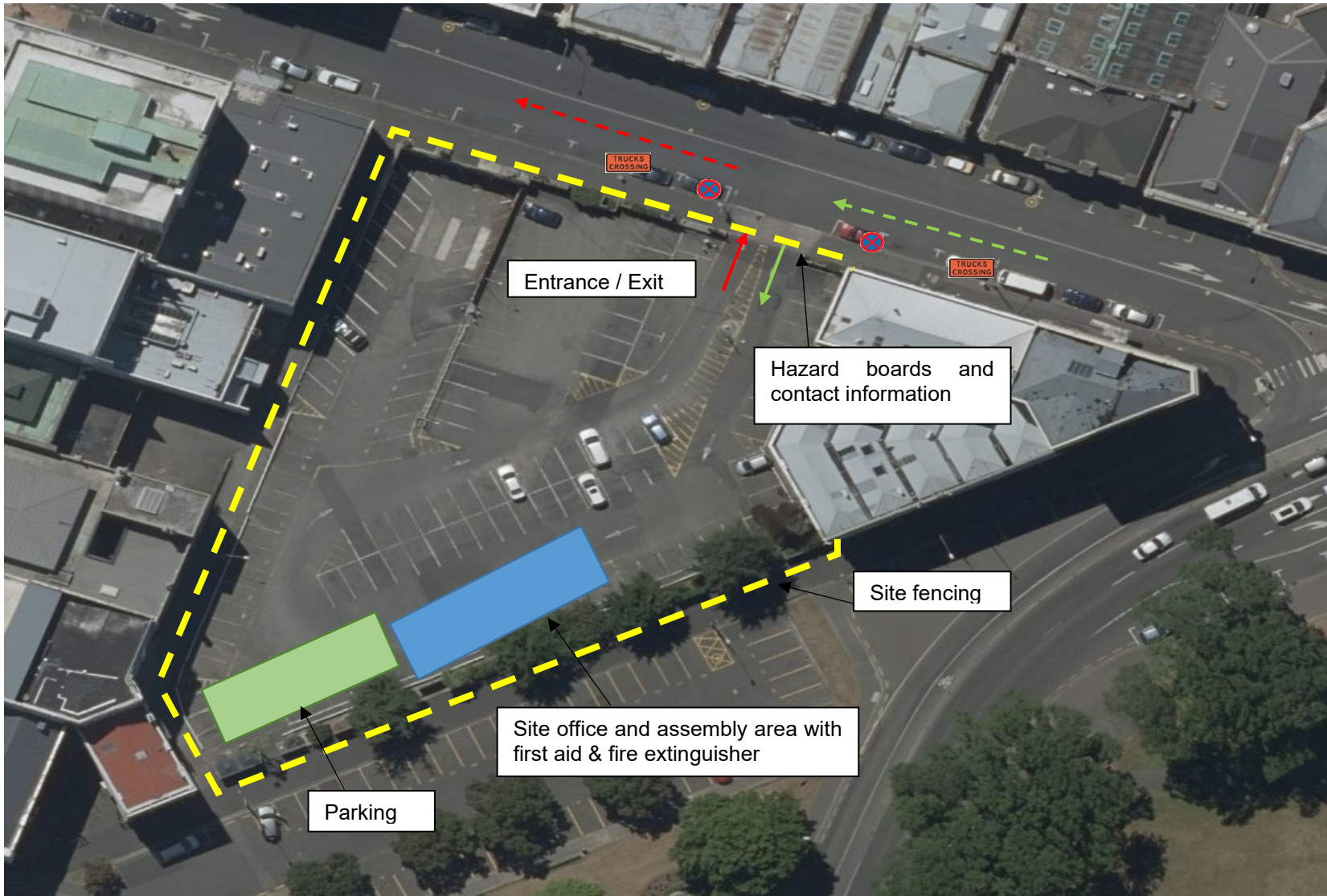


4. Site Layout



5. Staging and Construction Programme

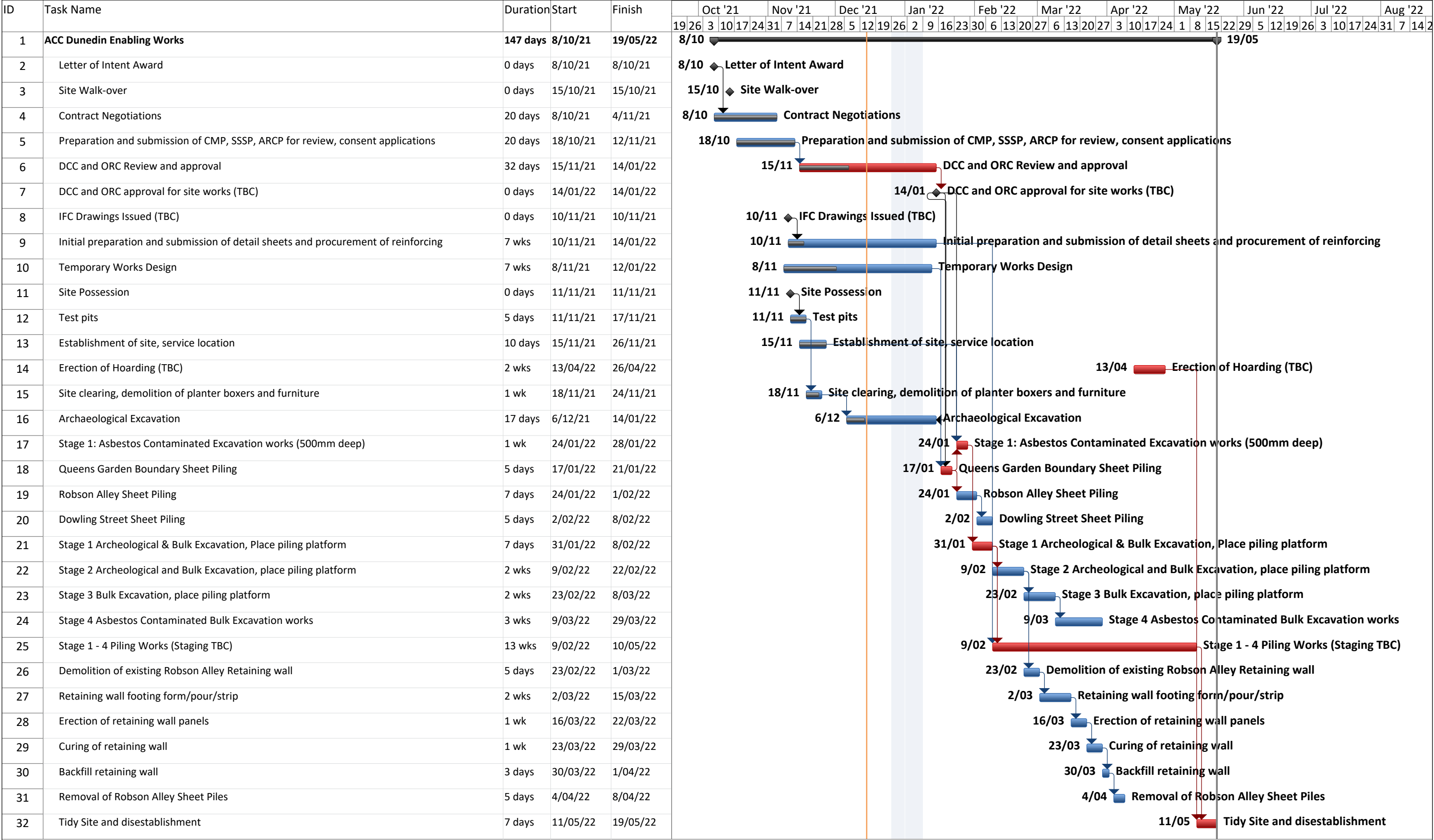




SITE LOCATION



FIGURE 3A: ASBESTOS RESULTS WITH ASBESTOS REMEDIATION/MANAGEMENT AREAS (CURRENT LAYOUT)



Project: ACC Dunedin Programme
Date: 15/12/21

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

Critical

Critical Split

Progress

6. Key Roles

Development Manager

James Jackson
Ngāi Tahu Property
Mob: 021 872 252
Email: James.Jackson@ngaitahu.iwi.nz

Health and Safety Advisor

Anna Harrison
Ngāi Tahu Property
Email: Anna.Harrison@ngaitahu.iwi.nz

Project Manager

Tom Morgan
RCP
Mob: 021 986 230
Email: tmorgan@rcp.co.nz

Engineer's Representative

Bruce Goodger
RCP
Mob: 021 568 816
Email: bgoodger@rcp.co.nz

Engineer to Contract

Matt Allen
RCP
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Email: mallen@rcp.co.nz

Technical Director

Josiah Thompson
Engco
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Engineering Geolist

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Contaminated Land

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Piling and Construction Manager

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Project Engineer

David McCallum
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Mob: 027 461 5146
Email: davidM@smithcranes.co.nz

Site Foreman

Daniel Gardiner
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Mob: 027 280 5341
Email: daniel@smithcranes.co.nz

Health and Safety Manager

Craig Baynon
Smith Crane and Construction
Mob: 027 431 1469
Email: craigb@smithcranes.co.nz

7. Communication Plan

The Principal and Smith Cranes and Construction will consult with neighbouring landowners and occupiers prior to commencement of works. Notification of the construction activities will be provided as well as types of activities and expected duration. Affected neighbours and parties will be consulted prior to works commencing to discuss health and safety plans, traffic management plans, noise and vibration plans and forward work plans. Communication channels including complaint forms will be implemented with neighbouring properties to ensure any concerns or issues are addressed to minimise disruption and arrive at a resolution.

Site signage and hazard boards will be erected at site access points outlining information of site works and possible hazards including relevant contact information.

7.1. Understanding and Closing out Concerns

With the scale of this piling contract there may be instances where surprises happen, and unplanned disruption occurs. This may will lead to complaints from the Public or local businesses.

It is important that the SCC team deals with these complaints and follow them through to closure to ensure that the issue is dealt with and appropriately documented.

SCC will work closely with the principal's management team to close out any complaints and concerns brought to attention. A process involving SCC's Site Manager will be implemented as follows:

1. All complaints will be directed in the first instance to the SCC designated site representative.
2. This person will have responsibility to ensure that the complaints procedure is enacted.
3. The site will have prominently displayed the works signboard with the 24-hour contact number of the demolition contractor on site manager,
4. The contractor will maintain an onsite complaint register and log of actions taken.
5. The register will include:
 - a. A standard complaint Pro forma
 - b. Date of complaint
 - c. Complainant name
 - d. Actions taken
 - e. Report back to complainant
 - f. Close out
6. The management of complaints during the delivery phase will receive high level attention from the SCC Project/Site management and NTP management team as required for resolution.
7. Ensuring that complaints are noted, acted upon and closed out.
8. All complaints will be filed and available upon request of the Principal or the Council

Complaints Log Sheet		
Descriptor	Information	Notes
Date of Complaint	•	
Complainants Name	•	
Details of Complaint	•	
Site Manager Investigation	•	
Actions Taken/Implemented	•	
Reported Back to Complainant	•	
Close Out Date	•	

8. Environmental Management Plan

8.1. Purpose of Environmental Management Plan

The Construction Environmental Management Plan (CEMP) sets out the environmental policies, procedures and protocols related to the construction activities associated with the ACC Dunedin Enabling Works. The document is not a Construction Manual or Method Statement.

The CEMP details the manner in which activities should be undertaken and the checks & safeguards necessary to ensure compliance with Smith Crane & Construction Ltd environmental policies, the contractual obligations, and the relevant Regional and Territorial Authority regulatory requirements, as they relate to environmental management for the Project.

This Document has been prepared to identify the nature of the environmental management procedures, practices, checks and systems required by Smith Crane & Construction Ltd to be undertaken on the Project.

The objectives of the CEMP are:

- To ensure that the construction works comply with the requirements and obligations of the Resource Management Act 1991, comply with the “permitted activity” requirements of the Regional and Territorial Authority planning documents, and the environmental requirements of the construction contract.
- To avoid, remedy or mitigate any adverse environmental effects associated with construction activities, including but not limited to issues such as fugitive dust, discharge of sediment, noise and vibration and the spill of contaminants such as fuels and hydraulic oils.

8.2. Resource Management Act

The Resource Management Act 1991 requires Ngāi Tahu, as the Principal and Smith Crane and Construction Ltd (SCC) the contractor to take all reasonable measures to mitigate any potential damage or danger to the environment. In addition to regulations, rules and standards imposed by the Regional Council and Territorial Authority, the Resource Management Act 1991 contains a number of statutory requirements related to avoiding adverse effects on the environment.

8.3. Regional and Territorial Authority Regulatory Compliance

The Otago Regional Council (ORC) is responsible for managing the coastal, air, freshwater and land resources of Otago. The Dunedin City Council (DCC) is responsible for land use matters. The procedures, protocols and checks contained in the CEMP are put in place to ensure on-going and continual compliance with the Conditions of the Land Use Consents granted by DCC “permitted activity” and the rules contained in the Otago Regional Council Plan. This plan has been developed in reference with Otago Regional Council (ORC) Resource Consent No. RM21.364.01 LAND USE CONSENT, Consent No. RM21.364.02 DISCHARGE PERMIT and Dunedin City Council (DCC) LUC-2021-158.

8.4. Smith Crane and Construction Environmental Policy:



ENVIRONMENTAL POLICY STATEMENT

Smith Crane & Construction Ltd is committed to undertaking its business in a manner that recognises the importance of environmental protection and sustainability. Smith Crane & Construction Ltd strives to achieve “industry best” practices in all its operations by:

- Complying with all applicable laws, regulations and statutory requirements relating to environmental issues.
- Managing environmental and related issues in accordance with any client requirements, policies and procedures.
- Applying waste minimisation principles, and taking all practicable steps to prevent pollution and other adverse effects from our operations.
- Establishing, monitoring, auditing and continually improving an Environmental Management System, codified in an Environmental Operations Manual, which is consistent with NZCF Quest Civil Construction Management Code, QEST Integrated Management System, and the certification requirements of ISO 1400.
- Educating and training its employees to continually improve awareness, skills and knowledge of environmental issues and practices.
- Identifying, investigating and satisfactorily resolving all non-conformances as part of a drive for continuous improvement.
- Monitoring and evaluating the environmental performance of subcontractors and suppliers, and implementing effective communication with them on environmental issues.
- Annual reviewing environmental objectives, targets and policy as part of a drive for continuous improvement in the QEST Integrated Management System.
- Reviewing the Environmental Operations Manual every two (2) years, in order to ensure the objectives, policies, and methods of implementation reflect changes in statutory requirements, the conditions of regulatory authorities, and environmentally responsible business practices.



Tim Smith
Managing Director
February 2021
Review date
February 2023

8.5. Procedures

The CEMP will be implemented using the following procedures:

1. Compliance with the CEMP will be the responsibility of the Environmental Manager and the Site Foreman.

The Environmental Manager will be responsible for:

- Operation of the Environmental Control Systems, primarily sediment and water control to ensure contamination of the surrounding stormwater systems and streets does not occur
- Environmental compliance.
- Follow-up on complaints.
- Identification of where corrective action is required and ensuring it is undertaken with respect to environmental issues.
- Maintaining records.

The Site Foreman will be responsible for:

- Site induction.
- Daily inspections.
- Incident reporting.

2. All staff will be required to undertake an Induction, where he/she will be advised of environmental expectations, as well as health and safety requirements. A training record will be kept. All staff will be briefed on the CEMP and its requirements. The requirements of the CEMP will be an agenda item for the daily Crew Briefings / Tool Box Meetings held by Smith Crane & Construction Ltd, on-site.
3. A copy of the Land Use Consent, including Permit conditions and any relevant Site Plans and attachments, will be passed on to any operator or contractor undertaking the works prior to the works commencing.
4. All subcontractors or suppliers who have the potential to cause any adverse environmental effects will be required to go through the induction process. No subcontractor will be allowed to commence work until induction is completed and signed acknowledgement of environmental responsibilities is completed.
5. Where appropriate, subcontractors will supply evidence that they have undertaken the necessary action to comply with the CEMP.

8.6. Erosion, Dust and Sediment Control

This section is in reference to ORC RC RM21.364.01 and RM21.364.02, as well as DCC RC LUC-2021-158. This section and the adopted measures fulfils compliance with LUC-2021-158 Condition 8. Smith Crane & Construction Ltd (SCC) recognises the potential for erosion, the discharge of contaminants, sediment and the release of debris during the Works. All the SCC Crew and Sub-contractors will be briefed on the issues during the Site Induction and the issue will form an Agenda Item at the daily Tool Box Meeting. All earthworks will be undertaken with principles of best practice throughout all stages of site development (LUC-2021-158 38)

SCC proposes the following controls:

8.6.1. Erosion

- Clear and optimised staging and excavation plan to mitigate unnecessary or over excavations
- Piling method that does not create any exposed excavation surfaces to minimise exposed surface area to reduce the impacts of erosion.
- Piling method that creates minimal vibration to reduce likelihood of erosion occurring and affecting the surroundings.
- Any deep excavations will be retained with temporary retaining structures such as sheet pile walls or battered to minimise any erosion. LUC-2021-158 37.

8.6.2. Dust

- A gravel piling platform will be constructed prior to commencement of Piling works. The site will be regularly monitored for dust including on windy days when work is not occurring on site.
- To mitigate the impact of wind disturbing dust, a water supply will be accessible on site at all times to spray dust.
- If wind speed is higher than 14 m/s and the soil is dry and prone to becoming airborne, no soil disturbance or shift will occur unless dust suppressant such as spray from a water hose is applied (LUC-2021-158 31 & 40)
- Water hoses will be used where monitoring demonstrates the need for dust suppression and on windy days to provide dust suppression
- Hoarding erected around the construction site to prevent effects of dust produced by construction activities.

8.6.3. Sediment Control

With compliance to LUC-2021-158 including but not limited to Condition No. 39, the following measures will be implemented on site:

- The top of the piling platform will be constructed 400mm lower than the top of the surrounding pavement. This will ensure that sediment will be contained on site and run off from site is controlled. Existing hardstand will be maintained as long as practicable to mitigate the effects of sediment run off from rain water
- Construction phase access ramp to have geotextile fabric underneath engineered fill to prevent run off to the road carriageway. Ramp to be sloping away from road to prevent run-off (RC LUC-2021-158 27)
- Construction phase stormwater will be treated by settling or filtration on site before being discharged into the nearest sewer provided the water being discharged has a suspended solids concentration of less than 100mg/l. Flocculants will be used to settle any solids in the water. Water will be tested for contaminants prior to discharge, in the event the water is contaminated, a sucker truck will remove from site and dispose of at contaminated water treatment plant
- All loading and unloading of soil will be carried out within the boundary of the site (LUC-2021-158 41), Surplus material will be disposed of at an authorised facility (LUC-2021-158 42).
- All storm drains on/around the site shall be protected by filter fabric and sediment socks to remove sediment from the runoff stream. The filter fabric will be checked on a weekly basis and replaced as required, or after periods of heavy rainfall. (more than 5mm in the previous 6 hours).
- Should a truck need to drive on soil or bare earth we will ensure that the wheels are washed prior to it leaving the site compound.
- If any construction dewatering is required Smith Crane and Construction will apply for a trade waste consent from Dunedin City Council for dewatering.
- In the event that run off onto surrounding pavement does occur, excess puddled water will be pumped into a dammed settlement area for the sediment to settle. SCC will apply to DCC for a trade waste consent for dewatering and follow Council guidelines for discharge limits.
- SCC will apply to DCC for a trade waste consent for dewatering of the piles to comply with DCC Trade Waste Bylaw before being discharged. Groundwater will be treated in settlement tanks with pH and flocculant. Initial samples of treated groundwater will be tested prior to discharge to stormwater. All records will be maintained on site.
- Bund areas where necessary to prevent travel of sediment laden water or contaminants
- Stockpiled spoil and handling of excavated material will be limited as far as reasonably practicable. Where stockpiling is unavoidable, it will be covered as required.
- Remain alert, report any odour, oil, grease, scum, foam or organic suspended material immediately to site foreman or site environmental manager
- Crew briefed and committed to ensuring erosion, discharges and the release of debris are minimised. The Crew will be "on-alert" for any erosion, sediment, turbidity plumes, or debris releases.
- A controlled and managed Work programme which minimises exposed areas.
- Over poured concrete from piles will be cleaned up by excavators immediately to mitigate run off. No excessive concrete waste to be discharged down (or run off into) storm water systems or into the marine environment. Concrete trucks to washout at batch plant.
- All debris, spoil and waste concrete will be removed from site and disposed of at approved facility.

Site Environmental Controls



8.7. Protection of Kerbs and Access Ways

All appropriate precautions will be taken to avoid damage to access ways and kerbs during entrance and exit of site. A wide clear access way to site will be implemented prior to mobilisation, measures such as ramps will be used if required to prevent damage to sidewalks, roadways or kerbs. As per LUC-2021-158 Condition 12, any damage done to the Council's stormwater or wastewater pipes as a result from the works will be resintated to the condition indicated by the CCTV footage. Any council assets that are affected or damaged by the works will be reinstated (LUC-2021-158 45).

8.8. Groundwater

As per DCC Consent condition 4, piling and excavations will be limited to the construction plans. Pre boring has been undertaken to In the event a confining layer beneath shallow groundwater is penetrated, the area will be backfilled immediately with clean fill. Excavation will be carried with methods and staging such that ponding and drainage issues do not cause disturbance to neighbouring properties, Excess water will be pumped in dewatering tanks as required. (LUC-2021-158 34).

8.9. Noise and Vibration

A Construction Noise and Vibration Management Plan has been prepared outlining the measures employed to mitigate the effects of noise and vibration on the surrounding environment (ref. Appendix C) as per consent condition LUC-2021-158 15 and rule 4.5.4.1 in the 2GP.

SCC will ensure that all noise complies with the NZ Standard for Construction Noise (Annex E of NZS 6803: 1999 "Acoustics – Construction Noise"). Furthermore, Appendix B of the standard DIN4150-3:1999 "Structural vibration – Part 3 Effects of vibration on structures" will be complied with.

By utilising sectional screwed piling method where possible, noise and vibration levels will be vastly reduced and will mitigating the hazard on the public and neighbouring properties.

Furthermore, no activities shall occur on public holidays except in cases of operation necessity, with prior agreement of the Council.

Two roving monitors will be set up on the neighbouring structures to measure and record the vibration levels, sending alerts if the limits/ thresholds are exceeded. In the event the vibration limits are exceeded then works will stop until a solution is developed.

8.9.1. Noise Mitigation measures

The site noise mitigation measures will be based and the NZS 6803:1999 guild lines and the experience of Smith Crane and Construction in noise mitigation at piling sites. Key features of the mitigation measures will include, but will not be limited to:

1. Where possible, the quietest machinery and methods available and practicable will be used.
2. All machinery will be either new or in good condition upon its arrival at the site, and will thereafter be maintained in good condition throughout the entire duration of the project.
3. Upon arrival at the site, the machinery and plant will be checked to ensure that it is not generating unnecessary noise, and will be rectified if necessary.
4. When selecting any compressors, generators or pumps for use on the project, the degree of noise generation between models will be considered as a major factor.
5. All machinery, (including excavators, cranes and generators) will be fitted with appropriate exhaust silencers where practicable.
6. When machinery or plant on site is not required to be running, it should be switched off and not left idling.
7. Noisy plant and machinery should be strategically positioned on the site to reduce the effects on neighbours where practicable.
8. The tail gates of trucks must be closed with care and not slammed or allowed to fall closed causing unnecessary noise.
9. Horns shall not be used under any circumstances unless in the case of an emergency.
10. Any radios or music played on site must be inaudible at the nearest dwellings.

8.9.2. Noise Monitoring

The construction noise levels will be monitored in accordance with the New Zealand Standard for Acoustics - Construction Noise, and acceptable noise levels will follow the criteria for long-term duration (> 14 days) work for residential zones as detailed in Table 1 (NZS 6803:1999). Noise monitoring will be undertaken as per the approved NVMP. This consists of initial noise monitoring for noisy works such as sheet piling and vibratory compaction when first being undertaken in a new location. This will be to check that the assumed setback distances detailed in NVMP are correct.

NZ Standard and Noise Criteria

The New Zealand Standard for Acoustics – Construction Noise NZS6803:1999 sets out the procedures for the measurement and assessment of noise for existing and proposed construction work, including maintenance and piling work.

This standard recommends noise and vibration limits for construction noise and vibrations and provides guidance concerning methods of predicting and managing construction noise. It should be read in conjunction with NZS 6801:1999 Acoustics – Measurement of environmental sound and DIN 4150-3:1999 Structural Vibration – Effects of vibration on structures.

Construction must not exceed the following limits and will be measured and assessed in accordance with NZS6803:1999 Acoustics Construction Noise:

- i. **Construction noise received in residential zones and dwellings in rural and rural residential zones, and buildings housing any noise sensitive activities in any other zone**

Time of week	Time period	Duration of work					
		1. Typical duration (dBA)		2. Short-term duration (dBA)		3. Long-term duration (dBA)	
		L _{Aeq}	L _{max}	L _{Aeq}	L _{max}	L _{Aeq}	L _{max}
Weekdays	1. 6.30am - 7.30am	60	75	65	75	55	75
	2. 7.30am - 6.00pm	75	90	80	95	70	85
	3. 6.00pm - 8.00pm	70	85	75	90	65	80
	4. 8.00pm - 6.30am	45	75	45	75	45	75
Saturdays	5. 7.30am - 6.00pm	75	90	80	95	70	85
	6. 6.00pm - 7.30am	45	75	45	75	45	75
Sundays and Public Holidays	7. 7.30am - 6.00pm	55	85	55	85	55	85
	8. 6.00pm - 7.30am	45	75	45	75	45	75

- ii. **Construction noise received in industrial, Port and commercial and mixed use zones for all days of the year**

Time period	Duration of work		
	1. Typical duration	2. Short-term duration	3. Long-term duration
	L _{Aeq} (dBA)	L _{Aeq} (dBA)	L _{Aeq} (dBA)
1. 7.30am - 6.00pm	75	80	70
2. 6.00pm - 7.30am	80	85	75

8.10. Contaminated Soil

The following management of contaminated land will be in accordance with the Contaminated Land Site Management Plan (CSMP) as per LUC-2021-158 24, refer Appendix F. The council will be notified of any variation to this plan as per LUC-2021-158 25. As per LUC-2021-158 26, a copy of the CSMP will be maintained on site at all times and the items and controls will form part of the daily toolbox agenda. A detailed site investigation (DSI) has been undertaken by PDP on the site prior to commencement of the enabling works. In the DSI, a site history review to identify potential sources of contamination and soil sampling to characterise contamination of the site soils was undertaken. Areas deemed contaminated with asbestos will be delineated during the excavation and piling works and removed as per ARCP, refer Appendix G. Asbestos containing material (ACM) will be disposed of at Burnside Ltd landfill. The site soils were deemed to be contaminated with heavy metals, however low risk to the site workers undergoing enabling works activities. All soil deemed contaminated with heavy metals will be disposed of at Burnside Ltd landfill. (LUC-2021-158 32). Evidence of any soil disposal must be provided to the Council within 1 month of completing works (LUC-2021-158 48).

As per RM21.364.01 6, to minimise the spread of contaminated material all excavated contaminated material will be transported from the site and disposed of at a disposal site that holds a consent to accept the relevant level of contamination. Excavated contaminated material will be stockpiled on site in accordance with procedures identified within the certified SMP and ARCP. Excavated contaminated material shall be loaded onto trucks for removal within the site and all material will be covered during transportation off-site, (LUC-2021-158 33). Soil disturbance in contaminated zones will be overseen by a suitably qualified and experienced person as per LUC-2021-158 29.

Records on site will be kept outlining the follow:

- Estimated volume of material excavated
- Temporary onsite storage location
- Discovery of unexpected contamination
- Records of exported or imported soil from site

If stockpiling of contaminated material is required on site, this will occur in designated areas and will be covered for the duration of the project. (LUC-2021-158 30)

Accidental discovery protocol for discovering unidentified contaminated soil or items is as per the CSMP. Works must stop in this area until it has been assessed. Notification must be made to the Resource Consent Manager or email to rmonitoring@dcc.govt.nz (LUC-2021-158 46)

Evidence and dockets of disposal of contaminated material will be provided to the client and council within one month of completing works

Exposed asbestos contaminated soil will be covered by a 300mm of compacted engineered fill. If exposure is for extended periods of time, this will be covered with filter fabric i.e battered excavations.

All fill material imported to site to be clean fill only as per LUC-2021-158 35. If fill is reused on the site it will be deposited in accordance with best practice and keyed into slopes, LUC-2021-158 36.

8.11. Storage of Fuels, Lubricants & hazardous Substances

All fuels will be stored on-site in a secure site container. SCC will adopt measures to avoid spills of hazardous substances, including fuels. A hazardous materials register and material safety data sheets will be kept on site for all hazardous substances. A hazardous substances register can be found in Appendix

- Minimal quantities of hazardous substances will be stored on-site.
- Fuel will be stored a minimum of 30 metres from a storm water drain inside of a secondary containment device with the ability to hold 110% of maximum storage capacity
- With respect to spill prevention, the SCC Crew and Sub-contractors will use sorbent pads under the filling area of the machinery, plant and equipment during refilling. In the event that the sorbent pads become contaminated, they will be double bagged (black polythene bags) and

disposed of to an approved facility without delay. This forms a key proactive protocol of the bunkering process at each refuelling.

- The intent is to contain any hazardous substance spill and prevent hazardous substances entering stormwater systems. At the first indication of an oil spill, the Crew will attempt to stop further oil discharges by arresting the source of the spill (i.e. turn off a tap, replace a bung, enclose a leak). The Crew will then ensure the spill is contained by using the sausage (booms) and sorbent pads to stem any flows. including into the stormwater network. The Crew will call the Dunedin City Council as soon as practicable to notify the spill. Finally, the Crew will clean-up the spill using material from the spill kit and complete any other procedures advised by Dunedin City Council including requirements to ensure compliance with Dunedin City Council's stormwater discharge consent. Once the spill has been contained and cleaned-up, the Crew will place all contaminated material in a black double layer polythene bag, and dispose of the contaminated material to an approved facility.

8.12. Compliance Monitoring

To ensure the CEMP is being enacted and complied with, an inspection, reporting and record-keeping regime will be established.

8.12.1. Inspections

The Site Foreman will undertake routine daily inspections of the site to confirm compliance with the CEMP or identify any issues that need to be addressed. A daily inspection form will be completed. A copy of this form can be found in Appendix 2.

In addition to the daily inspection, a monthly inspection will be undertaken by the Project Engineer or the EHS Manager. The purpose of the inspection is to ensure compliance with the CEMP and identify areas where improvements can be made. An Inspection Form for monthly inspections can be found in Appendix 2. As part of the regular monthly meeting between the Client and the Contract Manager the results of the monthly audit shall be discussed.

8.12.2. Reports

A two weekly construction report will be prepared by the Project Engineer. The report include a section summarising daily inspection reports which will be attached.

Included in the monthly report for the Project will be the monthly audit inspection, and comment on any incidents and complaints.

Incident or emergency initial reports will be recorded on the Incident Form in Appendix 2. These reports will be forwarded to the Engineer as soon as practical. A final report on the incident will be reported back to the Engineer and client.

A works Completion report will be provided with 2 months of completion of excavation works, confirming compliance with method outlined in CSMP and CMP.

8.12.3. Documents

The following records will be maintained in the Site Office:

- Daily Inspections
- Monthly Reports
- CEMP – Subsequent Updates
- Sub-contractor's Agreement Form

DAILY INSPECTION FORM

Date:	Inspected by:	
Current Construction Activities:		
Weather Conditions:		
Works		
	Works being undertaken in accordance with CEMP.	
	Presence of construction debris.	
	Sediment control works working effectively.	
Dust:	Identify if dust suppression activities requires an action taken.	
Noise:	Identify any noise problem and action taken.	
Waste:	Confirm availability of litterbins. Confirm waste is being disposed of properly.	
Fuel, Lubricants & Hazardous Substances	Confirm storage and handling as per CEMP.	
Overall Comment.		
(Signed)		

Corrective or preventive action required?
Confirmation of completion preventive actions identified in previous inspections.
Confirmed by:

MONTHLY INSPECTION FORM

Date:	Inspected by:
Weather Conditions:	
Site Condition:	
Status of Records:	Comment:
▪ Public Feed Back Register	
▪ Training	
▪ Sub-contractors	
▪ CEMP Update	
▪ Daily Inspection	
▪ Quality/Safety Improvement Forms	
▪ Weekly Reports	
Noise Management:	Comment:
▪ Condition of Equipment	
▪ General Observations	
Dust Management	Comments:
▪ Review dust suppression activities.	
Stormwater Control:	Comments:
▪	
▪	
▪	
Waste Management:	Comments:
▪ Check availability of litterbins.	
▪ Comment on litter and waste disposal.	
Fuel, Lubricants & Hazardous Goods	Comments:
▪ Confirm storage location	
▪ Confirm bunds in place	
▪ Spill kits available	
Contingency:	
Confirm contingency measures can be met.	

Overall Observations and Recommendations:	
Corrective actions:	
▪ Identified ▪ Completed	
For:	Signed by:..... . Print Name:

SUB-CONTRACTOR'S ACKNOWLEDGEMENT FORM

Sub-Contractor's Name:	
Contact Details:	

I acknowledge that I have read the CMP and understand our/my responsibilities in respect of this plan.

Where applicable

In particular, we shall ensure the following:

Signature:

Date:

8.13. Machinery Condition

The condition of the machinery used has the potential to result in adverse environmental effects. All plant and equipment, including pumps and hoses, will be required to be in a good state of repair and maintained in that condition during the Project. The Site Foreman will identify plant and equipment that is in poor condition and take the necessary steps to have the equipment repaired or removed from site.

Smith crane and Construction use advanced web based pre-start checks “Quipcheck” for all equipment. This ensures key equipment is maintained to the highest standard, are regularly serviced and operators take responsibility for their select equipment.

Examples of poor condition would be:

- Fuel leak from the pump
- Broken, damaged or leaking hoses
- Leaking hydraulic fittings

8.14. Accidental Archaeological Discovery Protocol

Principal has archaeological authority of site and will perform the archaeological management to ensure requirements of authority are upheld. All on-site staff members will be go through archaeological inductions prior to working on site. Refer to Appendix B for illustration of Accidental Discovery Protocol and contact details for the site. This graphic will be printed and distributed to the site office.

The site will be subject to an Archaeological Survey prior to enabling works commencing. The Archaeological Management Plan provided by the principal will be followed with regards to any discovery during construction works. All protocol will be carried out accordingly to minimise adverse effects on archaeological and heritage sites. The use of a low vibration producing piling technique will mitigate vibration effects on all neighbouring properties.

As per ORC consent condition 20 and DCC LUC-2021-158 47

- In the event that an unidentified archaeological site is located during works, the following will apply;
- Work must cease immediately at that place and within 20 metres around the site.
- All machinery must be shut down, the area must be secured, and the Principal, Heritage New Zealand Pouhere Taonga Regional Archaeologist and the Consent Authority will be notified.

8.15. Complaints and Incidents Reporting Procedures

All staff of Smith Crane & Construction Ltd and/or any Sub-contractors will be required to immediately report any complaints and/or incidents related to site visitors, neighbouring property owners or the surrounding community to the Site Supervisor, Daniel Gardiner.

The Site Supervisor will immediately notify the Project Manager, Tom Morgan (RCP) as soon as practicable.

All complaints and/or incidents received in respect of the Works will be recorded in a Complaints Register, which will be maintained by the Site Supervisor on-site. The Register will be made available to the principal upon request.

The Register will record:

- Name and address of complainant or informant.
- Identification of nature of complaint/incident.
- Date and time of complaint/incident and alleged event.
- Weather conditions at time of complaint/incident.
- Action taken to remedy the effects of the event/incident.
- Action to prevent further similar complaints/incidents.
- Date of oral response.
- Date of written response.

Complaints Response: Timeframe for response to a complaint or incident shall be:

- (i) 24 hours - oral responses.
- (ii) 48 hours - written response which confirms details of the action proposed (or the action that has been taken).

The Project Engineer will provide a copy of all complaints and/or incidents to the Principal as soon as practical and will be responsible for following up on complaints and closing off complaints and environmental incidents, reporting actions undertaken and the resolution of issues to the Principal.

Serious complaints / incidents shall be notified to the Principal immediately but no later than 24 hours of the complaint / incident being received.

If noise or vibration complaints arise, Smith Crane and Construction Ltd will sample the noise or vibration source at the location where the perceived vibrations appear excessive. This will be undertaken within 2-4 hours of receiving the complaint. The complaint will be assessed, acted upon, and closed out within one week.

The Project Engineer will provide a written explanation of the event to the Principal within 7 working days of the complaint / incident. The information to be provided shall include the details from the Register and the results of any investigations carried out and the action taken. Minor complaints shall be to be included in monthly meetings or as otherwise required by the Principal.

9. Traffic Management Plan

Traffic Management Control have been engaged to create a TMP that will be utilised for the duration enabling works. Vehicle movements will be through access point on Dowling Street as prescribed in the TMP. Refer TMP in appendix D.

The following traffic management controls will be implemented:

- Oversized loads to be piloted and arrive on site during early to avoid congestion on the roads and mitigate disruption to traffic, while allowing appropriate management of associated noise levels.
- Trucks crossing signs to be erected at site access point on Dowling Street
- Smith Cranes will have STMS and TC Level 1 qualified personnel on site during construction works to maintain and ensure compliance with the Traffic Management Plan.
- Site boundary perimeter fencing and hoarding will be implemented for duration of the works
- Plant and equipment to be parked and locked up in designated area when not in operation.
- Truck deliveries to be scheduled to minimise disruption to public traffic during peak hours where reasonably practicable.

10. Working Hours

Site working hours are as per below table

Day	Time
Monday – Sunday	07.30 – 18:00
Public Holidays	No work permitted

11. Health and Safety

11.1. Health and Safety Management

Prior to mobilisation to site, a Site Specific Safety Plan (SSSP), Safe Work Method Statement (SWMS) and Job Safety Environmental Analysis (JSEA) for the piling works will be prepared and submitted for approval. Refer Appendix E for SSSP.

The SSSP combines Smith Crane & Construction's Health and Safety Policy, best practices and procedures that will be utilised for this Project and specific Health & Safety requirements that will be adopted to ensure the most stringent health & safety standards are employed.

This SSSP also forms part of Smith Crane and Construction's own legal compliance, as a PCBU, under the Health & Safety at Work Act 2015 (HASW Act).

The essential elements of the Plan are as follows:

- Ensure Smith Crane & Construction's team and subcontractors are well informed and that accountabilities are understood, followed and enforced
- Health and Safety awareness is planned into all work activities
- Compliance is mandated including all applicable legislative requirements for WorkSafe NZ & the Health & Safety at Work Act 2015 (HASW Act).
- The complete Plan is viewed as a "managed system" whereby lessons can be learned as a part of continual improvement through cooperation and input from the client, subcontractors, suppliers and visitors.

The purpose of site health and safety plans is to document the policy and procedures of Smith Crane & Construction Ltd to comply with the requirements of the Health and Safety at Work act 2015 and amendments made thereto, and shall cover:

1. Health & Safety Policy
2. Description of work
3. Programme
4. Location of the site
5. Hazard identification, inspection and control
6. Emergency planning
7. Accident reporting and investigations
8. Employee Training
9. Auditing

The SWMS, JSEA will be produced prior to each task being undertaken. This process will explain what equipment will be used, how it should be used, and clearly explain an overall method of work down to the appropriate PPE that is required to be worn. The SWMS will be underpinned by the relevant job safety & environmental analysis (JSEA's) or how the work will actually be completed in a systematic manner with the sequential steps to perform those work activities both safely and efficiently. These documents will be distributed to site, subcontractors, SCC office and the Principal.

The covid-19 protocols are detailed in the SSSP.

11.2. Health and Safety Policy



HEALTH & SAFETY POLICY

Smith Crane & Construction is committed to providing and maintaining an environment and system of work that is safe and without undue risk to employees and others. We will strive to protect employees from accidental harm and our property from accidental damage through consultation and a focus on continuous improvement.

It is our intention that people at all levels in our business shall be committed to achieving the highest standards of Health & Safety management throughout the organisation. To this end, all employees will be inducted to the Smith Crane & Construction standard and it shall be reinforced to them that health and safety management is an integral part of our workplace and work practices. Employees will share in the benefits of maintaining a healthy and safe place of work. Maintaining safe working practices and reporting any unsafe acts or incidents shall demonstrate their commitment to safety.

Safety is everyone's responsibility. No one in this organisation should feel compelled to work unsafely.

We shall at all times ensure that:

- Hazard identification, Risk Management and control procedures are operating throughout the workplace to prevent personal injury.
- Consultation with employee representatives regarding health and safety management is valued and occurs regularly.
- All equipment is maintained in a serviceable state and any defect or fault reported immediately.
- All employees will be provided with the necessary support for the safe and structured return to work after an injury.
- All employees are provided with necessary instructions and adequate training.
- Personal protective equipment is provided as required and its safe use understood and encouraged.
- All practicable steps and precautions are taken to ensure the safety of our customers and other visitors.
- All operations in the workplace will comply with the applicable, relevant health and safety statutory requirements.
- A comprehensive and up-to-date plan for all emergencies is in place.

Individual employees will meet their obligations to take all practicable steps to ensure their own and other health and safety, and are encouraged to become actively involved in assisting management achieve a healthy and safe workplace.

Signed:



Managing Director

Date: 3 February 2021

This Health and Safety policy shall become effective from 3 February 2021 and shall be reviewed two yearly. Next review: February 2023.

12. References

DIN 4150-3:1999. Structural vibration part 3: effects of vibration on structures.

NZS 6803:1999. Acoustics - Construction Noise. Wellington: Standards New Zealand.

Resource Management Act 1991.

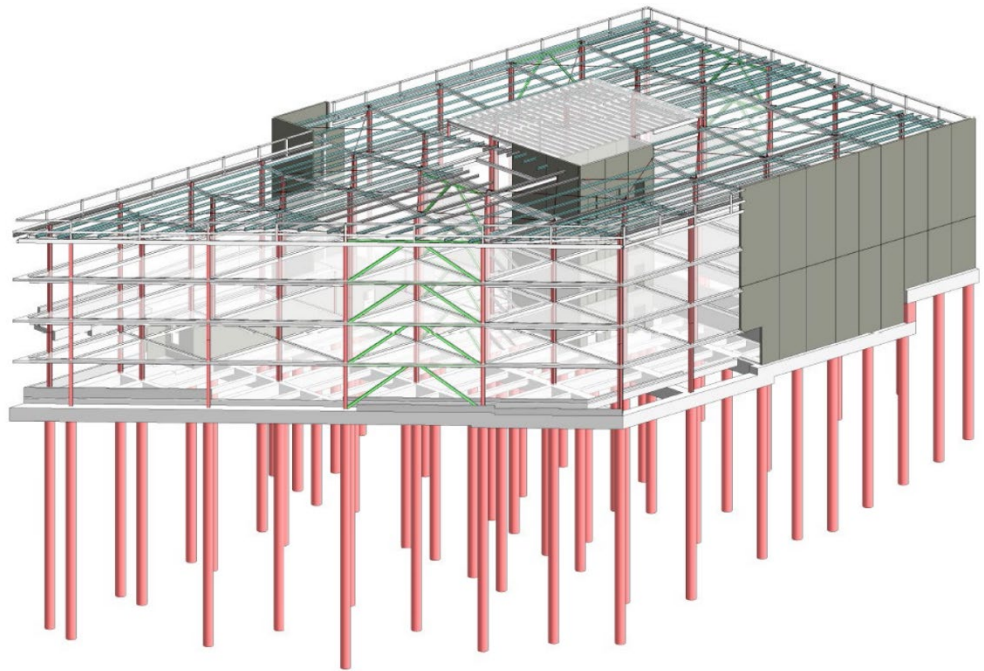
Appendix E

Noise and Vibration Management Plan by Southern Geophysical

January 2022

Noise & Vibration Management Plan

ACC Building Dunedin Enabling Works
15 Dowling St, Dunedin Central
Noise & Vibration Management Plan
Report prepared for Smith Crane & Construction Ltd



Southern
Geophysical

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Vibration management plan prepared for Southern Geophysical Ltd by:

- T. Grace (PgDip), Geophysicist

SGL Job Reference: 2276

Version 1.4 (Issued Dec 7, 2021)

Internally reviewed by:

M. Finnemore (PhD), Senior Geophysicist

Purpose of Noise and Vibration Management Plan:

This Noise and Vibration Management Plan (NVMP) outlines the measures that will be taken to mitigate noise and vibration nuisance that arises from the work and impacts on other parties. This NVMP outlines the site development process envisaged for this project and the effects of that process on neighbours and the environment in general.

Noise

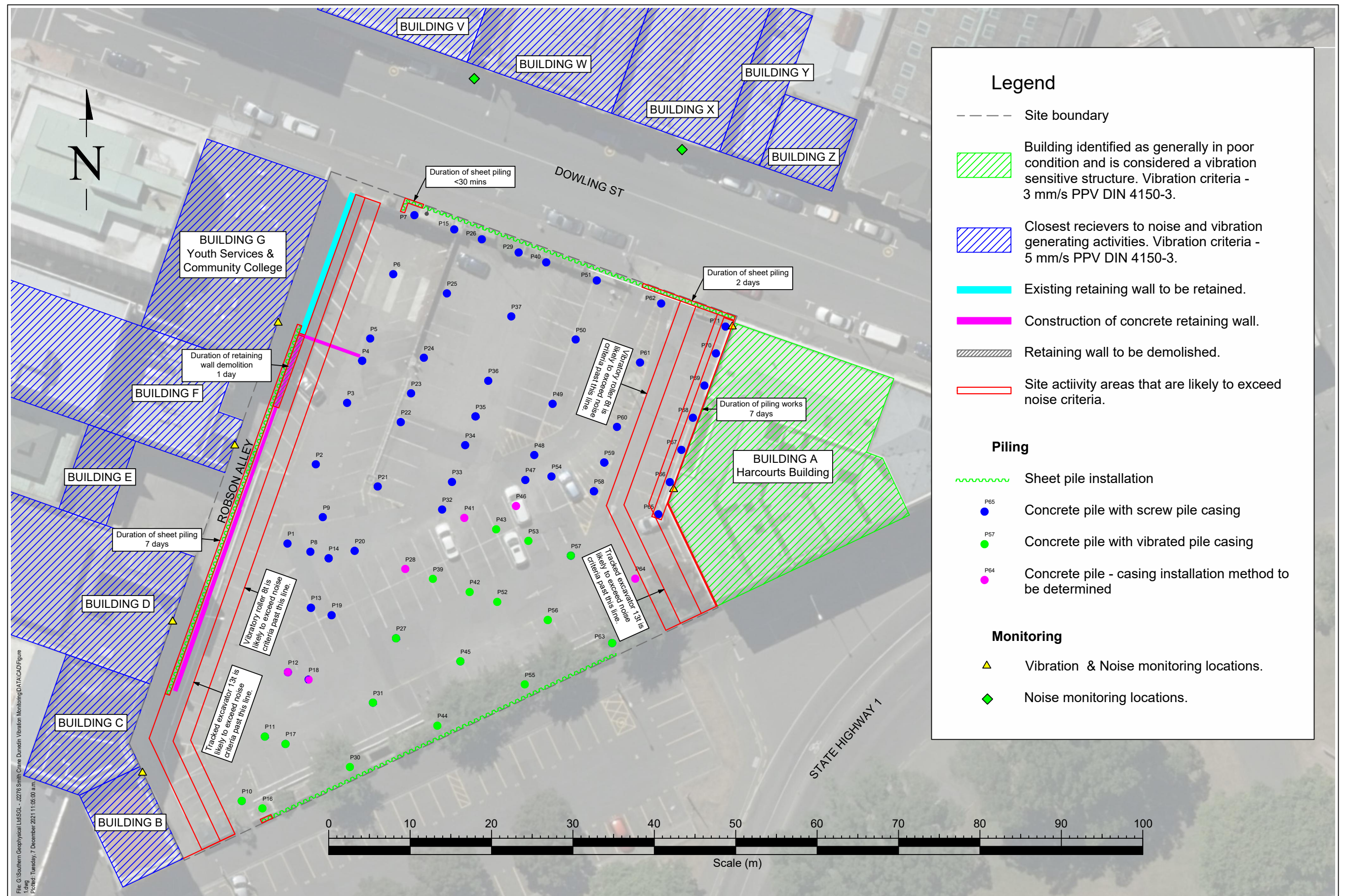
The methodology referred to in the plan has been developed to mitigate the high noise impacts usually associated with construction sites. It has been developed in collaboration with Smith Crane & Construction Ltd. The typical noise limit on a long-term construction site is 70 dB during standard construction hours. The construction methodology proposed for this project is expected to comply with that limit except for several noisy activities that are within close proximity to neighbouring properties (Figure 1). As with any large construction project the NVMP is an iterative process and may require some site and equipment specific solutions.

Vibration

The construction methodology for this site is designed to produce the lowest possible ground vibration disturbance. Construction vibration monitoring will use the German Standard DIN 4150-3:2016¹ as there is currently no New Zealand vibration monitoring standard.

Site Location

The site is located at 15, 15A and 15B Dowling St, Dunedin Central (Figure 1). Access to the site is from Dowling St to the north. The existing site is utilised as a carparking area with retaining structures and planter boxes.



Scope of Works

The proposed development at this site is for a multi-storey office building. There are several phases of site activity for this project including demolition, archaeological excavation, bulk earthworks, and construction activity.

- Demolition of the site will involve the removal of existing retaining structures using a 20T excavator. The existing carpark pavements will be removed by scraping the surface of the site.
- Temporary sheet pile retaining structures will be installed next to Robson Alley, Dowling St and on the southern site boundary (Figure 1). The vibratory hammer used to install the sheet piles will be suspended with a 100T crawler crane and driven by a Bosch hydraulic power unit.
- Bulk excavation will involve the use of a 20T excavator. The site will be excavated to different levels or heights and will include the construction of fill batters and ramp access for heavy machinery. These works will be undertaken by a 20T excavator. The site will be over excavated by 300 mm with the removed material replaced with a compacted engineering fill to be used as a platform for piling operations. Materials will be disposed of into a truck and trailer and removed from site. Compaction will involve the use of an 8T vibratory roller or 500kg plate compactor.
- Archaeological investigations will be ongoing with areas of the site surface scraped (100 mm per scrape) during general excavation activities.
- Piling works will involve the installation of 71 concrete reinforced piles. Temporary pile casings will be installed using two methods: screw pile casing and vibrated casing. Excavation of the piles will be undertaken with a drilling auger mounted on the piling Bauer BG25 Drilling Rig. If large boulders or obstructions are encountered when excavating, a crane suspended hydraulic clamshell will be used. Prefabricated pile reinforcing cages will be lowered into the pile casing. The pile casing will then be filled with concrete using a concrete pump and tremie tube setup. The temporary pile casings are removed using a vibratory hammer as pile is filled with concrete. Excess water used during the pile concreting process will be pumped into settlement tanks.
- Concrete retaining structures will be installed close to the temporary sheet pile retaining walls. This will involve concrete pouring of new floor slabs and drains prior to the installation of precast concrete wall panels. The concrete panels will be backfilled with aggregate and compacted in layers of 250 mm or less, preferably with vibratory roller. After the concrete retaining walls are installed the temporary sheet piles will be removed with the vibratory hammer.

Duration of Works

Table 1: Duration of key activities.

Activity	Duration
Earthworks	10 weeks
Sheet piling	3.5 weeks
Concrete pile installation	13 weeks

Working Hours

All noise and vibration generating activities associated with this NVMP will only be carried out during the times detailed in Table 2. Quieter activities may occur outside these times including meetings or arranging tools.

Table 2: Site working hours.

Day	Time
Monday – Sunday	07.30 – 18:00
Public Holidays	No work permitted

Noise Criteria

The construction noise levels will be monitored in accordance with the New Zealand Standard for Acoustics - Construction Noise 6803:1999⁴, and acceptable noise levels will follow the criteria for long-term duration (> 14 days) work for residential zones. All occupied buildings will comply with the noise limits in the following table.

Table 3: Noise criteria for all occupied buildings.

Day	Time	L _{Aeq} (dB)	L _{Amax} (dB)
Mondays to Saturdays	07:30 – 18:00	70	85
Sundays	07:30 – 18:00	55	85
Public Holidays	No work permitted	-	-

There are several noisy site activities that have been identified as likely to exceed the noise criteria in Table 3. These noisy activities have been highlighted in Figure 1 using the setback values in Table 7. The noisy activities include (Table 4):

Table 4: Noisy activities likely to exceed noise criteria.

Activity	Duration	Receivers
Sheet piling on Robson Alley	7 days	Buildings C-G
Sheet piling on Dowling St (west end)	<30 mins	Building G
Sheet piling on Dowling St (east end)	2 days	Building A
Pile installation adjacent to Building A	7 days	Building A
Demolition of the existing retaining wall adjacent to Robson Alley	1 day	Buildings F-G
Vibratory roller compaction and excavation adjacent to Robson Alley	TBC	Buildings B-G
Vibratory roller compaction and excavation adjacent to Building A	TBC	Building A

Vibration Criteria

The site will be monitored for excessive vibrations arising from demolition, earthworks and construction phases of the project. Building damage and human/perception response will be the main issue from the proposed site works.

Table 5: Vibration criteria.

Receiver	Limit
Any occupied buildings sensitive to noise	*5 mm/s PPV
All other buildings	In accordance with the German DIN 4150-3:2016 ¹ standard

**Occupied buildings sensitive to noise will follow the vibration limits for residential structures in accordance with the German DIN 4150-3:2016¹ standard.*

Neighbouring Properties

The closest neighbouring properties listed in Table 6 are likely to experience the highest levels of noise and ground vibrations generated by demolition, earthworks and construction related activity. The more distant properties would be expected to be within the vibration limits provided the nearest properties are compliant. The reference name for each building has been adopted from the Dilapidation and Verticality Report undertaken by Paterson Pitts Group².

The properties listed in following table are zoned as commercial and mixed-use properties under the Proposed 2GP Dunedin District Plan. Whether these buildings are used for residential and/or commercial purposes for some of these properties is unclear. It will be assumed that these properties are occupied by sensitive receivers until the use of the buildings has been determined.

Table 6: Closest receivers to noise and vibration generating activities.

Reference	Address	Distance to nearest site works (m)	Building use
Building A	9 Dowling St & 16 Queens Gardens	0	Harcourts – Commercial and Residential
Building B	5 Queens Gardens	5	La Maison – Commercial
Building C	201 Princes St	1.1	– Commercial and Residential (one residential unit on top floor)
Building D	193 Princes St	1.1	Commercial and Residential (one residential unit on top floor)
Building E	179 Princes St	12.8	Commercial
Building F	169 Princes St	1.2	Commercial
Building G	23 Dowling St	1.3	Youth Services & Community College - Commercial
Building V	1-9/30 Dowling St	17.2	Residential and Commercial
Building W	18 & 20 Dowling St	17.2	Commercial
Building X	14 & 16 Dowling St	17.2	Residential and Commercial
Building Y	12 Dowling St	17.2	Commercial
Building Z	10 Dowling St	17.2	Commercial

**The shortest possible distance from the building (measured from 1 m outside the building facade) to the nearest site works.*

Noise Sources

Table 7 details the appropriate setback distances for specific noise generating activities and equipment. The sound levels in this table have been derived from the British Standard BS5228-1:2009⁵, relevant machinery specifications and testing undertaken by Smith Crane & Construction Ltd. This table will be updated with noise level data measured on site during the initial first use of noisy equipment (Table 9). Acoustic screens or site hoarding will be used to mitigate construction noise, but any building level above the ground floor will be in direct line of sight to the noise generating activity. The noise reduction factor of 10 dB applies only to ground floor levels.

The British Standard contains few details on vibratory hammers and hydraulic power units to be used at the site. The estimated setback value in Table 7 assumes that the power unit is situated beside the vibratory hammer. The power unit is particularly noisy and will be set back approximately 10-20 metres (situated towards the centre of the site) from the vibratory hammer to reduce noise levels. Further noise testing of the vibratory hammer and power unit

will be undertaken prior to delivery to site to confirm compliance with the noise level criteria (Table 3).

The Bauer BG25 piling rig noise levels were determined from relevant machinery specifications. This assumes the maximum noise levels from the engine are applied and is not specific to the activity being undertaken by the piling rig. Piling works will commence centrally on the site to minimise noise disturbance and further noise testing will be undertaken to confirm compliance with the noise level criteria for piles closer to the site boundary (Table 3).

In the event that compliance is not achievable based on results of site sound monitoring with existing mitigation measures for works closer to the site boundary, further engineering controls or alternative methods will be implemented as well as notification and communication with neighbouring properties.

Mitigating methods involving sound rated acoustic enclosures and screens will be tested to determine their effectiveness in reducing sound levels prior to works commencing. Refer Appendix A for acoustic screen specification.

Note the calculated setback distances have been reassessed from earlier versions of this NVMP based on machinery specifications and the BSI Standards Publication: Code of practice for noise and vibration control on construction and open sites⁵ to ensure these values are as correct and accurate as possible. Furthermore, additions have been made to include new equipment. This is a LIVE document and will be updated with testing results and further information when available.

Table 7: Estimated noise levels for key site activities.

Key site activities and equipment		Activity Sound Power (dB LAw)	Activity Mitigation Sound Reduction (dBA)	Required setback (m) based on 70 dB limit with noise mitigation	Required setback (m) based on 70 dB limit with no noise mitigation
1	Site Scrap and Demolition				
a	Tracked excavator 20t (site scrape)	104	10.0	8	21
b	Tracked excavator 13t (site scrape)	96	10.0	4	10
c	Tracked excavator 20t (demolition and loading)	105	10.0	9	23
d	Tracked excavator 13t (demolition and loading)	100	10.0	6	14
2	Temporary Works and Retaining Structures				
a	ICE 23RF & power unit (sheet piling)	116	18.8	11	63
b	Tracked Crawler Crane 100t (lifting ICE23RF)	93	10.0	3	8
3	Archaeological & Bulk Excavation				
a	Tracked excavator 20t (earthworks)	97	10.0	4	11
b	Tracked excavator 13t (earthworks)	95	10.0	4	9
d	Vibratory roller 8t	101	10.0	6	16
e	Plate Compactor - 500kg	106	10.0	10	25
4	Piling Works				
a	Truck (Delivery of steel cage)				
	Truck pulling up	98	10.0	5	12
b	Bauer BG25 piling rig (screw piling & augering)	109	18.8	6	33
c	ICE 23RF & power unit (vibro-driven pile casing)	116	18.8	11	63
d	Craneage for piling (lifting casing / steel cage)	93	10.0	3	8
e	Cement mixer truck (discharging)	101	10.0	6	16

Note: The calculated setback distances have been reassessed from earlier versions of this NVMP based on machinery specifications and the BSI Standards Publication: Code of practice for noise and vibration control on construction and open sites⁵ to ensure these values are as correct and accurate as possible. Furthermore, additions have been made to include new equipment. This is a LIVE document and will be updated with testing results and further information when available.

Vibration Sources

The following table lists the activities and the equipment that is likely to generate ground vibrations at the site. It is not practicable to estimate vibration levels for a specific site, but any activity that occurs within few metres of a building will be monitored closely.

Table 8: Major vibration sources.

Activity	Equipment
Sheet piling	ICE23RF Vibratory Hammer
Vibro-driven pile casing	ICE23RF Vibratory Hammer
Screw pile casing	Bauer BG25 piling rig
Augering (all piles)	Bauer BG25 piling rig
Site Scrape	Tracked Excavator 20t
Earthworks	Tracked Excavator 20t
Demolition of Retaining Walls	Tracked Excavator 20t
Compaction of Aggregates	Vibratory Roller 8t / 500kg Plate Compactor

Mitigation

Noise

The key site activities that will involve noisy equipment will use mitigating measures detailed in the following table. All enclosures and acoustic sleeves will use acoustically rated Soundex Noise Control Curtains (refer Appendix A).

Table 9: Mitigation of noisy activities and equipment (information supplied by Smith Crane & Construction).

Activity & Equipment	Mitigation
Sheet piling and concrete pile casing installed with ICE23RF vibratory hammer and Bosch hydraulic power units.	The Bosch power unit will be covered by an acoustic enclosure with one open side that will be rear facing. The vibratory hammer will have an acoustic sleeve that covers the entire hammer and extends to just below the top of the pile. The Bosch hydraulic power unit will be positioned central to the site and at the maximum practicable extension from the hammer.
Screw pile casing and augering with the Bauer BG25 Piling Rig.	The Bauer BG25 will have an acoustic enclosure around the engine with the rear side open. The upper rotary parts that are subject to high noise levels will be enclosed with an acoustic rated sleeve.
Tracked excavators 20t and 13t (earthworks and demolition).	Site hoarding will be erected at the site boundaries. This will mitigate noise for building ground floor levels only. Any level above ground floor will not be protected. The excavator will track slowly as is practicable. When within 10 m of any noise sensitive receiver the 13t excavator will be used.
Vibratory roller 8t and 500kg plate compactor (compaction).	Site hoarding will reduce the noise levels from the compactors for building ground floor levels only. All compactors will be throttled down gently and will track as slowly as is practicable.

The site noise mitigation measures will be based on the NZS 6803:1999³ guidelines and the experience of Smith Crane & Construction Ltd in noise mitigation at construction sites. To mitigate construction noise levels, the following general measures will be undertaken:

- Where possible, use the quietest machinery and methods available.
- All machinery will be either new, or in good condition upon its arrival at the site and will thereafter be maintained in good condition throughout the entire duration of the project.
- Upon arrival at the site, the machinery and plant will be checked to ensure that it is not generating unnecessary noise and will be rectified if necessary.
- When selecting any compressors, generators, or pumps for use on the project, the degree of noise generation between models will be considered as a major factor.
- All machinery, (including excavators, cranes, and generators) will be fitted with appropriate exhaust silencers where practicable.
- When machinery or plant on site is not required to be running, it should be switched off and not left idling.
- Noisy plant and machinery should be strategically positioned on the site to reduce the effects on neighbours where practicable.
- The tail gates of trucks must be closed with care and not slammed or allowed to fall closed causing unnecessary noise.
- Where appropriate, use acoustic enclosures or noise reduction screens for machinery or noisy work areas.
- Noise caused by friction in rollers, trolleys or other machines can be reduced by proper lubrication.

Vibration

The key site activities that will involve vibration generating equipment will be mitigated as detailed in the following table:

Table 10: Mitigation of vibration generating activities and equipment (information supplied by Smith Crane & Construction).

Activity & Equipment	Mitigation
Sheet piling and concrete pile casing installed with ICE23RF vibratory hammer and Bosch hydraulic power units	The vibratory hammer chosen for this project is varying frequency, resonance free hammer to mitigate disturbance when compared to other vibratory hammers. The frequency of the vibratory hammer impacts will be set high and the speed at which the sheet piling is driven into the ground will be undertaken at a steady pace particularly when near sensitive receivers. Steel casing will be installed in short sections and excavated frequently to reduce the friction on the casing during installation.
Screw pile casing and augering with the Bauer BG25 Piling Rig.	This piling method was selected to minimise noise and vibration to neighbouring properties. Pile rig attachments or tooling will be placed (not dropped) on the ground. The piling rig will be tracked slow across the site to minimise vibrations.
Tracked excavator (earthworks and demolition)	The tracked excavator will track slowly across the site to minimise vibrations. The concrete breakout from demolition of the existing retaining wall should only be broken into smaller sizeable blocks away from sensitive receivers.
Vibratory roller 8t and 500kg plate compactor (compaction)	The temporary sheet piling is an alternative design to minimise the required backfill and compaction close to the boundary. The roller will be used centrally on the site and where required, a plate compactor will be used near the boundary to minimise disturbance. The vibratory roller and plate compactor should be throttled gently. If possible, the frequency of the vibratory roller or plate compactor impacts will be increased.

To mitigate the risk of building damage to the neighbouring properties, the following general measures will be undertaken:

- Where practicable, use machinery and methods that produce the lowest source of vibrations.
- When loading or unloading trucks, care must be taken to ensure materials are not dropped from height.
- When loading trucks, load softer material at the bottom.
- Limit truck movement and speeds onsite and position loading zones away from sensitive structures.
- Heavy machinery attachments or tools must be placed carefully on the ground.
- Heavy machine operators will track the machines as slowly as is practicable (fast tracking across a site can generate high vibration levels).
- Workers will be made aware of the impacts of vibration and the methods that can be used to minimise its generation before works begin on site.

As site response to vibration is poorly known for the site, it is recommended that were possible initial “runs” of vibration and noise equipment are conducted as far as possible from sensitive structures and residential receivers.

Monitoring

Noise

Noise levels at the site will be measured using a calibrated Class 1 sound level meter. Measurements will be undertaken in accordance with NZ 6801:1999⁴ and NZ 6803:1999³ and will be recorded on the survey sheet in Table 11. Noise level measurements will be undertaken at the following times:

- During the first use of any equipment or activity that generates high noise levels.
- Noisy activities or equipment will be sampled at regular intervals (must not exceed two weeks) for the duration of the project to ensure ongoing compliance.
- Within two working days of a noise complaint at the location where the perceived noise levels were experienced during normal use of the noisy equipment or activity.

Table 11: Noise measurement survey sheet.

Date/time	Noise source activity or equipment	Noise receiver location	Noise source to receiver distance (m)	L _{Aeq(t)} (dB)	L _{Amax} (dB)

Noise monitoring will be undertaken during the first use of noisy equipment (Table 9). The noisy equipment will be sampled to characterise the activity noise levels. Noise levels will also be sampled at a minimum of two locations at the commercial storefronts on Dowling St (Buildings V-Z in Figure 1) when noisy equipment is operating within 10 m of northern site boundary. The noise level data will be used to update the setback distances in Table 7 and this will be referred to when positioning or operating noisy equipment onsite.

If noise complaints arise, the activity noise levels will be measured at the perceived location as indicated by the complainant during normal use of the noisy equipment. If the noise levels are in excess of the noise criteria outlined in Table 3, noise mitigation measures will be used to reduce noise levels. The activity noise levels will then be measured again to determine if noise levels are within limits. Noise measurements should be made outside the building approximately 1 m from the wall most exposed to the sound under investigation³.

Vibration

Two calibrated Texcel ETM vibration monitoring units will be used to measure vibration levels at the site. The vibration monitors will be set to record continuously between the hours of 6:30 – 19:00 with background vibration levels measured every minute. In addition to the continuous measurements, any vibration event with a Peak Particle Velocity (PPV) of 0.3 mm/s or greater will be recorded. The vibration monitoring units will be set to automatically notify (via SMS or email) the site manager for any vibration event within 80% of the vibration criteria. Vibration measurements will be in accordance with the following table.

Table 12: Vibration guidelines from DIN 4150-3:2016¹ for assessing effects of vibrations on buildings.

Type of structure	Vibration thresholds for building damage, PPV (mm/s)				
	Short term			Long term	
	At foundation			Uppermost floor	Uppermost floor
	0 to 10 Hz	10 to 50 Hz	50 to 100 Hz*	All frequencies	All frequencies
Commercial/industrial	20	20 to 40	40 to 50	40	10
Residential	5	5 to 15	15 to 20	15	5
Sensitive/historic	3	3 to 8	8 to 10	8	2.5
*For frequencies greater than 100Hz, the maximum vibration velocity specified in this column is applied.					

The Harcourts Building (Building A in Figure 1) is within close proximity to the site and is likely to be susceptible to vibration related activity. A vibration monitor will normally be positioned centrally on the west side of the building (Figure 1) to measure ground-borne vibrations from the surrounding site. This monitor will be moved to the north-west corner of building during sheet piling operations along Dowling St. The vibration threshold for this building will be set at a Peak Particle Velocity (PPV) limit of 3 mm/s in accordance with the German Standard DIN 4150-3:2016¹ for sensitive structures (Table 12).

A second 'roving' vibration monitor will be used to measure vibrations at the buildings (Buildings B-G) on the west side of the site (Figure 1). The vibration threshold for these buildings will be set at a PPV limit of 5 mm/s in accordance with the German Standard DIN 4150-3:2016¹ for residential structures (Table 12). This vibration monitor will be positioned at the closest mounting point (Figure 1) to the site activity or equipment generating the highest vibration levels. It will be the requirement of the Smith Crane & Construction Ltd site manager to move the vibration monitor accordingly. Southern Geophysical Ltd will be notified when the vibration monitor has been moved and a site photograph supplied. This vibration monitor may be temporarily used to investigate any complaints related to vibration activity.

The vibration monitoring units will be set to automatically notify (via SMS or email) the site manager if vibrations levels are within 80% of the vibration criteria outlined in Table 5. Vibration measurements are continuously recorded during the site working hours (Table 2) and all data is remotely downloaded to the Southern Geophysical Ltd office in Christchurch.

If vibration levels do exceed the recommended levels, the activity or equipment generating the excessive vibrations will cease. Smith Crane and Construction Ltd may in the first instance use measures to mitigate the vibrations. This may involve simple changes including changing the type of equipment, how the equipment is used or by increasing the distance between the vibration source and the building being monitored. If there is no practicable way to reduce the vibration levels, Smith Crane and Construction Ltd will in consultation with the Dunedin City Council undertake a review of the earthworks or construction methodology before work can continue.

Building Condition Survey

A building condition survey was undertaken on Building A (Harcourts Building) by surveying firm Paterson Pitts Group². The survey identified two rooms extending from the main building that are in poor condition with concrete cracking on the floors and iron roofs that are in a state of disrepair. In general, the external brick walls exhibit cracks, spalling, mortar repairs and slight variations in wall verticality. The existing building fabric appears to be in an overall poor condition. The observed degradation establishes a baseline for determining whether construction vibrations are having an effect on the structure. Daily visual inspections of the Harcourts Building will be undertaken by Smith Crane & Construction Ltd.

Site Supervision

The site will always be supervised by a competent site supervisor trained and experienced in earthworks or construction site management. At all times during working hours a site supervisor or delegated stand-in site supervisor will be present on the site and be competent to deal with project site issues.

Site Operatives Training

Training and proof of competency records will be held on site for all machine operators. All other site operatives will be required to hold a Site Safe Passport or alternative Safety Training Record. This may be an in-house training record.

Reporting and Communication

Reporting

Southern Geophysical Ltd will provide a weekly vibration monitor report to Smith Crane & Construction Ltd and to the Dunedin City Council via rcmonitoring@dcc.govt.nz. Note that vibration levels are actively monitored during the site development process with automatic notifications (via SMS or email) sent to the site manager if the vibration levels are within 80%

of the vibration criteria. Text notifications can be provided to machine operators where necessary.

Communication with Neighbours:

The residential and commercial premises operating adjacent to the construction site will be advised of any noise or vibration generating activities for the duration of these works. It is important to note that even low levels of vibration may be experienced by adjacent properties but not necessarily be of an amplitude and frequency to cause damage to their building.

Good communication with neighbours can dramatically reduce noise and vibration complaints. Scheduling the use of equipment at times when buildings are unoccupied or when the occupants are less sensitive to noise and vibrations can alleviate complaints. This will need to be determined by discussion with the affected neighbours.

Complaints Procedure

If noise or vibration complaints arise, Smith Crane and Construction Ltd will sample the noise or vibration source at the location where the perceived vibrations appear excessive. This will be undertaken within two to four hours after the complaint has been received. The complaint will be assessed, acted upon, and closed out within one week.

The complaints process involving the Smith Crane & Construction Ltd, project manager and site manager will be implemented as follows:

- All complaints will be directed in the first instance to the Smith Crane & Construction Ltd designated site manager.
- This person will have responsibility to ensure that the complaints procedure is enacted.
- The site will have prominently displayed the works signboard with the 24-hour contact number of the site manager.
- The site manager will maintain an onsite complaint register and log of actions taken.

The register will include:

- a. A standard complaint form.
 - b. Date of complaint.
 - c. Complainant name.
 - d. Actions taken.
 - e. Report back to complainant.
 - f. Close out.
- The management of complaints during the delivery phase will receive high level attention from the Smith Crane & Construction Ltd project/site management.

- Ensuring that complaints are noted, acted upon, and closed out will be a Key Performance Indicator adjudging the successful completion of these works.

References:

- ¹ Deutsches Institut für Normung. Vibrations in buildings – Part 3: Effects on structures. English translation of DIN 4150-3:2016.
- ² Paterson Pitts Group. D17873 Dilapidation and Verticality Report. July 2021.
- ³ New Zealand Standard. Acoustics – Construction Noise. NZS 6803:1999
- ⁴ New Zealand Standard. Acoustics – Measurement of environmental sound. NZS 6801:1999.
- ⁵ BSI Standards Publication. Code of practice for noise and vibration control on construction sites – Part 1: Noise. BS5228-1:2009.

Appendix A: Acoustic Screen Specification

Soundex Curtain

This BS EN 32.9 dB rated curtain has become the preferred choice of many contractors, boasting almost unrivaled attenuation and noise absorption.

Designed specifically to provide high-absorption acoustic screening around site plant and other high noise emitting activities, its unique Velcro fastening ensures a seamless noise barrier with eyelets on all edges to enable easy suspension. The fold-and-lay-flat design enables easy storage and transportation.

Features & Benefits

- ✓ Up to 32.9dB reduction in noise
- ✓ Tested and certified to be hung from scaffolding BS57955
- ✓ Fire resistant and weatherproof
- ✓ Non-irritant acoustic material with no glass-fibre
- ✓ Velcro connections to ensure optimum performance

Key Applications

- ✓ Ideal for creating temporary enclosures for piling rigs, or compressors and generators
- ✓ Suspended off scaffold façades during demolition
- ✓ Suspended off temporary fencing during street utility works
- ✓ Suspended off fencing surrounding generators
- ✓ Lining internal party walls and hoarding

Product Testing and Certification

- ✓ Laboratory Acoustic Test BS EN ISO 10140-2:2010 & BS EN ISO 717-1:2003
- ✓ Laboratory Absorption Test BS EN ISO 354:2003 & BS EN ISO 11654-1997
- ✓ PVC Containment Sheets BS 7955:1999 Clause 4.3: tensile Strength, Clause 4.4: Attachment Point Strength, Related Specification: BS 2576:1996.
- ✓ Bureau Veritas Fire Test BS 476 Part 12 1991
- ✓ Bureau Veritas Field Test to BS 5821:1984
- ✓ Exova/BTTG Fire Test BS 7837:1995 (2015)
- ✓ DMA Curtain Wind Load Calculations BS 5975





SOUNDEX®

Soundex Curtain



Technical data

Size	1250 x 2050mm
Weight	11.7kg each
Maximum Sound Absorption	46% @ 250Hz 94% @ 1000Hz 98% @ 5000Hz
Maximum Sound Attenuation	18.8 dB @ 250Hz 22.9 dB @ 1000Hz 32.9 dB @ 5000Hz

Test data at various Hz.

(Product Testing and Certification BS EN ISO 717-1 : 1997; BS EN ISO 345 : 2003; EN ISO 11654 : 1997)

Hz.	250	500	1250	2500	4000	5000	Rw Value
Reduction dB	18.8	22.8	22.5	27.5	31.1	32.9	24
Absorption α s	0.46	0.70	0.96	0.83	1.00	0.98	0.70

Fire ratings

Acoustic Vinyl Membrane	M2 / B1 / BS / B-s2-d0 / NFPA701
Acoustic Core	Class 0
Acoustic Mesh Membrane	M2
Printing	Water Based Ink



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RVTGROUP™

Protecting long-term health on site

Appendix F

LUC-2021-158/B Staging Plan



Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

