordance with the NZ Geotechnical Society "Guidelines for the classification and field description of soils and rocks for engineering purposes".
- Visual inspection of the sample and the fill material for the presence of fragments of asbestos containing material.
- Freshly gloved hands shall be used to collect samples and place them immediately into double bagged zip lock plastic bags.
- Samples of fines shall be a 1/3 cup measure in volume for ease of testing by Dowdell & Associates and maintain a consistent sample size.
- The sample position will be recorded using a GPS.
- Equipment used to collect the samples are to be decontaminated between sample locations using clean water and Decon 90 (a phosphate-free detergent) rinses.
- Samples will be shipped to IANZ certified Dowdell & Associates laboratory under chain of custody documentation.
- Samples will be tested for the presence of asbestos.

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[2] MfE, revised 2011: Contaminated Land Management Guideline No. 5 – Site Investigation and Sampling.

Appendix B: Contractor Checklist

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Contractor Checklist:

Sites 8, 9, and 10 - Summary of key CSMP requirements

The Contractor shall undertake the following during the earthworks in potentially contaminated soil at Sites 8, 9, and 10, Waterloo Quay, Wellington:

Timing	Key task	Details
Prior to works commencing	Site set up	• Provide WCC and GWRC and neighbouring property owners notice of works commencement date. • Establish works controls (dust, erosion, sediment, stormwater, groundwater management, odour) controls as per CSMP Section 5 and 6. • Establish fencing site structures, site sheds as per Section 5.1. • Hazard board to state contaminated soil may be present and indicating health and safety requirements for workers. • Obtain PPE: disposal gloves, tyvek suits and P2 dust masks. • Establish the personnel decontamination unit. • Establish air monitoring units. • Arrange disposal permits. • Sweep surface of loading area prior to establishment of site sheds, loading areas and site facilities.
During the works	General CSMP compliance	• Maintain works controls (dust, erosion, sediment, stormwater, groundwater) controls as per CSMP Section 6; • Implement health and safety procedures in Section 8 as required; • Retain all weighbridge and disposal dockets and provide to Willis Bond and the contaminated land specialist.
	Alert contaminated land specialist	If any of the following situations arise: • Contaminated soil is encountered that includes: - Odours (petroleum, oil) - Discolouration (black, green/blue staining most common) - Inclusions of non-cleanfill allowable (refer Table 4.1 MfE Cleanfill Guidelines, Appendix C) deleterious materials (i.e. plastic, rubber, metal) • Materials with an oil sheen, odour or discolouration is encountered. • To collect validation samples <u>before</u> reinstatement.
Within one month of completion of the relevant works	Provide contaminated land-related Information to Willis Bond and contaminated land specialist	• Details of any complaints relating to dust received during the works. • Details of unexpected encounters/events and the action taken. • Details of additional sampling undertaken to characterise materials during the works (if any). • Details of visits made by Council representatives. • Summary of weighbridge information for disposal verification.

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Appendix C: MfE Cleanfill Guidelines (acceptable and unacceptable materials)

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Table 4.1: Acceptable materials

Material	Discussion
Asphalt (cured)	Weathered (cured) asphalt is acceptable: After asphalt has been exposed to the elements for some time, the initial oily surface will have gone and the asphalt is considered inert.
Bricks	Inert – will undergo no degradation.
Ceramics	Inert.
Concrete – un-reinforced	Inert material. Ensure that other attached material is removed.
Concrete – reinforced	Steel reinforcing bars will degrade. However, bars fully encased in intact concrete will be protected from corrosion by the concrete. Reinforced concrete is thus acceptable provided protruding reinforcing steel is cut off at the concrete face.
Fibre cement building products	Inert material comprising cellulose fibre, Portland cement and sand. Care needs to be taken that the product does not contain asbestos, which is unacceptable.
Glass	Inert, and poses little threat to the environment. May pose a safety risk if placed near the surface in public areas, or if later excavated. The safety risk on excavation should become immediately apparent, so glass is considered acceptable provided it is not placed immediately adjacent to the finished surface.
Road sub-base	Inert.
Soils, rock, gravel, sand, clay, etc	Acceptable if free of contamination (see 4.3.2 for definition of contaminated soil in this context).
Tiles (clay, concrete or ceramic)	Inert.

Table 4.2: Unacceptable waste

Material	Discussion
Abrasive blasting sand/agents	May contain metals, paint and other contaminants.
Asbestos (including asbestos sheeting)	Potentially hazardous. Although an inert compound, future excavation could cause significant health effects.
Asphalt (new)	New asphalt or asphalt that has been ground or pulverised may release oily substances that could leach into the environment.
Bark	Degradable; leaches tannins.
Cables	Metal cables will degrade (see Metals).
Car bodies	Contain metals, oils, plastics, asbestos and other potential contaminants.
Carpet	Degradable. May also contain formaldehyde residue from flooring.
Cesspit/stormwater sump cleanings	Contain various metal contaminants and organics.

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Material	Discussion
Containers	To avoid any potential confusion, all containers are considered unacceptable. Containers may degrade or be punctured, releasing their contents or the remnants of their contents. The containers themselves may be detrimental to the environment (see plastics and metal).
Cork tiles	Degradable.
Corrugated iron	Degradable steel and zinc.
Electrical equipment and insulation	For example, fluorescent light tubes could contain PCBs (also see Plastics).
Formica	Generally stable (it is a melamine-formaldehyde polymer), but may be bonded with urea formaldehyde. This is water soluble and may leach formaldehyde compounds into groundwater. Often attached to particleboard.
Foundry sand	Contains metals.
Greenwaste (e.g. grass clippings, tree trimmings)	Will degrade and release contaminants such as ammonia and nitrates into the soil and groundwater, and may generate gases such as methane and carbon dioxide. The resulting leachate may mobilise other contaminants in the fill.
Hardboard	Degradable; contains phenol resorcinol formaldehyde.
Household waste	Typically contains large amounts of putrescible and degradable waste that will degrade and cause odour problems, and create soluble compounds causing leachate. Also contains some hazardous components.
MDF (medium-density fibreboard – customwood)	Degradable; may use urea formaldehyde as a bonding agent. This is water soluble and may leach formaldehyde compounds into groundwater (see Particleboard). Some modern MDF boards use phenol formaldehydes and other resins that may be acceptable, but the board itself is unacceptable.
Medical and veterinary waste	Unsafe if excavated (health hazard); may generate leachate.
Metals	For example, structural steel, roofing, window frames, building components, etc; degradable, can leach into the ground or groundwater. Soluble metals may be toxic depending on the concentration.
Paint	Hazardous waste. Liquid paints may contain significant quantities of volatile organic carbon compounds. These will contaminate soils and groundwater, causing detrimental effects to the environment (e.g. killing aquatic life) and human health. Some paints contain metals. Water-based paints contain preservatives and biocides which may include mercury, or other compounds that can cause dermatological problems.
Painted materials	Lead-based paint is hazardous and must be taken to a hazardous waste facility. Once paint has dried, the potential for contaminants in the paint to migrate through the soil is minimised, so all dried paint other than lead-based is relatively inert. However, to avoid any doubt all painted materials should be rejected.
Paper and cardboard	Paper and cardboard are degradable and present a fire hazard.

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Material	Discussion
Particleboard (chipboard)	Contains urea formaldehyde as a bonding agent. This is water soluble and may leach formaldehyde compounds into the groundwater. Formaldehyde is known to cause many adverse health reactions and has been classified as a “probable human carcinogen” by the USEPA.
Plywood – structural / external grade	Uses phenol resorcinol formaldehyde as a bonding agent. This is not water-soluble and is relatively inert. However, the board itself is degradable and the difference between internal and external grade may not be apparent to the cleanfill operator.
Plywood – internal grade	Uses urea formaldehyde glue as a bonding agent. This is water-soluble and may leach formaldehyde compounds into groundwater (see Particleboard).
Road sweepings	Contain various metal contaminants and organics.
Sawdust	Degradable and could contain timber treatment chemicals.
Tar	Can contain a variety of compounds, many of which have been found to be carcinogenic. Many of the compounds do not bind to soil and can migrate directly to groundwater; potential for groundwater contamination with hydrocarbon compounds.
Timber (processed)	All sawn, gauged or dressed timber is considered unacceptable, as the cleanfill operator will not be able to determine easily if it is treated or untreated. Chemicals used for timber treatment can leach out and contaminate soils and groundwater. The chemicals used include copper-chrome-arsenic (CCA), light organic solvent preservatives (LOSP), creosote, boron and pentachlorophenol (PCP). These can all have a detrimental effect on human health and the environment.
Wood chips	Degradable.

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APPENDIX D
WASTE MANAGEMENT PLAN