
NOISE IMPACT ASSESSMENT FOR THE PROPOSED GRANGER BAY PRECINCT DEVELOPMENT, V&A WATERFRONT, CAPE TOWN

Prepared by:

DDA ENVIRONMENTAL ENGINEERS



PO Box 60034

7439 Table View

Tel: (021) 551 1836

Cell: 082 684 8082

Submitted to:

INFINITY ENVIRONMENTAL

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DECLARATION OF INDEPENDENCE

The specialist appointed in terms of the Regulations_

I, Demos Dracoulides, declare that—

General declaration:

I act as the independent specialist in this application;

I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;

I declare that there are no circumstances that may compromise my objectivity in performing such work;

I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;

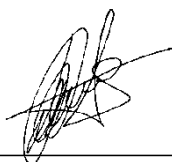
I will comply with the Act, regulations and all other applicable legislation;

I have no, and will not engage in, conflicting interests in the undertaking of the activity;

I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;

All the particulars furnished by me in this form are true and correct; and

I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

DDA Environmental Engineers

Name of company (if applicable):

Date: 30/06/2026

DETAILS OF SPECIALIST

Demos Dracoulides has 25 years of consulting experience specialising in air quality and noise pollution. He is the Director of DDA Environmental Engineers.

Over the past years, Demos Dracoulides has been involved in the development of industry-specific emission inventories, establishing the impacts on air quality in a great number and variety of projects, including AEL applications, emissions testing reporting to the NAEIS system, etc. These include projects for petrochemical and chemical industries, minerals processing and mining, the ceramic industry, power generation, landfill facilities, incineration operations, wastewater treatment plants, airport facilities, etc.

He has also been active in the noise and vibration fields. He has been involved in the development of industry-specific noise and vibration models, including power stations and transformer stations, as well as airports, such as the Cape Town International Airport and the Cape Winelands Airport. He has participated in teams for the design, technical specifications and noise minimisation for projects such as the Gautrain, the Cape Town International Airport Realignment, the Ankerlig and the Gourikwa CCGT Power Stations, as well as the proposed Pebble Bed Modular Reactor Demonstration Power Plant in South Africa.

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Terminology, Acronyms and Definitions

Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-weighted sound level:	A frequency weighting filter used for the measurement of sound pressure levels designed to reflect the acuity of the human ear, which does not respond equally to all frequencies.
dB(A):	Unit of sound level. The weighted sound pressure level by the use of the A metering characteristic and weighting specified in the American National Standards Institute (ANSI) Specifications for Sound Level Meter.
decibel (dB)	A measure of sound. It is equal to 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference sound pressure. The reference sound pressure used is 20 micropascals, which is the lowest audible sound.
Equivalent A-weighted sound level (L_{Aeq}):	A-weighted sound pressure level in decibels of continuous steady sound that within a specified interval has the same sound pressure as a sound that varies with time. This is an average sound level that would produce the same energy equivalence as the fluctuating sound level actually occurring.
Equivalent continuous rating level ($L_{Req,T}$):	The equivalent continuous A-weighted sound level ($L_{Aeq,T}$), measured or calculated during a specified time interval T, to which adjustments are added for tonal character, impulsiveness of the sound and the time of day.
Integrating averaging sound level meter	A Sound Level Meter which accumulates the total sound energy over a measurement period and calculates an average.
L_{A10}	The noise level exceeded 10% of the measurement period with 'A' frequency weighting calculated by statistical analysis. It represents the higher noise levels during the measurement interval. It is generally utilized for traffic noise impacts.
L_{A50}	The noise level exceeded 50% of the measurement period with 'A' frequency weighting calculated by statistical analysis.
L_{A90}	The noise level exceeded 90% of the measurement period with 'A' frequency weighting calculated by statistical analysis. It gives an indication of the underlying noise level, or the level that is almost always there in between intermittent noisy events. It is generally utilized for the determination of background noise, i.e. the noise levels without the influence of the main sources.
L_{eq}	Equivalent continuous sound pressure level of a steady state sound that has the same sound energy as that contained in the actual time-varying sound being measured over a specific time, referenced to the sound pressure level of 2×10^{-5} Pa.
L_{pA}	Sound pressure level with 'A' frequency weighting.
$L_{pA \max}$	Maximum sound pressure level with 'A' frequency weighting.
L_{Rdn}	Equivalent continuous Day-Night rating level
L_{WA}	Sound power level in dB(A), referenced to the sound power of 10^{-12} Watt.
NSR	Noise-Sensitive Receivers.
PWL	Power level in dB(A).
Residual noise	Sound in a given situation at a given time that excludes the noise under investigation but encompasses all other sound sources, both near and far.
SANS	South African National Standard.
WHO	World Health Organisation

1 INTRODUCTION

V&A Waterfront Holdings (Pty) Ltd. (V&A Waterfront) proposes to reclaim land and construct coastal protection infrastructure to support new mixed-use development in the Granger Bay Precinct, which lies east of Beach Road and north of Granger Bay Boulevard in Cape Town (Figure 1-1). The proposal includes the replacement of existing coastal defence structures with a new revetment and breakwaters, and reclamation of land from Table Bay landward of these new structures, as well as new mixed-use development in the area landward of the existing coastal defence infrastructure.

The proposed development incorporates the reclamation of approximately 3.2 hectares of land from Table Bay to accommodate new coastal public amenities and new mixed-use development. This reclamation will be protected by a new permanent rock revetment and two ('east' and 'west') breakwaters forming a new protected bay approximately 3 hectares in extent. The west breakwater will extend approximately 90 metres into Table Bay, and the east breakwater approximately 140 metres. A revetment connecting the two breakwaters will be approximately 540 metres long. No development will occur in the new bay formed by the breakwaters and revetment. The proposed revetment and breakwaters will be constructed in phases over approximately 3 years.

DDA Environmental Engineers (DDA) was appointed by Infinity Environmental to undertake a noise impact assessment for the construction phase of the proposed Granger Bay Precinct development.

The present report describes the baseline noise measurements, the noise modelling and the noise impact assessment for the construction phase of the development.



Figure 1-1. Locality Map

1.1 Terms of Reference

The proposed terms of reference for the noise impact assessment were:

- Define and describe the baseline noise conditions around the development;
- Provide an overview of relevant legislation, standards, guidelines and policies on noise;
- Identify the noise-sensitive receptors in the area that may be affected;
- Use a 3-dimensional model to determine the future noise contours representing the worst-case noise levels associated with the proposed construction;
- Assess the impacts of the noise on the surrounding communities and the environment, using the prescribed impact assessment methodology;
- Recommend mitigation measures to reduce impacts, where applicable. Assess the effectiveness of proposed mitigation measures using the prescribed impact assessment methodology; and
- Recommend and draft a monitoring plan to ensure the correct implementation and adequacy of recommended mitigation and management measures, if applicable.

1.2 Construction Phases

The proposed EIA study area will be approximately 11.76 ha, including the land reclamation of approximately 3.2 ha of land from Table Bay, which includes 0.8ha for the breakwaters. The land reclamation will be protected by a new permanent rock revetment and two breakwaters forming a new protected bay 3 ha in extent. The west breakwater will extend approximately 90 metres into Table Bay, and the east approximately 140 metres. A revetment connecting the two breakwaters will be approximately 540 metres long.

Key elements of the proposed marine infrastructure forming part of the development include:

- Breakwaters and revetments: Provides protection from wave action and coastal erosion.
- Capping: Provides vehicular and pedestrian access to the breakwaters and revetments.
- Quay with a vertical wall and steps with provision for temporary walk-on moorings: To provide a space for public events and facilitate the mooring and boarding of vessels.
- Slipway and permanent walk-on mooring: To support the launching and retrieval of recreational boats.
- Stormwater outfalls: Culverts through the revetment for all stormwater discharge.

The marine works for land reclamation will be the necessary first phase of the development and will be phased over a period of around 2.5 years (see Figure 1-2). During this period, construction activities will progressively move across the site, with the active work face concentrated at different locations as each phase of the reclamation is completed. The main noise will be generated during the construction of the breakwaters and revetments, which are designed as rubble mound structures, with armoured slopes that will back onto the land once reclamation behind them is complete.

Based on the conceptual construction programme and the location of the nearest sensitive receptors relative to the project site, three representative construction noise modelling scenarios were developed to assess the worst-case noise impacts associated with the different stages and locations of the active construction works.

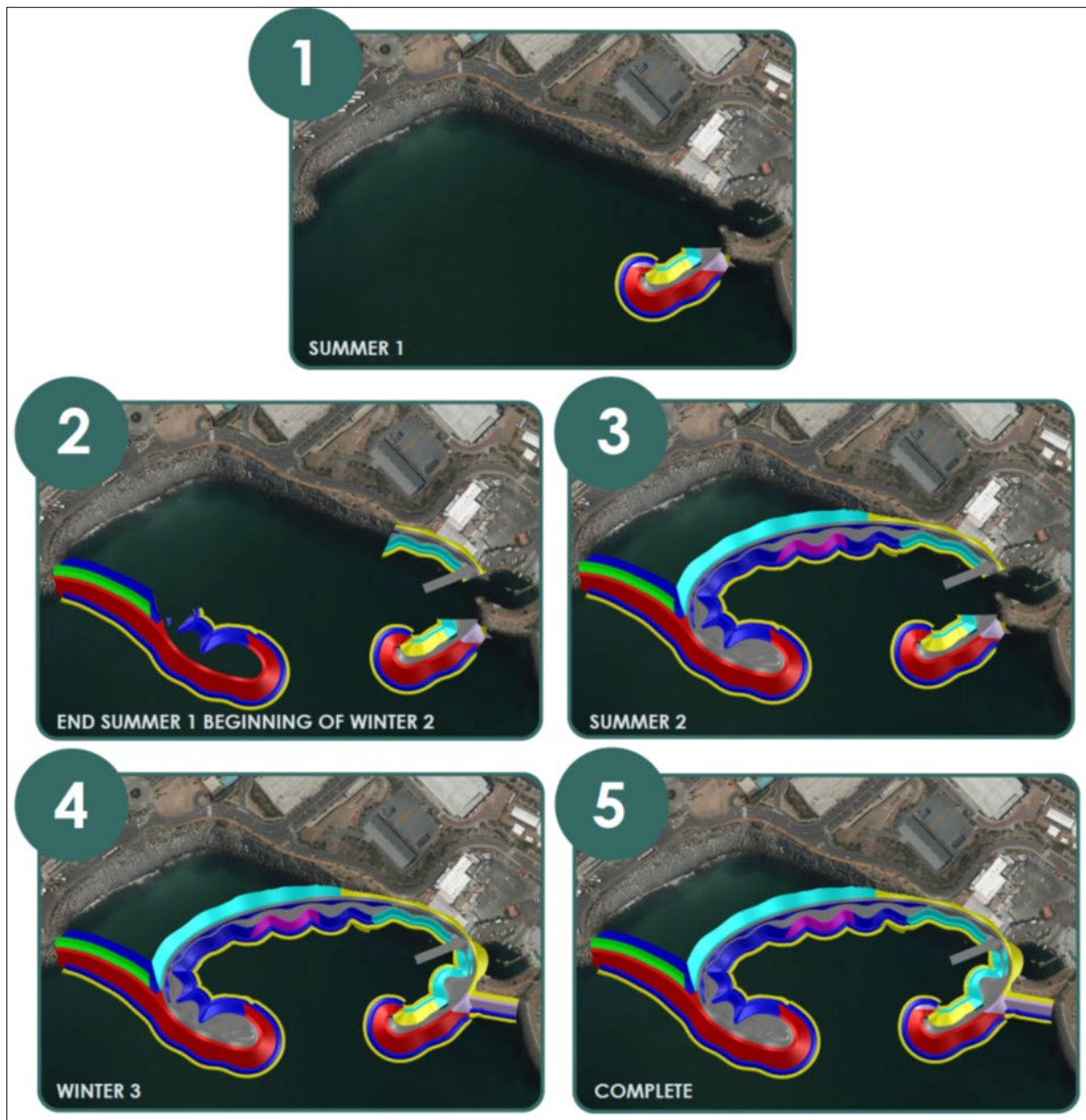


Figure 1-2. Conceptual Construction Schedule for Granger Bay Phase 0 Infrastructure (PRDW, 2025)

1.3 Methodology Overview and Modelling Scenarios

The construction noise impact assessment was undertaken to evaluate the potential daytime noise impacts associated with the proposed marine reclamation works at Granger Bay. The assessment considers the progression of construction activities across the site and identifies the periods during which surrounding sensitive receptors are expected to experience the highest construction noise exposure.

To capture the variation in construction activities throughout the programme, the following scenarios were modelled and assessed:

- Baseline Scenario: Existing daytime ambient noise environment comprising road traffic and other existing environmental noise sources;
- Construction Scenario 1: Construction activities focused on the western breakwater, replacement slipway and adjacent revetment;
- Construction Scenario 2: Construction activities focused on the middle reclamation area;
- Construction Scenario 3: Construction activities focused on the eastern breakwater; and
- Mitigated Construction Scenario 1: Construction Scenario 1 incorporating a 3 m temporary noise barrier along the western haul road.

The baseline scenario establishes the existing acoustic environment against which the predicted construction noise impacts were assessed. Construction Scenarios 1 to 3 represent the progression of the active construction work face across the site and assess the corresponding cumulative daytime noise environment at the surrounding sensitive receptors. The mitigated scenario evaluates the effectiveness of the proposed temporary noise barrier in reducing construction noise during the worst-case construction phase.

The construction noise assessment was undertaken using the CadnaA (Computer Aided Noise Abatement) environmental noise model. Existing road traffic, construction equipment, internal haul routes and representative offloading locations were incorporated into the model to predict cumulative daytime equivalent sound pressure levels (L_{Aeq}) at the surrounding sensitive receptors.

The assessment has been undertaken with due consideration of the following South African National Standards:

- SANS 10103:2008 – *The measurement and rating of environmental noise with respect to land use, health, annoyance and speech communication*; and
- SANS 10328:2008 – *Methods for environmental noise impact assessments*.

The modelling results indicate that the highest construction noise impacts occur during the initial construction phase, when the active work face is located closest to the Waterclub buildings on the western side of the site. As construction progresses eastwards across the reclamation area, the increasing separation distance between the active work face and the surrounding sensitive receptors results in progressively lower construction noise impacts. Additional mitigation modelling demonstrated that the installation of a 3 m high temporary noise barrier along the western haul road provides an effective reduction in construction noise at the nearest residential receptors, resulting in cumulative daytime noise levels that remain broadly consistent with the existing urban waterfront acoustic environment.

2 NOISE BASICS, GUIDELINES AND LEGAL REQUIREMENTS

2.1 Noise Basics

Sound is created when an object vibrates and radiates part of that energy as acoustic pressure or waves through a medium, such as air, water or a solid. Sound and noise are measured in units of decibels (dB). The dB scale is not linear but logarithmic. This means, for example, that if two identical noise sources, each producing 60 dB, operate simultaneously they will generate 63 dB. Similarly, a 10-decibel increase in sound levels represents ten times as much sound energy.

The human ear can accommodate a wide range of sound energy levels, including pressure fluctuations that increase by more than a million times. The human ear is not equally receptive to all frequencies of sound. The A-weighting of sound levels is a method used to approximate how the human ear would perceive a sound, mostly by reducing the contribution from lower frequencies by a specified amount. The unit for the A-weighted sound levels is dB(A).

Small changes in ambient sound levels will not be detectable by the human ear. Most people will not notice a difference in loudness of sound levels of less than 3 dB(A), which is a two-fold change in the sound energy. A 10-dB(A) change in sound levels would be perceived as doubling of sound loudness.

The level of ambient sound usually varies continuously with time. A human's subjective response to varying sounds is primarily governed by the total sound energy received. The total sound energy is the average level of the fluctuating sound, occurring over a period of time, multiplied by the total time period.

In order to compare the effects of different fluctuating sounds, one compares the average sound level over the time period with the constant level of a steady, non-varying sound that will produce the same energy during the same time period. The average of the fluctuating noise levels over the time period is termed L_{eq} , and it represents the constant noise level that would produce the same sound energy over the time period as the fluctuating noise level.

Percentile parameters (L_n) are also useful descriptors of noise. The L_n value is the noise level exceeded for "n" percent of the measurement period. The L_n value can be anywhere between 0 and 100. The two most common ones are L_{10} and the L_{90} , which are the levels exceeded for 10 and 90 percent of the time respectively. The L_{90} has been adopted as a good indicator of the "background" noise level. The L_{10} has been shown to give a good indication of people's subjective response to noise.

Sound levels diminish with distance from the source because of dispersion, and for point noise sources the calculated sound pressure is:

$$L_{p2} = L_{p1} - 20 \log(r_2/r_1)$$

Where: L_{p2} = sound pressure level in dB at distance r_2 in meters, and

L_{p1} = sound pressure level in dB at distance r_1 in meters.

In the case of a line source (e.g. conveyor belt, road, etc.) the sound pressure is:

$$L_{p2} = L_{p1} - 10 \log(r_2/r_1)$$

In simple terms, for point sources, the distance attenuation would be approximately 6 dB(A) per doubling of distance from the source. For line sources the same attenuation is approximately 3 dB(A).

The atmospheric conditions, interference from other objects and ground effects also play an important role in the resulting noise levels. For example, "hard" ground, such as asphalt or cement transmits

sound differently than “soft” ground, such as grass. The first ground type promotes transmission of sound, thus producing louder sound levels farther from the source. In general terms, the above effects increase with distance, and the magnitude of the effect depends upon the frequency of the sound. The effects tend to be greater at high frequencies and less at low frequencies.

Typical noise levels for various environments are shown in the following figure.

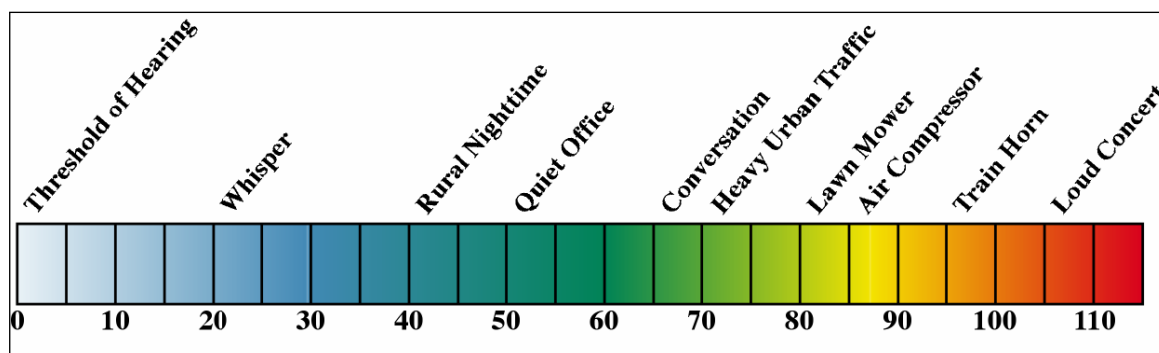


Figure 2-1. Typical Sound Levels (dB(A))

2.2 Noise Guidelines and Regulations

In general, the standards applied by the international community are similar for different countries. Internationally, the current trends are to apply more stringent criteria due to the deteriorating noise climate.

The noise impacts due to a proposed project are generally based on the difference between the expected noise level increase and the existing noise levels in the area, as well as on comparisons against area-specific noise guidelines.

The available international guidelines are presented in the sections below and have taken into consideration the following adverse effects of noise:

- Annoyance.
- Speech intelligibility and communication interference.
- Disturbance of information extraction.
- Sleep disturbance.
- Hearing impairment.

2.2.1 Noise Control Regulations

In South Africa, the national Noise Control Regulations were promulgated in terms Section 25 of the Environmental Conservation Act (GN R154 in Government Gazette No. 13717 dated 10 January 1992). The responsibility of the administration of the Noise Control Regulations is at provincial level. Western Cape Noise Control Regulations were published in Provincial Gazette Number 7141 of 20 June 2013.

The disturbing noise and noise nuisance definitions have also changed in the new regulations:

“Disturbing noise” means a noise, excluding the unamplified human voice, which—

- a) exceeds the rating level¹ by 7 dBA;
- b) exceeds the residual² noise level where the residual noise level is higher than the rating level;
- c) exceeds the residual noise level by 3 dBA where the residual noise level is lower than the rating level; or
- d) in the case of a low-frequency noise, exceeds the level specified in Annex B of SANS 10103;

“Noise nuisance” means any sound which impairs or may impair the convenience or peace of a reasonable person.

In Schedule 2 of the Noise Control Regulations, 2013, it is stipulated that a person may not:

- a) cause a disturbing noise; or
- b) allow a disturbing noise to be caused by any person, animal, machine, device, apparatus, vehicle, vessel or model aircraft, or any combination thereof.

In Schedule 3, regarding causing of a noise nuisance, a person may not:

- build, make, construct, repair, rebuild, modify, operate or test a vehicle, vessel, aircraft, model aircraft or any other object, or allow it to be built, made, constructed, repaired, rebuilt, modified, operated or tested, in or near a residential area;

In terms of Schedule 4 (1) of the Noise Control Regulations:

The local authority, or any other authority responsible for considering an application for a building plan approval, business license approval, planning approval or environmental authorization, may instruct the applicant to conduct and submit, as part of the application, a noise impact assessment in accordance with SANS 10328 to establish whether the noise impact rating of the proposed land use or activity exceeds the appropriate rating level for a particular district as indicated in SANS 10103, or where the noise level measurements cannot be determined, an assessment, to the satisfaction of the local authority, of the noise level of the proposed land use or activity.

In terms of Schedule 4 (3) of the Noise Control Regulations:

Where the results of an assessment undertaken in terms of sub regulation (1) indicate that the applicable noise rating levels referred to in that sub regulation will likely be exceeded, or will not be exceeded but will likely exceed the existing residual noise levels by 5 dBA or more, the applicant must provide a noise management plan, clearly specifying appropriate mitigation measures to the satisfaction of the local authority, before the application is decided; and implementation of those mitigation measures may be imposed as a condition of approval of the application.

¹ The equivalent continuous level that includes corrections for tonal character, impulsiveness of the noise and the time of day. These rating levels are indicated in columns 2 and 5 of Table 2 in SANS 10103 (see also Table 2-3).

² The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far, excluding the noise under investigation.

In terms of Clause 4(4) of the Noise Control Regulations:

Where an applicant has not implemented the noise management plan as contemplated in sub regulation (3), the local authority may instruct the applicant in writing to cease any activity that does not comply with that plan, or reduce the noise levels to an acceptable level to the satisfaction of the local authority.

2.2.2 SANS Codes of Practice and Guidelines

The SANS 10103 Code of Practice provides typical ambient noise rating levels ($L_{Req,T}$) in various districts. The outdoor ambient noise levels recommended for the districts are shown in Table 2-1 below.

It is probable that the noise is annoying or otherwise intrusive to the community or to a group of persons if the rating level of the ambient noise under investigation exceeds the applicable rating level of the residual noise (determined in the absence of the specific noise under investigation), or the typical rating level for the ambient noise for the applicable environment given in Table 2-1 (Table 2 of SANS 10103).

The expected response from the local community to the noise impact, i.e. the exceedance of the noise over the acceptable rating level for the appropriate district, is primarily based on Table 5 of SANS Code of Practice 10103 (SANS 10103, 2008), but expressed in terms of the effects of impact, on a scale of NONE to VERY HIGH (see Table 2-2 below).

The noise monitoring of the baseline conditions within and around the site will provide the rating level of the residual noise. The noise impact during construction and operation will be determined by comparing:

- the ambient noise under investigation with the measured rating level of the residual noise (background noise levels); and
- the ambient noise under investigation with the typical rating level for the ambient noise for the applicable environment given in Table 2-1.

Table 2-1. Typical Rating Levels for Ambient Noise

Type of district	Equivalent continuous rating level ($L_{Req,T}$) for noise (dB(A))					
	Outdoors			Indoors, with open windows		
	Day-Night $L_{R,dn}^{(1)}$	Day-time $L_{Req,d}^{(2)}$	Night-time $L_{Req,n}^{(2)}$	Day-Night $L_{R,dn}^{(1)}$	Day-time $L_{Req,d}^{(2)}$	Night-time $L_{Req,n}^{(2)}$
a) Rural districts	45	45	35	35	35	25
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
d) Urban districts with one or more of the following: workshops; business premises; and main roads	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

Table 2-2. Response Intensity and Noise Impact for Increases of the Ambient Noise

Increase (dB)	Response Intensity	Remarks	Noise Impact
0	None	Change not discernible by a person	None
3	None to little	Change just discernible	Very low
$3 \leq 5$	Little	Change easily discernible	Low
$5 \leq 7$	Little	Sporadic complaints	Moderate
7	Little	Defined by South African National Noise Regulations as being 'disturbing'	Moderate
$7 \leq 10$	Little - medium	Sporadic complaints	High
$10 \leq 15$	Medium	Change of 10dB perceived as 'twice as loud', leading to widespread complaints	Very high
$15 \leq 20$	Strong	Threats of community/group action	Very high

2.2.3 Occupational Health and Safety

In South Africa, any operation that has the potential to generate noise should have a noise survey done, in terms of the Noise Induced Hearing Loss Regulations of the Occupational Health and Safety Act 85 of 1993.

The regulations require an Approved Inspection Authority to conduct the surveys in accordance with SANS 10083 and submit a report. All people exposed to an equivalent noise level of 85 dB(A) or more must be subjected to audiometric testing. It is required that all records of surveys and audiometric testing must be kept for 40 years.

The sound pressure threshold limits within workshops and plants that could affect employees' health, quality of life and quality of work are:

- Alert threshold 80 dB(A).
- Danger threshold 85 dB(A).

Site locations are required to meet the following levels of performance at all points accessible by the employees on a regular basis:

- For workshop circulated areas, the maximum levels must not exceed 85 dB(A).
- For work equipment, the maximum levels must not exceed 80 dB(A) at one meter from the equipment and at 1.60 m high.

Exceptions may be considered for areas that should not be accessed on a regular basis. Personal Protective Equipment (PPE) will be required to access those areas, and the noise levels outside should comply with the above-mentioned thresholds.

The employer has a legal duty under the current Occupational Health Regulations (SA) to reduce the risk of damage to his/her employees' hearing. The main requirements apply, where employees' noise exposure is likely to be at or above the danger threshold limit of 85 dB(A). It should be noted that there is an international tendency to regard 80 dB(A) as an informal warning level.

The action level is the value of 'daily personal exposure to noise' ($L_{EP,d}$). This depends on the noise level in the working area and how long people are exposed to the noise. The values take account of an 8-hour noise exposure over the whole working day or shift.

3 AMBIENT NOISE MEASUREMENTS

Ambient noise measurements were undertaken to characterise the existing acoustic environment within and surrounding the study area and to establish representative baseline ambient noise levels for the subsequent noise assessment and modelling. Measurements were conducted during May 2026 at five strategically selected monitoring locations (MP01 to MP05), representative of the surrounding receiving environment and noise-sensitive receptors.

3.1 Monitoring Equipment and Measurement Methodology

Ambient noise measurements were undertaken using two 01dB DUO Type 1 Data-Logging Precision Impulse Integrating Sound Level Meters, as listed in Table 3-1. The instruments were field calibrated immediately before and after each monitoring session using a 01dB CAL01 Type 1 acoustic calibrator generating a 94 dB, 1 kHz reference signal. No significant calibration drift was observed during the monitoring programme.

The sound level meters and acoustic calibrator hold valid laboratory calibration certificates issued by De Beer Calibration Services and the respective equipment manufacturer, ensuring traceability to recognised national and international measurement standards.

The instrumentation complies with the following international standards:

- IEC 651 & 804 – Integrating sound level meters.
- IEC 942 – Sound calibrators.

Table 3-1. Sound Level Measurement Instrumentation

Instrument	Type	Serial No.
1. Precision Integrating Sound Level Meter	01dB DUO	10372
2. Precision Integrating Sound Level Meter	01dB DUO	10373
3. Field Calibrator 01dB Cal01	CAL01	11243

Measurements of the A-weighted equivalent continuous sound pressure level (L_{Aeq}) were undertaken at the five selected monitoring locations in accordance with the measurement procedures contained in SANS 10103:2008.

In addition to the L_{Aeq} , the maximum (L_{max}) and minimum (L_{min}) sound pressure levels, 1/3-octave band spectra, and statistical percentile noise levels (L_n) were recorded. The percentile level, L_n , represents the sound pressure level exceeded for n% of the measurement period. Commonly reported descriptors include L_{10} , L_{50} and L_{90} , representing the sound levels exceeded for 10%, 50% and 90% of the measurement period, respectively. These statistical descriptors provide additional information on the characteristics of the acoustic environment. The L_{10} is commonly used as an indicator of traffic-related noise conditions, while the L_{90} is generally considered representative of the prevailing background noise level, as it is less influenced by intermittent or short-duration noise events. Unless otherwise stated, all reported noise levels are A-weighted and expressed in dB(A).

During the intermittent monitoring programme, meteorological conditions were monitored using a portable weather meter. Measurements were suspended whenever the average wind speed exceeded 5 m/s or wind gusts exceeded 10 m/s, in accordance with accepted environmental noise measurement practice. Any measurements affected by extraneous noise events or other abnormal disturbances that

were not representative of the prevailing acoustic environment were excluded from the analysis. Similarly, periods during the continuous monitoring that were adversely affected by elevated wind conditions were identified during post-processing and omitted from the reported dataset.

All measurements were undertaken in accordance with the following standards and legislation:

- SOUTH AFRICAN NATIONAL STANDARD - Code of Practice, SANS 10103:2008, *The measurement and rating of environmental noise with respect to land use, health, annoyance and to speech communication*.
- DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND TOURISM. NO. R. 154. *Noise Control Regulations in Terms of Section 25 of the Environmental Conservation Act, 1989 (Act No. 73 of 1989)*. Govt. Gaz. No. 13717, 10 January 1992.

3.2 Noise Measurement Locations

As noted above, baseline ambient noise measurements were undertaken at five monitoring locations (MP01 to MP05) selected to provide a representative characterisation of the existing acoustic environment across the study area. The monitoring positions were selected based on the following considerations:

- Representative coverage of the existing receiving noise environment;
- Safe and practical access under prevailing site conditions;
- Personal safety during instrument deployment, inspections and retrieval; and
- Security of the monitoring equipment with respect to theft and vandalism.

One sound level meter was deployed at MP01 (Waterclub) to undertake continuous ambient noise monitoring over the period 29 to 30 May 2026. The second sound level meter was used to conduct intermittent measurements at the remaining four monitoring locations (MP02 to MP05) over the same monitoring period.

The locations of the monitoring points are illustrated in Figure 3-1, while the monitoring dates and geographical coordinates are summarised in Table 3-2.

Monitoring locations MP01, MP02 and MP03 were situated within the Waterclub precinct to characterise the existing acoustic environment within the proposed development area. Monitoring location MP04 was positioned adjacent to Beach Road, opposite the Granger Bay Parking Garage, to quantify the influence of the nearby road network. Monitoring location MP05 was located along Granger Bay Boulevard, where the ambient noise environment is influenced by road traffic together with recreational marine and harbour-related activities.

The study area is generally representative of an Urban District with business premises and main roads, as defined in SANS 10103:2008. Photographs of the monitoring locations are provided in APPENDIX E.

Table 3-2. Monitoring Locations and Duration

No.	Monitoring Points	Location	Measurement Dates	GPS Locations
1	MP01	The Waterclub	29, 30 May 2026	Latitude: -33.900766°, Longitude: 18.415002°
2	MP02	The Waterclub	29, 30 May 2026	Latitude: -33.900061°, Longitude: 18.415016°
3	MP03	The Waterclub	29, 30 May 2026	Latitude: -33.900818°, Longitude: 18.413820°
4	MP04	Along Beach Road, opposite Granger Bay Parking Garage	29 May 2026	Latitude: -33.902967°, Longitude: 18.415401°
5	MP05	Along Granger Bay Blvd	29 May 2026	Latitude: -33.903765°, Longitude: 18.416160°



Figure 3-1. Ambient Noise Monitoring Positions

3.3 Results and Findings

The ambient noise measurement results are presented in Table 3-3 to Table 3-6, while the continuous monitoring results for MP01 are illustrated in Figure 3-2 to Figure 3-4.

The monitoring programme indicates that the existing acoustic environment across the study area is characteristic of a busy urban waterfront setting. Ambient noise levels vary spatially depending primarily on the degree of shielding from the surrounding road network, particularly Beach Road and Helen Suzman Boulevard, as well as the influence of local recreational and commercial activities.

Monitoring locations situated within the Water Club precinct (MP01, MP02 and MP03) benefit from partial shielding from the surrounding road network and generally exhibit daytime ambient noise levels representative of the transition between an Urban District and an Urban District with business premises and main roads, with measured daytime equivalent sound levels generally ranging between approximately 50 dB(A) and 60 dB(A).

In contrast, the roadside monitoring locations (MP04 and MP05) are directly exposed to traffic along Beach Road and Granger Bay Boulevard and consequently recorded the highest ambient noise levels within the study area, with daytime equivalent sound levels consistently exceeding the SANS 10103 guideline value of 60 dB(A) for Urban Districts with business premises and main roads.

Considering the measured ambient noise levels across all monitoring locations, together with the urban waterfront setting, the surrounding road network and the presence of commercial and recreational activities, the receiving environment has been assessed as an *Urban District with business premises and main roads* for the purposes of this noise impact assessment. Accordingly, the SANS 10103 daytime guideline value of 60 dB(A) has been adopted as the applicable assessment criterion for evaluating the predicted construction noise impacts and for the development of the recommended mitigation measures.

The existing receiving noise environment is further influenced by several established urban and recreational noise sources. These include road traffic, helicopter operations associated with the nearby helipad, recreational marine craft operating from the Oceana Power Boat Club (OPBC) slipway, vessel movements between the V&A Waterfront Marina and the Port of Cape Town, general harbour-related commercial activities, nearby construction activities, events at the DHL Stadium and general pedestrian activity throughout the Waterfront precinct. Collectively, these sources contribute to an elevated daytime ambient noise climate, particularly during periods of increased recreational and commercial activity.

The measured ambient noise environment is therefore representative of the existing land uses surrounding the study area and provides an appropriate baseline against which the predicted operational noise impacts of the proposed development have been assessed.

3.3.1 MP02, MP03, MP04 & MP05 – Non-continuous Measurements

The intermittent ambient noise measurement results for MP02 to MP05 are presented in Table 3-3 to Table 3-6.

MP02 – Waterclub

Monitoring location MP02 was situated within the Waterclub precinct and was primarily influenced by general urban background noise, helicopter operations associated with the nearby helipad, recreational marine activities and vessel movements within the harbour.

Measured daytime equivalent noise levels (LAeq) ranged between 51.3 dB(A) and 57.2 dB(A), remaining below the SANS 10103 daytime guideline of 60 dB(A) for an Urban District with business

premises and main roads. The relatively consistent background noise levels (L_{90}) indicate a stable ambient acoustic environment, while elevated L_{10} and L_{max} values reflect intermittent noise events associated with helicopter flyovers and recreational boating activity.

Overall, the measured noise environment at MP02 is representative of a moderately elevated urban waterfront setting where intermittent transportation and recreational activities contribute to the existing ambient noise climate.

MP03 – Waterclub Dock Area

MP03 was located within the dock area of the Waterclub and experienced a similar acoustic environment to MP02, although with a slightly greater degree of shielding from the adjacent road network.

The dominant noise sources comprised general urban activity, recreational boating, vessel movements, helicopter operations and pedestrian activity within the marina. Measured daytime L_{Aeq} levels ranged between 48.6 dB(A) and 55.9 dB(A), remaining below the SANS 10103 daytime guideline of 60 dB(A).

The lower equivalent and background noise levels recorded at this location indicate a reduced influence from road traffic relative to the roadside monitoring positions. Noise levels were instead characterised by intermittent recreational and harbour-related activities, resulting in occasional short-duration increases reflected by the measured L_{10} and L_{max} values.

MP04 – Beach Road

MP04 was located along Beach Road, opposite the Granger Bay Parking Garage and directly in front of The Granger residential apartment building. This location was selected to characterise the existing receiving noise environment at one of the nearest residential receptors to the proposed development site.

The measured daytime equivalent noise levels (L_{Aeq}) ranged between 62.6 dB(A) and 70.8 dB(A), consistently exceeding the SANS 10103 daytime guideline value of 60 dB(A) for an Urban District with business premises and main roads. The existing acoustic environment at this receptor is dominated by continuous road traffic on Beach Road, with additional contributions from harbour activities, recreational marine craft, helicopter operations and general Waterfront activity.

The elevated baseline ambient noise levels measured at this location are important when considering the predicted construction noise impacts of the proposed development. Construction activities will occur within an environment that is already characterised by relatively high daytime ambient noise levels. Consequently, while construction activities will result in temporary small increases in noise levels during certain phases of the works, the magnitude and perceptibility of these increases will be moderated by the existing elevated ambient noise climate.

MP05 – Granger Bay Boulevard

MP05 was located along Granger Bay Boulevard directly in front of the operational New Somerset Hospital. The monitoring location was selected to characterise the existing ambient noise environment at one of the nearest and most sensitive receptors to the proposed development site.

Measured daytime equivalent noise levels (L_{Aeq}) ranged between 67.1 dB(A) and 71.5 dB(A), consistently exceeding the SANS 10103 daytime guideline value of 60 dB(A) for an Urban District with business premises and main roads. The existing acoustic environment at this location is dominated by continuous traffic on Granger Bay Boulevard and Beach Road, with additional contributions from

harbour-related activities, recreational marine craft, vessel movements, helicopter operations and general activity associated with the V&A Waterfront precinct.

The elevated baseline ambient noise levels demonstrate that the hospital façade is already exposed to a relatively high daytime noise environment. Consequently, construction activities associated with the proposed development will occur within an existing acoustic environment that is materially influenced by transportation and harbour-related noise sources. While construction activities will generate temporary increases in ambient noise levels, particularly during earthworks and the operation of heavy construction equipment, these increases will occur against an already elevated baseline noise climate.

Table 3-3. Measured Noise Levels at MP02

Period start	Leq	Lmin	Lmax	L90	L50	L10	L1
5/29/2026 11:42	51.7	46.7	60.3	48.6	50.5	53.9	57.8
5/29/2026 11:52	51.4	45.8	62.4	47.5	49.6	54.2	58.7
5/30/2026 14:38	52.4	47.4	60.2	48.7	51.6	54.6	57.8
5/30/2026 14:48	51.7	48.6	56.4	49.8	51.4	52.9	54.7
5/30/2026 15:25	57.2	47.6	69.9	52.5	55.6	59.1	65.3
5/30/2026 15:35	51.3	44	61.2	45.5	49.7	54	58.1
SANS 10103 Guidelines: Urban Districts with main roads: Daytime: 60 dB(A), Night-time:50 dB(A)							

Table 3-4. Measured Noise Levels at MP03

Period start	Leq	Lmin	Lmax	L90	L50	L10	L1
5/29/2026 12:08	50.6	41.8	64.1	45.6	48.7	53.3	58.7
5/29/2026 12:18	48.6	45.9	53	46.4	48	50.2	52.8
5/30/2026 15:02	48.9	42.9	61.2	44.6	47.3	51.2	54.9
5/30/2026 15:12	55.9	46.4	62.1	50.1	54.8	58.9	61.2
5/30/2026 15:38	52.9	43.7	65.6	46.2	50.4	56.1	60.5
5/30/2026 15:48	53.4	45.5	58.4	48.1	52.8	56.1	58.3
SANS 10103 Guidelines: Urban Districts with main roads: Daytime: 60 dB(A), Night-time:50 dB(A)							

Table 3-5. Measured Noise Levels at MP04

Period start	Leq	Lmin	Lmax	L90	L50	L10	L1
5/29/2026 12:44	63.1	47.5	79.8	51.2	56.6	64.7	76.6
5/29/2026 12:54	70.8	48.6	93.1	51.4	57.8	66.5	81.9
5/29/2026 13:41	62.6	49	78.8	52.9	58.9	64.9	73.6
5/29/2026 13:51	63.9	51	71.6	54.5	61.2	68.1	71.5
SANS 10103 Guidelines: Urban Districts with main roads: Daytime: 60 dB(A), Night-time:50 dB(A)							

Table 3-6. Measured Noise Levels at MP05

Period start	Leq	Lmin	Lmax	L90	L50	L10	L1
5/29/2026 13:09	71.5	54.1	93.1	57.5	62.9	70.5	83.8
5/29/2026 13:19	67.1	49.9	85.1	54.7	59.6	67	80.2
SANS 10103 Guidelines: Urban Districts with main roads: Daytime: 60 dB(A), Night-time:50 dB(A)							

3.3.2 MP01 - Continuous Measurements

Continuous ambient noise monitoring was undertaken at MP01, located within the Waterclub precinct adjacent to the security post, over the period 29 to 30 May 2026. The measured time histories are presented in Figure 3-2 to Figure 3-4.

The monitoring results indicate a relatively stable daytime acoustic environment that is characteristic of the central Waterclub area. Daytime equivalent noise levels were generally maintained between 55 dB(A) and 60 dB(A), consistent with the measured intermittent results obtained at MP02 and MP03 and generally representative of the SANS 10103 guideline for an Urban District with business premises and main roads.

The acoustic environment at this location was influenced primarily by general urban background activity, helicopter operations associated with the nearby helipad, recreational boating, vessel movements within the harbour and general pedestrian activity. Intermittent increases in measured noise levels were also associated with entertainment activities originating from the V&A Waterfront precinct and events at the DHL Stadium. These short-duration events resulted in elevated maximum noise levels but had a relatively limited influence on the overall equivalent sound level.

Night-time ambient noise levels generally ranged between 45 dB(A) and 55 dB(A). Although traffic volumes and recreational activities reduced during the evening and overnight periods, the existing ambient noise environment remained influenced by ongoing urban activity and harbour-related activities.

Overall, the continuous monitoring confirms that the Waterclub precinct experiences a consistently elevated urban waterfront acoustic environment. While the location benefits from partial shielding from the adjacent road network, the combined influence of road traffic, recreational marine activities, harbour operations, helicopter movements and other surrounding urban activities results in daytime ambient noise levels generally varying between those characteristic of an Urban District and an Urban District with business premises and main roads. The continuous monitoring results are consistent with the intermittent measurements and provide a representative baseline against which the proposed development has been assessed.

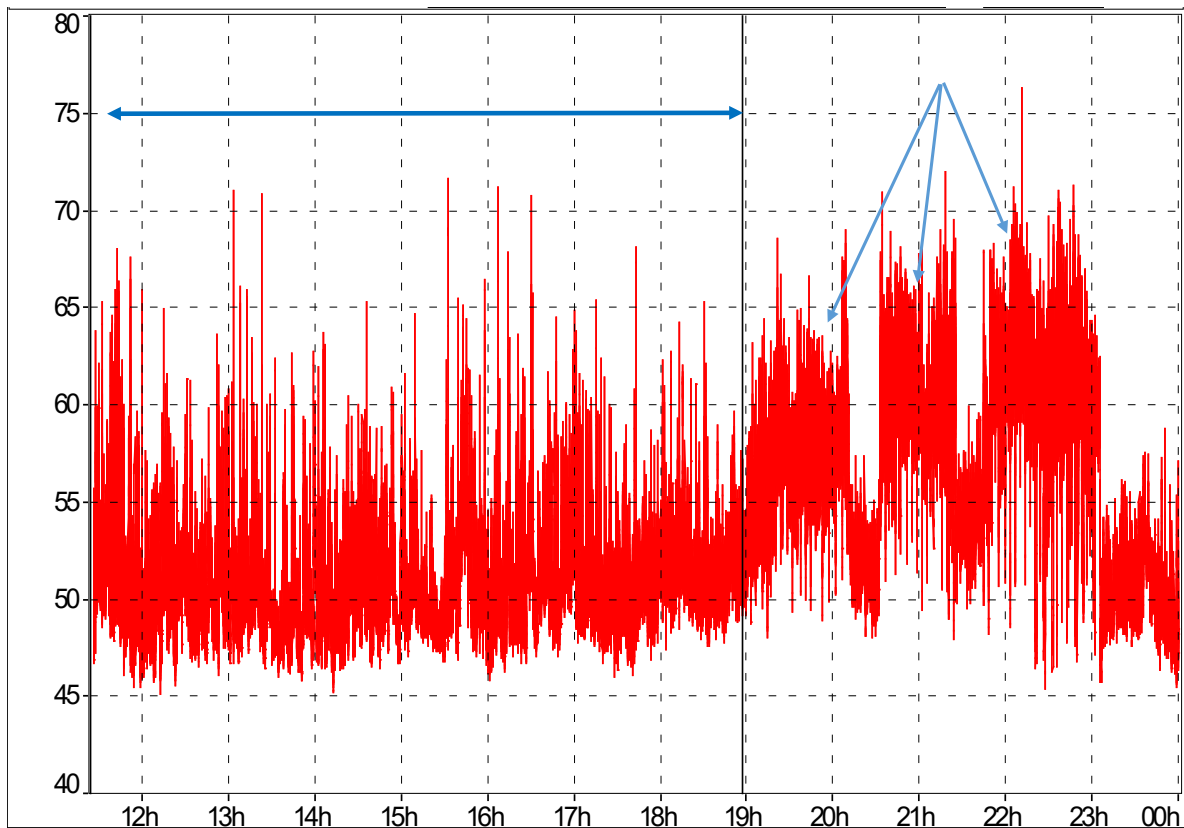


Figure 3-2. Measured Noise Levels at MP01: Daytime 29 May 2026

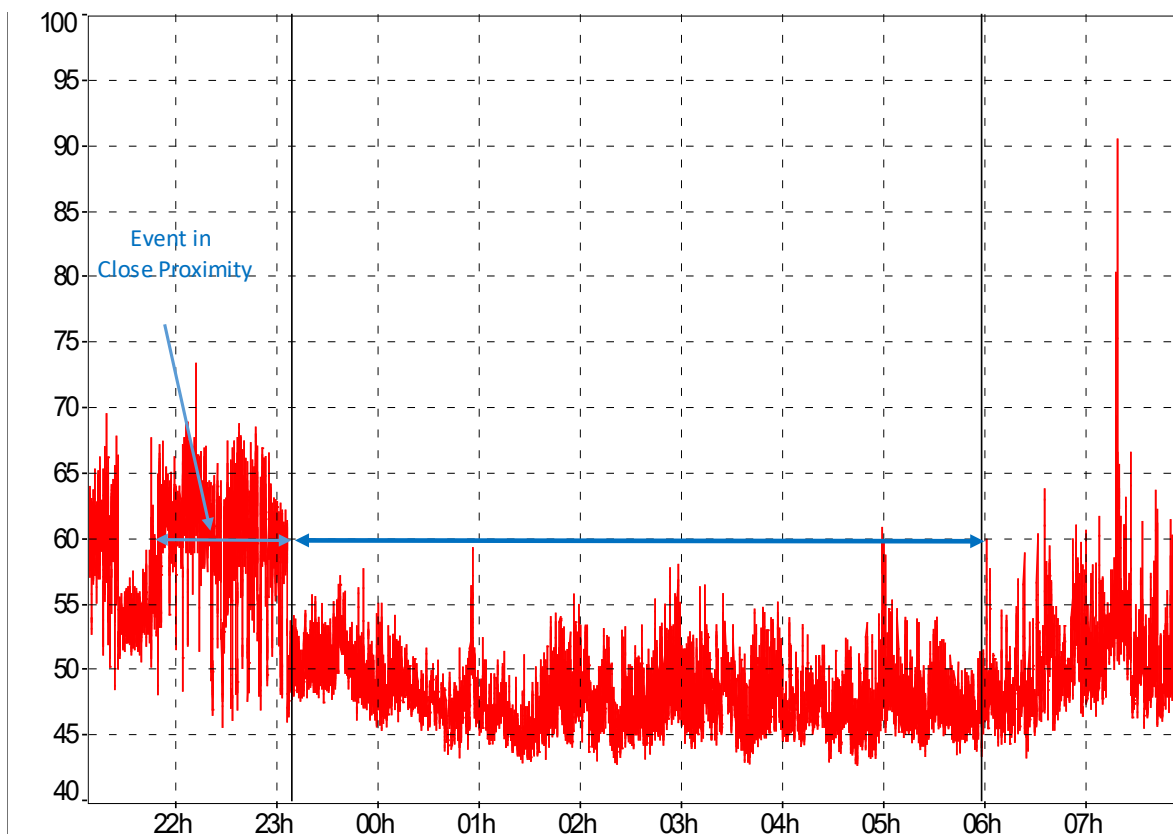


Figure 3-3. Measured Noise Levels at MP01: Night-time 29 May 2026

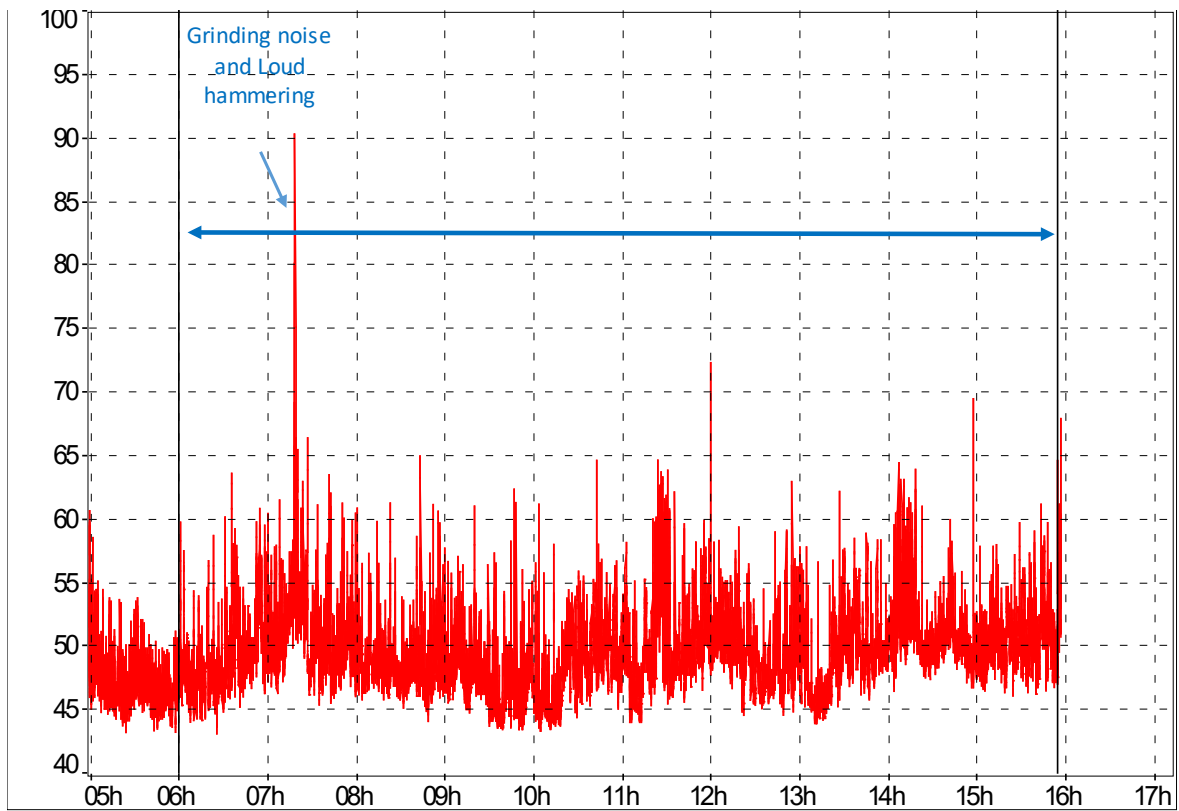


Figure 3-4. Measured Noise Levels at MP01: Daytime 30 May 2026

4 NOISE MODELLING METHODOLOGY AND RESULTS

4.1 Construction Noise Modelling Scenarios

Construction noise predictions were undertaken to assess the potential short-term noise impacts associated with the proposed marine reclamation works. As the construction programme will progress across different areas of the site, the location of the active work face will vary throughout the construction period. The distance between the active construction activities and surrounding sensitive receptors therefore changes over time, resulting in varying noise exposure.

Based on the conceptual construction programme and the spatial relationship between the project site and the nearest sensitive receptors, three representative construction scenarios were identified to assess the worst-case construction noise impacts throughout the construction phase.

The initial phase of the development comprises the marine reclamation works, including the construction of the breakwaters, new slipway, revetments, quay structures, tidal pools, pedestrian walkways and associated public realm infrastructure. Construction of the replacement slipway will be completed before the existing slipway is decommissioned to ensure uninterrupted marine access throughout the construction period.

The construction noise assessment considered the following scenarios:

- **Baseline Scenario** – Existing ambient noise environment without construction activities.
- **Construction Scenario 1** – Construction activities concentrated on the western breakwater, new slipway and adjacent revetment.
- **Construction Scenario 2** – Construction activities concentrated within the middle reclamation area.
- **Construction Scenario 3** – Construction activities concentrated on the eastern breakwater.

The movement of construction vehicles and the delivery of construction materials vary throughout the construction programme according to the location of the active work face. The haul routes adopted in the noise modelling were obtained from the Traffic Specialist Study (Motion Consulting Engineers, 2026) and are described in Section 4.3.

The haul routes, together with the material and rock offloading locations adopted for each construction scenario, are presented in APPENDIX B. These locations reflect the anticipated progression of the marine reclamation works and form the basis of the construction noise modelling.

The three construction scenarios were selected to represent the different positions of the active construction work face as it progresses from the western breakwater, through the middle reclamation area, to the eastern breakwater. Collectively, these scenarios represent the worst-case construction noise conditions at the surrounding sensitive receptors during the various phases of construction (see Figure 4-1).

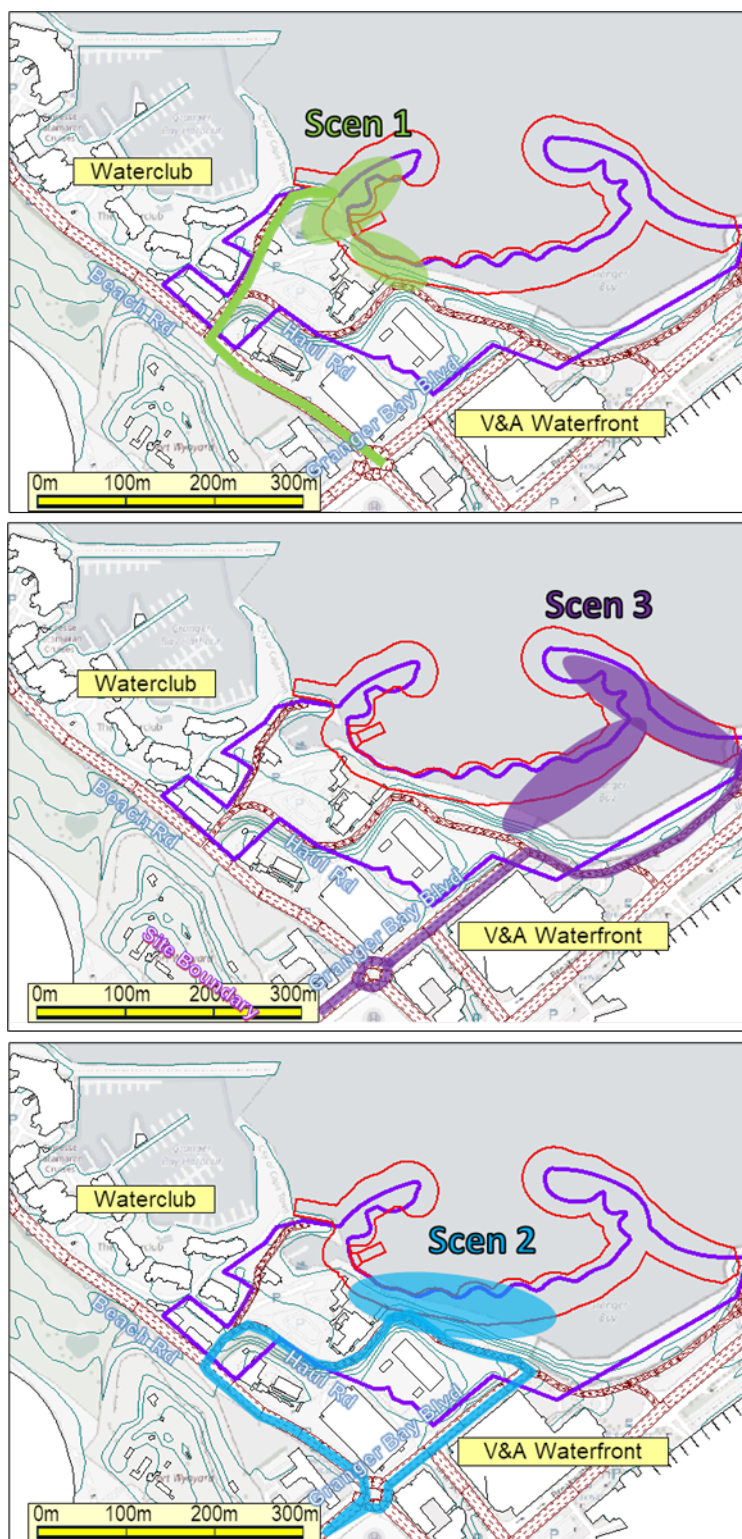


Figure 4-1. Construction Modelling Scenarios

4.2 Construction Activities and Equipment

The construction assessment considered the principal activities associated with the marine reclamation works, including:

- rock delivery and unloading;

- placement of armour rock for the breakwaters and revetments;
- excavation associated with the new slipway;
- placement of pre-cast concrete quay and jetty elements;
- operation of cranes and heavy earthmoving equipment; and
- movement of construction vehicles within the site.

During the initial construction period, activities are expected to focus on the western portion of the site, including construction of the western breakwater, replacement slipway, adjacent revetment and new jetty. Subsequent construction phases progressively shift towards the central reclamation area before concluding at the eastern breakwater.

Construction of the Granger Bay revetment will involve the movement of heavy construction vehicles and plant along the developing breakwater, together with the operation of marine construction equipment where required.

The principal construction equipment included in the assessment comprises:

- Long-reach tracked excavator;
- Excavator-mounted hydraulic rock breaker;
- Rigid dump trucks;
- Articulated dump trucks;
- Wheeled mobile telescopic crane; and
- Cement mixer trucks.

Sound power levels for the construction equipment were obtained from BS 5228-1:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites – Part 1: Noise, and are presented in Table C-1 of APPENDIX C.

4.3 Existing and Construction Traffic

Rock required for the marine reclamation works will be transported to the site by road over an anticipated construction period of approximately two years.

Based on the Traffic Specialist Study (Motion Consulting Engineers, 2026), approximately 125,000 m³ of rock will be delivered to the site, corresponding to an average of approximately 35 loaded truck deliveries per day, or approximately 4 to 6 trucks per hour, during active construction periods.

Most construction material is expected to be transported from the Dorstberg and other approved quarries via Contermans Kloof Road, the N7, N1, Buitengracht Street (M62), Helen Suzman Boulevard (M6) and Granger Bay Boulevard before entering the construction site (Motion Consulting Engineers, 2026).

The Traffic Specialist Study also established the internal haul routes and material offloading locations within the construction site. Three representative offloading locations were identified to reflect the progression of the marine reclamation works. The western offloading location, situated closest to the Waterclub boundary, is spatially constrained and is anticipated to require the use of smaller 8.5 m rigid tipper trucks. The remaining two offloading locations can accommodate articulated side-tipper vehicles based on a conservative 22 m articulated vehicle with left-side offloading. These internal haul

routes and offloading locations were incorporated into the construction noise model and were adopted for the three construction scenarios presented in this assessment. The adopted haul routes and offloading locations are presented in APPENDIX B.

Construction activities are expected to occur during normal daytime working hours between 07:00 and 18:00.

The construction haulage traffic forms part of the overall construction noise assessment. However, when compared with the existing traffic volumes on the surrounding road network, the anticipated number of construction vehicle movements is relatively low and is therefore not expected to materially alter the existing road traffic noise environment beyond the temporary construction activities occurring within the project area.

For the baseline road traffic noise assessment, the **Traffic Specialist Study** provides AM and PM peak-hour traffic volumes. Representative daytime and night-time traffic flows were therefore derived for the road traffic noise model using the following assumptions:

- The peak-hour traffic volume represents approximately 10% of the average daily traffic (ADT);
- 90% of the daily traffic volume occurs during the daytime period; and
- 10% of the daily traffic volume occurs during the night-time period.
- Heavy vehicle percentage 1%.
- Annual increase on road sections based on compound annual growth rate.

These assumptions are considered appropriate for deriving representative daytime traffic flows for the baseline road traffic noise assessment where detailed hourly traffic distribution data are unavailable. The resulting traffic volumes provide the basis for estimating the existing road traffic noise environment surrounding the study area.

Existing traffic volumes on the primary roads surrounding the study area were obtained from the Traffic Specialist Study (Motion Consulting Engineers, 2026) and incorporated into the baseline road traffic noise model. The reported AM and PM peak-hour traffic volumes are presented in Table 4-1, while the corresponding derived daytime traffic volumes adopted for the noise modelling are summarised in Table 4-2.

Table 4-1. Peak Traffic

Road Segment	AM Peak 2023	AM Peak 2012	PM Peak 2023	PM Peak 2012
	v/hr	v/hr	v/hr	v/hr
Dock Rd (to Portswood)	604	438	1,226	784
Portswood Rd (to Somerset)	482	511	927	578
Beach Rd (to Granger Bay)	379	540	635	829
Granger Bay Blvd (to Beach)	246	147	704	453
Compound Annual Growth Rate	0.41%		2.56%	

Table 4-2. 2026 Calculated Current Traffic Volumes and with Construction

Road Segment	Current			With Construction		
	Daily	Daytime	HV ¹	HV ²	Daytime	HV
	v/24hr	v/hr	v/hr	v/hr	v/hr	%
Dock Rd (to Portswood)	9,340	525	5	5	525	1.0%
Portswood Rd (to Somerset)	7,192	405	4	4	405	1.0%
Beach Rd (to Granger Bay)	5,175	291	3	13	301	4.3%
Granger Bay Blvd (to Beach)	4,849	273	3	13	283	4.5%
Beach Rd (after Granger Bay)	5,175	291	3	3	291	1.0%
Granger Bay Blvd (after Beach)	4,849	273	3	3	273	1.0%
^{1.} Based on 1% heavy vehicles ^{2.} Based on truck return trips						

4.4 Noise Prediction Methodology

Construction noise predictions were undertaken using CadnaA (Computer Aided Noise Abatement), a three-dimensional environmental noise prediction model widely used for industrial, transportation and construction noise assessments.

Noise propagation calculations were undertaken using the ISO 9613 propagation algorithms implemented within CadnaA. The model accounts for:

- geometric divergence of sound with increasing distance from the source;
- atmospheric absorption;
- ground attenuation;
- terrain and barrier screening;
- reflections from buildings and other structures; and
- the cumulative contribution of multiple noise sources.

Construction equipment was represented as individual point sources located within the active construction area for each modelling scenario, while haul roads were represented as line sources.

4.5 Modelling Assumptions

The construction noise assessment was undertaken using conservative assumptions to represent worst-case construction conditions.

The principal assumptions adopted in the modelling are summarised below:

- Ground conditions: Acoustically hard ground conditions (Ground Factor $G = 0$) were assumed throughout the site, with zero ground absorption assigned to water surfaces. This represents minimum ground attenuation and therefore a conservative prediction.
- Meteorological conditions: Daytime meteorological conditions of 35°C and 50% relative humidity were adopted for the calculation of atmospheric absorption.

- Temporary screening: Temporary stockpiles, construction materials and other temporary site features were not included in the model. Consequently, no screening benefit from these features has been assumed.
- Construction equipment: Construction equipment was assigned the representative sound power levels published in BS 5228-1, which are based on measured data from comparable construction activities.
- Equipment utilisation: As a worst-case assumption, all major items of construction plant required for each scenario were assumed to operate simultaneously.
- Operating hours: Construction activities were assumed to occur during daytime working hours only (07:00–18:00).
- Source height: Construction plant was modelled using a nominal source height of 2 m above local ground level unless a different operating height was required for specific equipment.

4.6 Predicted Noise Levels

Based on the modelling methodology, assumptions and input data described in the preceding sections, construction noise levels were predicted for each of the representative construction scenarios. The predicted noise levels represent unmitigated conditions, assuming that no noise attenuation or management measures are implemented. As such, the results provide a conservative assessment of the potential construction noise impacts.

The predicted daytime equivalent continuous sound pressure levels (L_{Aeq}) are presented in the following sections as noise contour plots for each construction scenario. These contours illustrate the spatial extent of the predicted construction noise and provide the basis for evaluating potential impacts at the surrounding sensitive receptors.

4.6.1 Baseline Traffic Noise Scenario

The predicted baseline road traffic noise levels are presented in Figure 4-2. The model represents the contribution from the existing road network only and therefore excludes other environmental noise sources present within the Granger Bay precinct.

The model indicates that the highest daytime traffic noise levels occur immediately adjacent to Beach Road, Haul Road and Breakwater Boulevard, where predicted L_{Aeq} levels exceed 70 dB(A). Noise levels reduce progressively with increasing distance from these roads as a result of geometric spreading together with screening provided by existing buildings and local topography.

Within the Waterclub site, the predicted traffic noise environment is substantially lower than that adjacent to the surrounding road network. The Waterclub buildings are located approximately 100–180 m from Beach Road and between approximately 20 m and 50 m from the nearest project site boundary. Despite the proximity of Buildings B1 and B2 to the proposed development site, the existing baseline traffic noise environment is governed primarily by the surrounding road network rather than the project site itself.

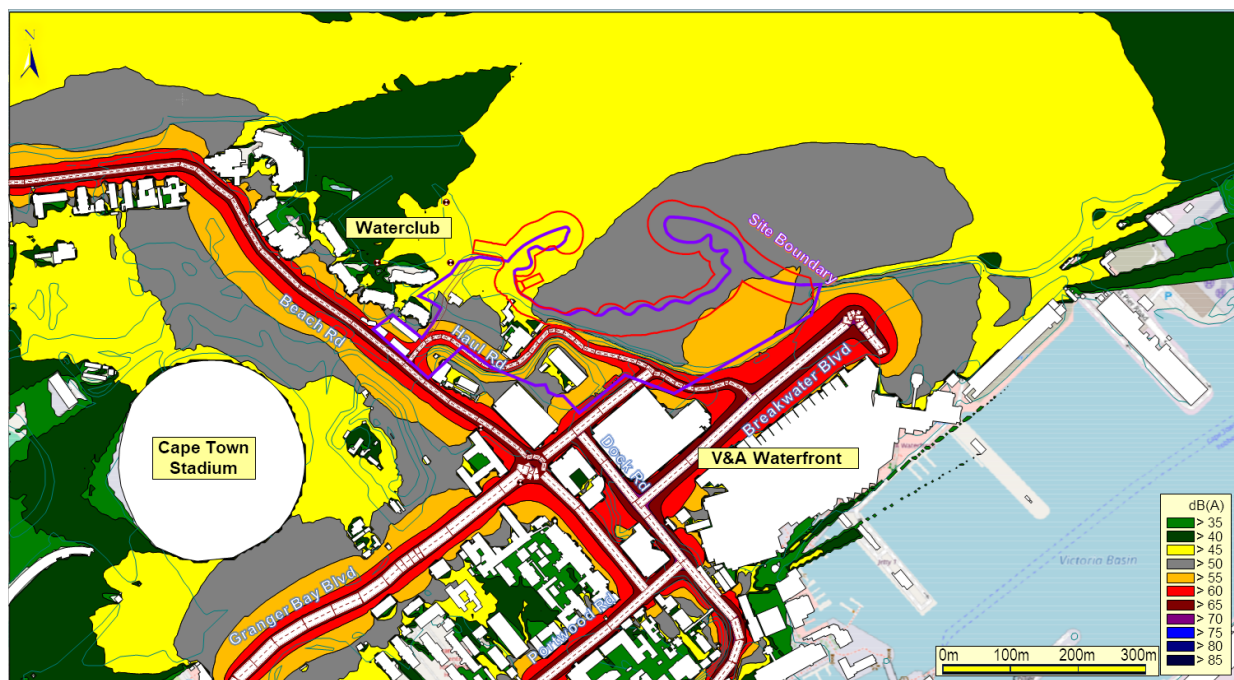


Figure 4-2. Predicted Baseline Traffic Noise (L_{Aeq})

The calculated façade noise levels for the Waterclub buildings are presented in Figure 4-3. The predictions were undertaken at the uppermost occupied floor, representing a conservative assessment, as upper floors experience a clearer line-of-sight to surrounding traffic corridors.

The predicted traffic-only façade noise levels indicate:

- Elstree Building (B1): generally 45–50 dB(A) along the façades closest to the site, reducing to approximately 33–35 dB(A) along the northern façades overlooking the marina.
- Dover Building (B2): approximately 46–52 dB(A) along the eastern and northern façades, increasing to approximately 55–58 dB(A) along the southern façades nearest Beach Road.
- Calais Building (B3): generally 50–53 dB(A) around the northern façades, increasing to approximately 54–59 dB(A) along the southern façades adjacent to Beach Road.
- Biscay Building (B4): approximately 51–54 dB(A) around the eastern façades, increasing to approximately 57–59 dB(A) along the western and southern façades closest to Beach Road.

These results demonstrate that the existing traffic noise environment varies across the Waterclub buildings according to their orientation and proximity to Beach Road. Buildings B3 and B4 experience the highest existing traffic noise exposure, while Building B1, which is furthest from the road network, experiences the lowest traffic noise levels.

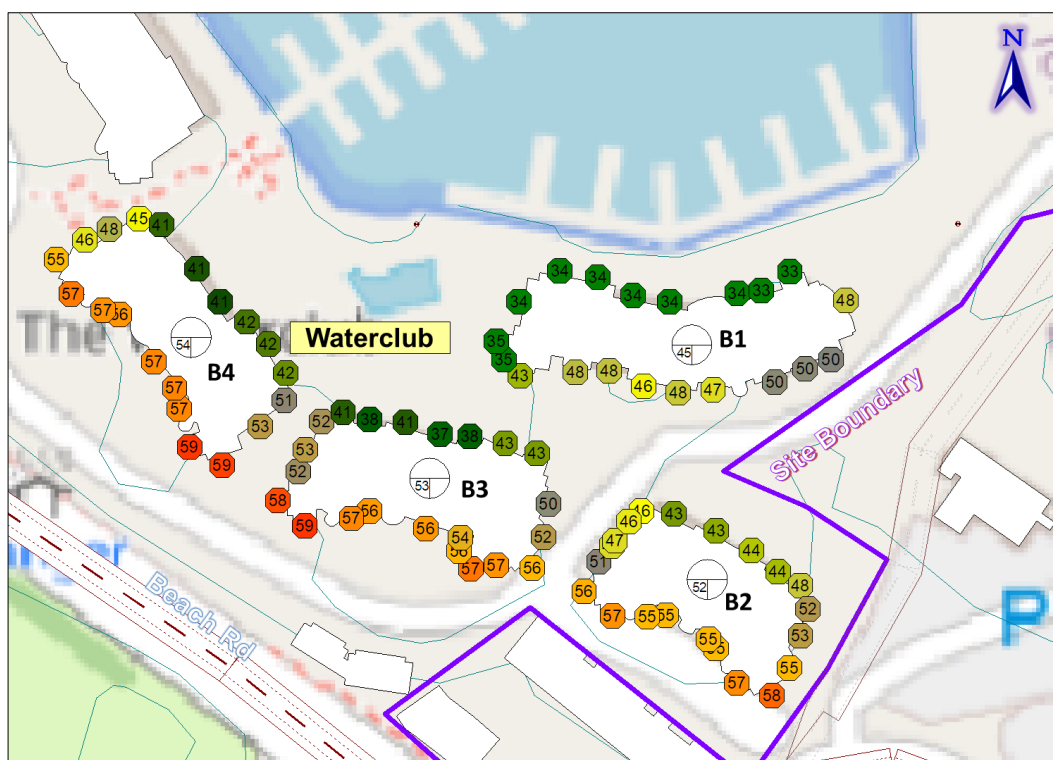


Figure 4-3. Predicted Noise Levels at Waterclub due to Baseline Traffic (L_{Aeq})

Road traffic does not represent the only source contributing to the existing acoustic environment within the study area. The Granger Bay precinct is also influenced by helicopter operations, recreational marine activities associated with the OPBC slipway, vessel movements to and from the Port of Cape Town and the V&A Waterfront Marina, harbour-related commercial activities, events within the Waterfront precinct and at the DHL Stadium, together with general urban activity.

To establish a representative baseline acoustic environment, the traffic noise model was calibrated against the measured ambient noise levels recorded at monitoring locations MP01, MP02 and MP03. The comparison is presented in Table 4-3.

Table 4-3. Comparison of Measured and Modelled Baseline Noise Levels

Monitoring Point	Measured L_{Aeq} dB(A)	Modelled Traffic L_{Aeq} dB(A)	Traffic-model underprediction dB	Calibrated Cumulative Baseline L_{Aeq} dB(A)
MP01	52	48.1	+4	52.1
MP02	52	45.3	+6	51.3
MP03	52	45.2	+6	51.1

The comparison with the measurements at MP01, MP02 and MP03 indicated that the traffic-only model did not fully represent the existing ambient noise climate within the Waterclub precinct. The measured levels at these monitoring positions were generally higher than the corresponding traffic-only predictions, confirming the contribution of environmental sources not explicitly included in the road traffic model. These sources were incorporated into the cumulative baseline model to provide a representative description of the existing acoustic environment. Following calibration, the predicted baseline noise levels at the monitoring locations were within approximately ± 1 dB of the measured

values, demonstrating good agreement between the measured and predicted baseline acoustic environments.

The calibration was applied as an additional ambient noise contribution rather than as a uniform numerical correction to every façade. As decibel levels combine logarithmically, the effect is greatest where the traffic contribution is low and progressively smaller where traffic noise is already dominant.

The resulting calibrated cumulative baseline noise contours are presented in Figure 4-4, while the corresponding façade noise levels for the Waterclub buildings are shown in Figure 4-5.

The calibrated cumulative baseline model indicates that the contribution of non-road environmental noise sources varies across the Waterclub precinct. The resulting increase relative to the traffic-only model is therefore not uniform. Along façades already strongly influenced by Beach Road and the surrounding road network, particularly the southern and western façades of Buildings B2, B3 and B4, the cumulative baseline levels are generally only marginally higher than the traffic-only predictions, as road traffic remains the dominant source. In contrast, substantially larger increases are predicted along the quieter, road-shielded façades, particularly the northern façades of Buildings B1 and B3, where the traffic-only model predicts comparatively low levels. At these locations, recreational marine activity, helicopter movements, vessel traffic, harbour operations and other general Waterfront activity make a proportionally greater contribution to the existing acoustic environment.

Following calibration, the cumulative baseline façade levels are generally approximately 50–53 dB(A) at Building B1, 51–58 dB(A) at Building B2, 51–59 dB(A) at Building B3 and 51–60 dB(A) at Building B4. The lowest cumulative levels occur along the more sheltered marina-facing façades, while the highest levels occur along the southern and western façades with greater exposure to Beach Road and the surrounding road network. The calibrated model therefore produces a more spatially representative baseline than would be achieved by applying a uniform adjustment to the traffic-only predictions.

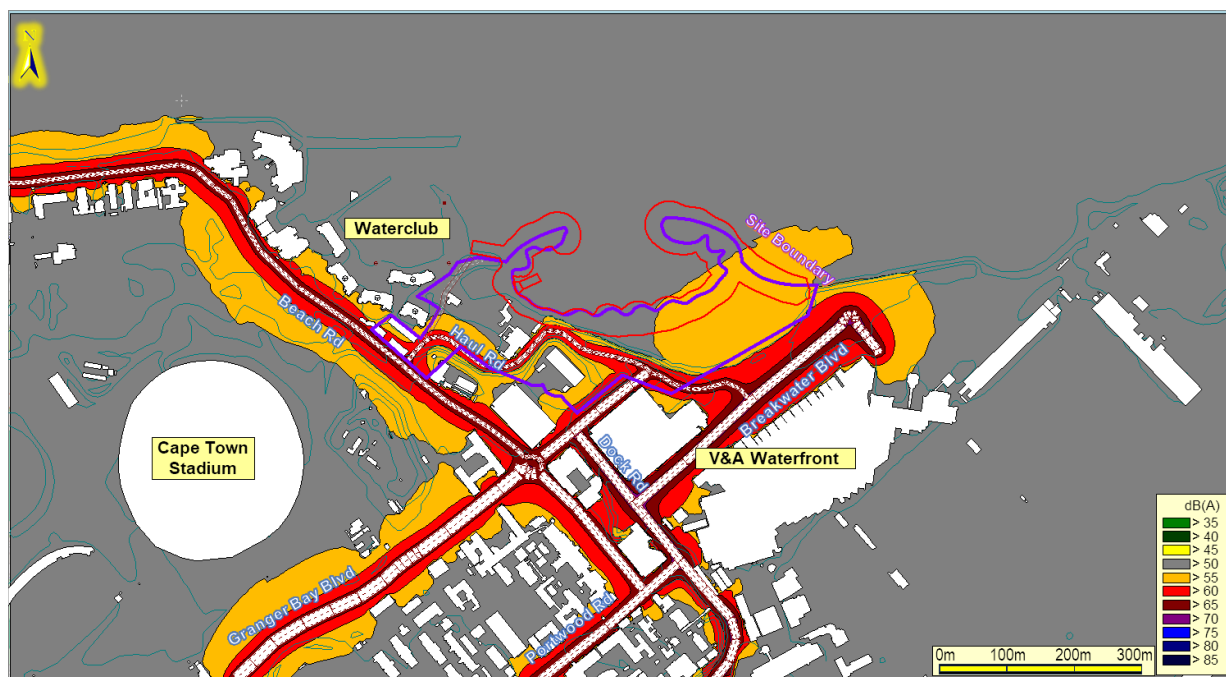


**Figure 4-4. Predicted Cumulative Baseline Noise
(Existing Traffic + General Ambient Sources) (L_{Aeq})**

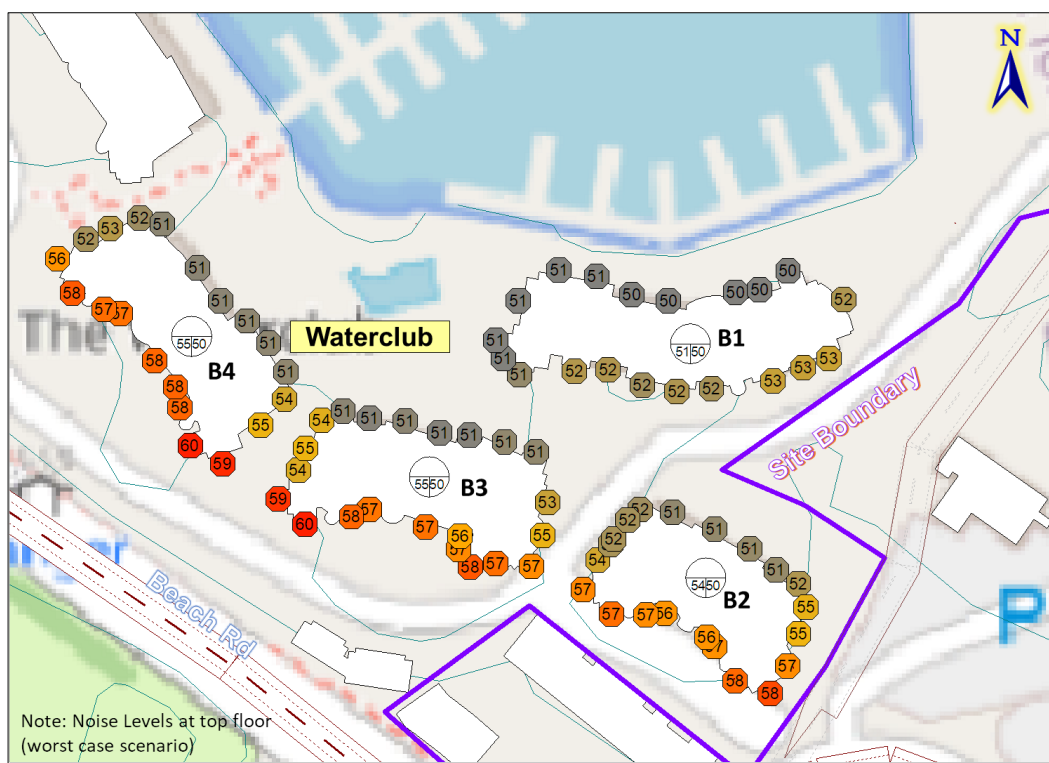


**Figure 4-5. Predicted Cumulative Noise Levels at Waterclub
(Existing Traffic + General Ambient Sources) (L_{Aeq})**

4.6.2 Construction Scenario 1 – Construction Activities on the Western Breakwater

The predicted noise contours for Construction Scenario 1 are presented in Figure 4-6, while the corresponding façade noise levels at the Waterclub buildings are shown in Figure 4-7. These predictions include the combined contribution of the existing road traffic and the construction activities, but exclude the contribution from other existing ambient noise sources, such as helicopter operations, recreational marine activities, harbour operations and general Waterfront activity.

Construction Scenario 1 represents the initial phase of the marine works, during which construction activities are concentrated on the western breakwater, the replacement slipway and the adjacent revetment. As these activities are located closest to the Waterclub precinct, this scenario represents the highest potential construction noise exposure for the nearest residential receptors.

The predicted noise contours indicate that the highest noise levels remain concentrated around the active construction area, with the 65–70 dB(A) contours generally confined to the immediate vicinity of the western breakwater and slipway works. Noise levels decrease rapidly with increasing distance from the construction area due to geometric spreading, with the majority of the Waterclub buildings falling within the 50–60 dB(A) contour.

Predicted façade noise levels (traffic plus construction) indicate:

- Building B1: approximately 49–59 dB(A);
- Building B2: approximately 48–60 dB(A);
- Building B3: approximately 50–59 dB(A); and
- Building B4: approximately 47–59 dB(A).

The highest predicted façade levels occur along the eastern façades of Buildings B1 and B2, which have the shortest separation distance and the most direct line-of-sight to the active construction works. Buildings B3 and B4 experience slightly lower construction noise contributions due to their greater separation distance and partial screening provided by the intervening Waterclub buildings.

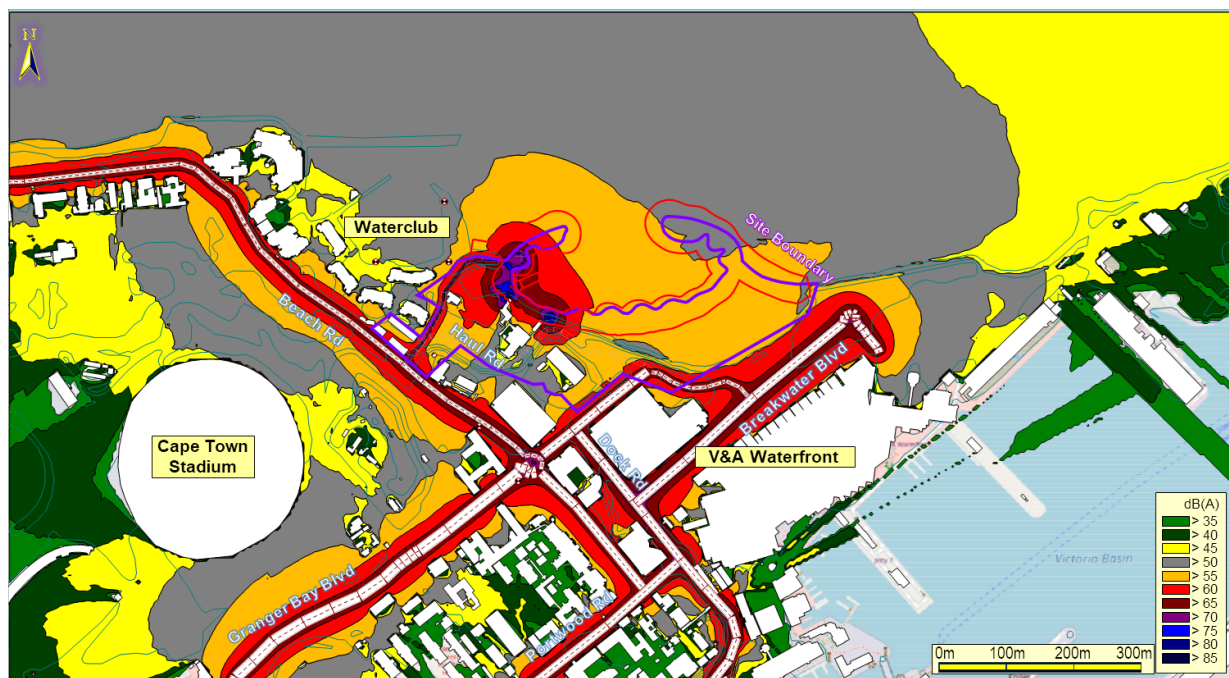


Figure 4-6. Scenario 1: Predicted Noise Levels (Existing Traffic + Construction Activities) (L_{Aeq})

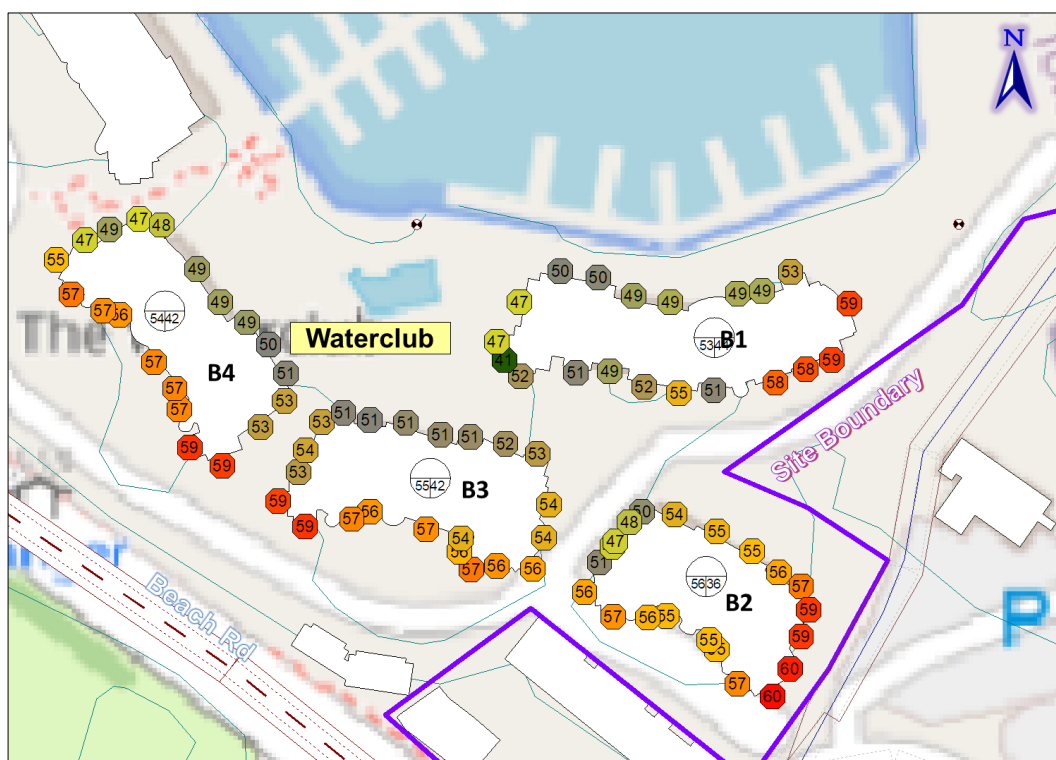


Figure 4-7. Scenario 1: Predicted Façade Noise Levels at the Waterclub (Existing Traffic + Construction Activities) (L_{Aeq})

The cumulative daytime noise model, incorporating the existing road traffic, the predicted construction activities and the general existing ambient noise environment, is presented in Figure 4-8, while the corresponding façade noise levels are shown in Figure 4-9.

Comparison of the two modelling scenarios demonstrates that the inclusion of the existing ambient noise environment does not result in a uniform increase across the Waterclub buildings. Instead, the magnitude of the increase varies according to the relative contribution of the existing environmental noise sources at each façade. Façades already dominated by road traffic and construction activities exhibit relatively small increases in cumulative noise levels, whereas larger increases occur at the quieter, more sheltered façades where the contribution from the broader Waterfront acoustic environment is proportionally greater.

Following inclusion of the existing ambient noise sources, the predicted cumulative façade noise levels are approximately:

- Building B1: 52–59 dB(A);
- Building B2: 52–60 dB(A);
- Building B3: 52–59 dB(A); and
- Building B4: 52–59 dB(A).

Overall, the modelling indicates that Construction Scenario 1 results in a relatively modest increase above the existing acoustic environment at the Waterclub buildings. Although Buildings B1 and B2 experience the greatest influence due to their proximity to the western construction area, the cumulative daytime noise levels generally remain at or below 60 dB(A) across the residential façades. The results therefore indicate that the construction activities will be superimposed on an already elevated urban waterfront noise environment that is influenced by existing road traffic, harbour operations, recreational marine activities and other general Waterfront noise sources.

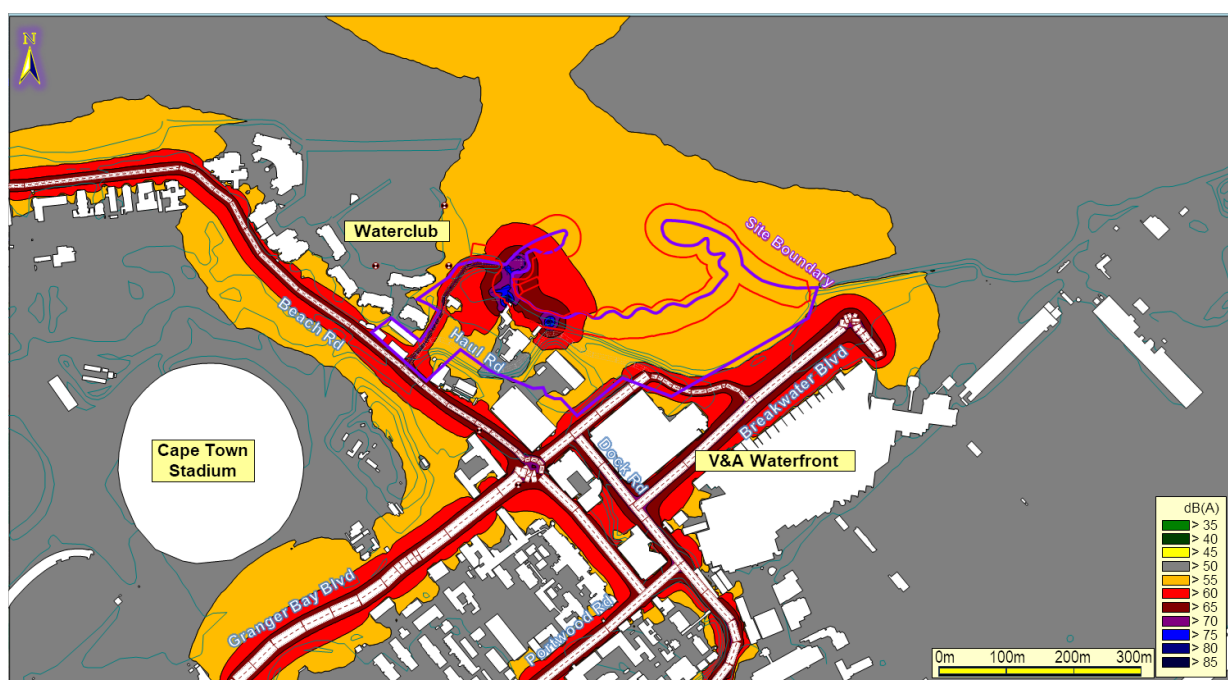


**Figure 4-8. Scenario 1: Predicted Cumulative Noise Levels
(Existing Traffic + Construction Activities + General Ambient Sources) (L_{Aeq})**

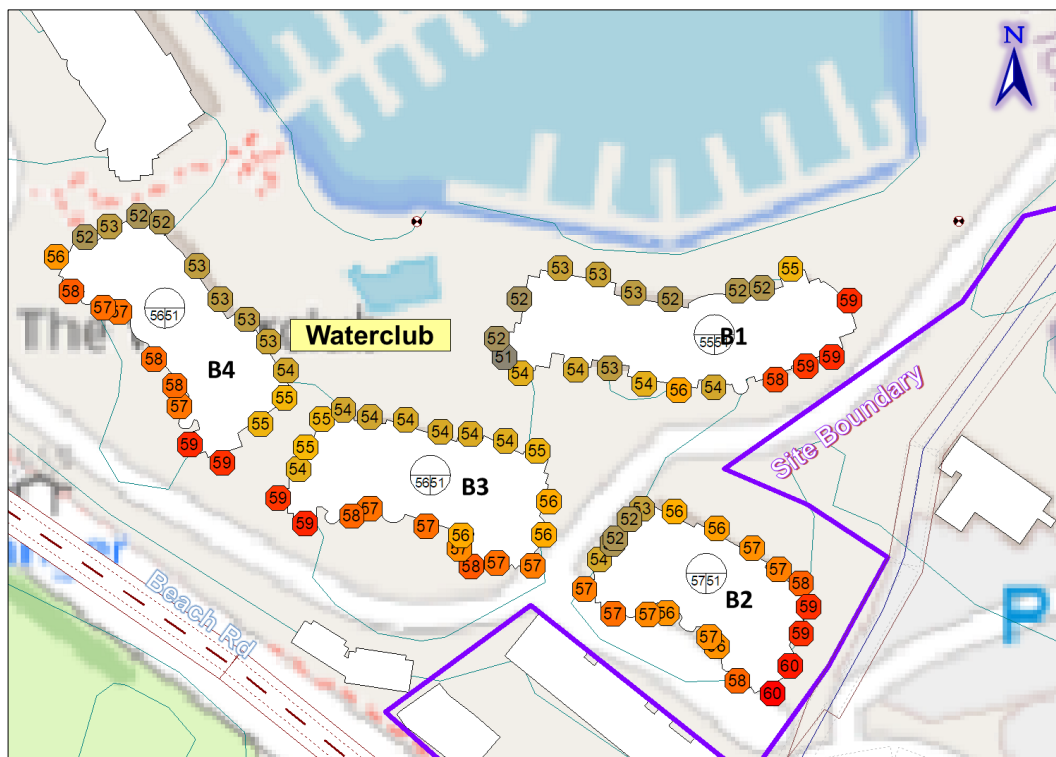


**Figure 4-9. Scenario 1: Predicted Cumulative Façade Noise Levels at the Waterclub
(Existing Traffic + Construction Activities + General Ambient Sources) (L_{Aeq})**

4.6.3 Construction Scenario 2 – Construction Activities at Middle Reclamation Area

The predicted cumulative daytime noise contours for Construction Scenario 2 are presented in Figure 4-10, while the corresponding façade noise levels at the Waterclub buildings are shown in Figure 4-11. The predictions represent the combined contribution of the existing road traffic, the general existing ambient noise environment and the construction activities associated with the middle reclamation area.

During this construction phase, the principal construction activities shift from the western breakwater towards the centre of the reclamation area. As a result, the active work face is located further from the nearest Waterclub buildings, increasing the separation distance to the sensitive receptors and reducing the direct contribution of the construction activities.

The cumulative noise contours indicate that the highest noise levels remain confined to the immediate construction area, with the 65 dB(A) contour largely restricted to the active work face. Across the Waterclub precinct, cumulative daytime noise levels remain predominantly within the 50–60 dB(A) range, similar to the existing baseline acoustic environment.

The predicted cumulative façade noise levels are approximately:

- Building B1: 52–54 dB(A);
- Building B2: 52–58 dB(A);

- Building B3: 52–60 dB(A); and
- Building B4: 52–60 dB(A).

Comparison with the calibrated baseline scenario indicates that the movement of construction activities towards the middle reclamation area results in only minor increases in cumulative noise levels across the Waterclub buildings. The greatest changes occur on the eastern façades of Buildings B1 and B2, which maintain a direct line-of-sight towards the active construction area. However, these increases are generally limited to only a few decibels above the existing ambient environment.

The marina-facing and northern façades of Building B1 remain largely unchanged from the calibrated baseline, with cumulative noise levels generally remaining between 52 dB(A) and 54 dB(A). Similarly, although Building B2 remains the closest residential building to the project site, its southern façades continue to be dominated by existing traffic noise associated with Beach Road, while the eastern façades experience only a modest increase due to construction activities.

Buildings B3 and B4 exhibit little change relative to the calibrated baseline. The highest façade noise levels continue to occur along the southern and western elevations facing Beach Road, confirming that the existing road traffic environment remains the dominant contributor to the overall acoustic climate at these buildings. The additional contribution from the construction activities is therefore relatively small compared to the prevailing ambient noise environment.

Relative to Construction Scenario 1, the predicted cumulative noise levels at the Waterclub buildings are generally lower. This reduction is attributable to the increased distance between the active construction works and the nearest residential receptors as the construction programme progresses eastwards across the reclamation area. Consequently, the construction activities become progressively less influential than the existing road traffic and other established urban noise sources.

Overall, the modelling indicates that the existing acoustic environment continues to dominate the cumulative daytime noise climate at the Waterclub buildings during Construction Scenario 2. The predicted increases above the calibrated baseline are relatively modest, demonstrating that the relocation of the active work face towards the centre of the reclamation area reduces the potential construction noise impact on the nearest sensitive receptors.

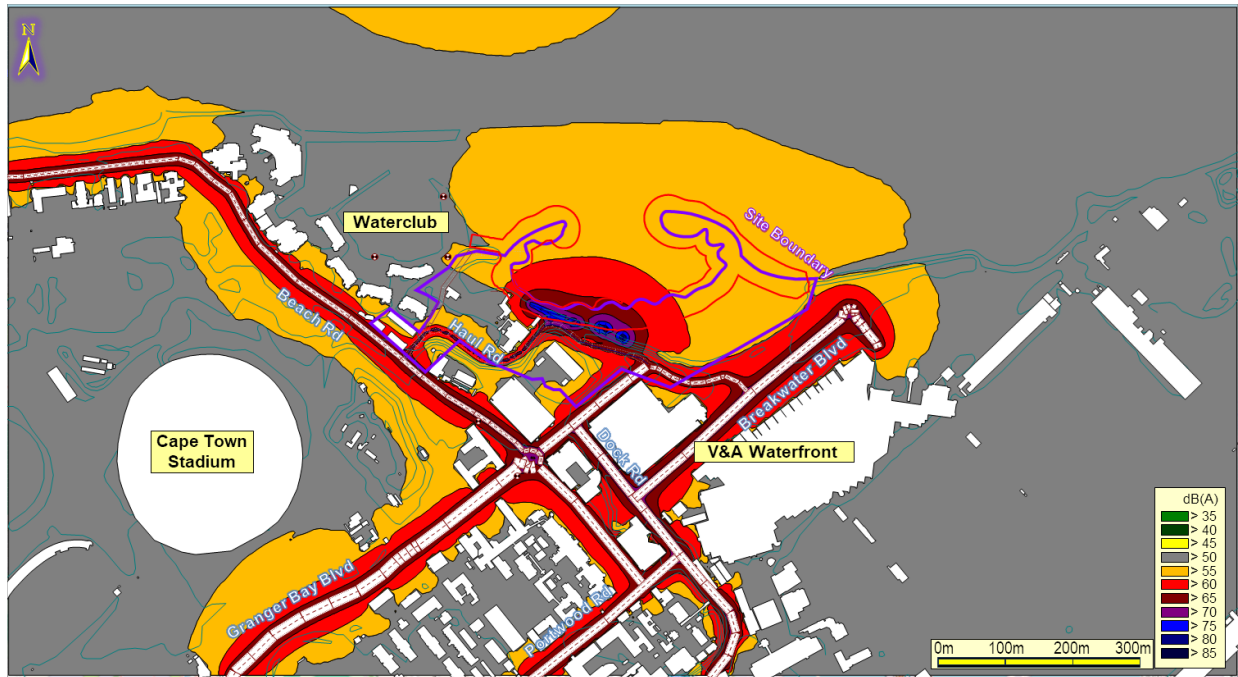


**Figure 4-10. Scenario 2: Predicted Cumulative Noise Levels
(Existing Traffic + Construction Activities + General Ambient Sources) (L_{Aeq})**

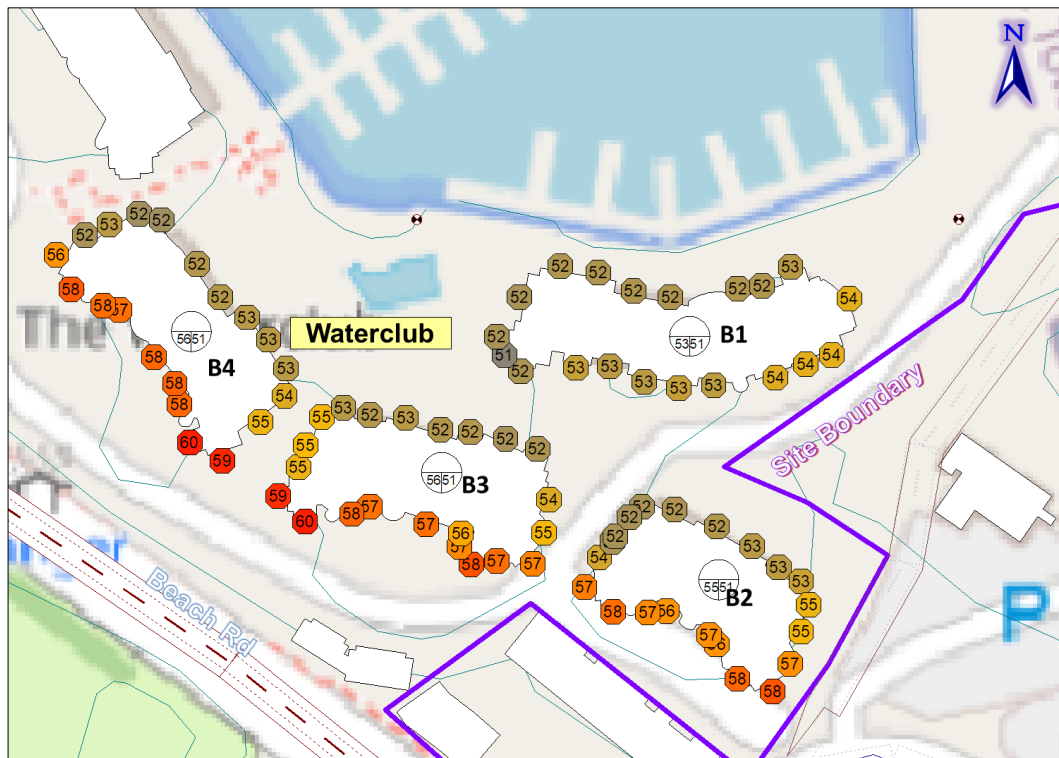


**Figure 4-11. Scenario 2: Predicted Cumulative Façade Noise Levels at the Waterclub
(Existing Traffic + Construction Activities + General Ambient Sources) (L_{Aeq})**

4.6.4 Construction Scenario 3 – Construction Activities on the Eastern Breakwater

The predicted cumulative daytime noise contours for Construction Scenario 3 are presented in Figure 4-10, while the corresponding cumulative façade noise levels at the Waterclub buildings are shown in Figure 4-11. The predictions represent the combined contribution of the existing road traffic, the general existing ambient noise environment and the construction activities associated with the eastern breakwater.

During this construction phase, the principal construction activities are concentrated on the eastern breakwater and the eastern extent of the reclamation area. This represents the greatest separation distance between the active construction work face and the Waterclub buildings and consequently the lowest potential construction noise impact at the nearest residential receptors.

The cumulative noise contours indicate that the 65 dB(A) and higher contours remain confined to the immediate vicinity of the eastern breakwater construction works. The 60 dB(A) contour does not extend into the Waterclub precinct, with the entire development remaining within the 50–60 dB(A) cumulative daytime noise contour. The results demonstrate that construction noise attenuation with distance noticeably reduces the influence of the eastern breakwater activities at the nearest sensitive receptors.

The predicted cumulative façade noise levels are approximately:

- Building B1: 52–54 dB(A);
- Building B2: 52–57 dB(A);
- Building B3: 51–60 dB(A); and
- Building B4: 52–60 dB(A).

Comparison with the calibrated baseline noise scenario indicates that construction activities on the eastern breakwater result in only marginal increases in cumulative noise levels at the Waterclub buildings. The predicted façade noise levels remain almost identical to the existing ambient noise environment, with any increases generally limited to approximately 1 dB(A) or less. Such small changes are consistent with the increased separation distance between the active construction works and the Waterclub precinct and would generally not be readily distinguishable from normal variations in the existing ambient noise environment.

The southern and western façades of Buildings B2, B3 and B4 continue to experience the highest cumulative noise levels, with values approaching 60 dB(A). However, these levels remain dominated by the existing road traffic environment associated with Beach Road and the surrounding road network rather than the construction activities. Similarly, Building B1, which faces towards the marina and is furthest from Beach Road, exhibits cumulative façade noise levels that remain effectively unchanged from the calibrated baseline scenario.

Compared with Construction Scenarios 1 and 2, Scenario 3 results in the lowest construction noise contribution at the Waterclub buildings. The progressive movement of the construction work face eastwards across the reclamation area increases the separation distance to the nearest sensitive receptors and correspondingly reduces the direct influence of construction activities on the surrounding residential environment.

Overall, the modelling demonstrates that the cumulative daytime acoustic environment at the Waterclub during Construction Scenario 3 continues to be governed predominantly by the existing urban waterfront noise climate. The contribution from the eastern breakwater construction activities

is minor relative to the prevailing ambient noise environment and does not materially alter the existing acoustic conditions at the Waterclub buildings.

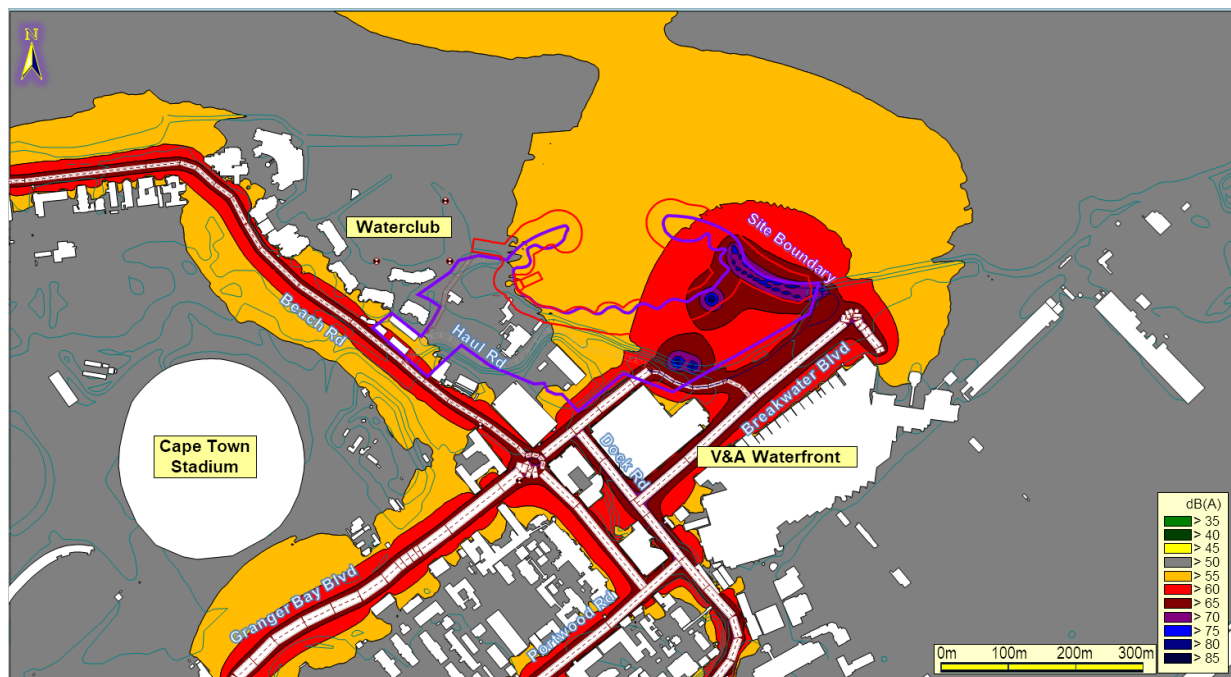


**Figure 4-12. Scenario 3: Predicted Cumulative Noise Levels
(Existing Traffic + Construction Activities + General Ambient Sources) (L_{Aeq})**

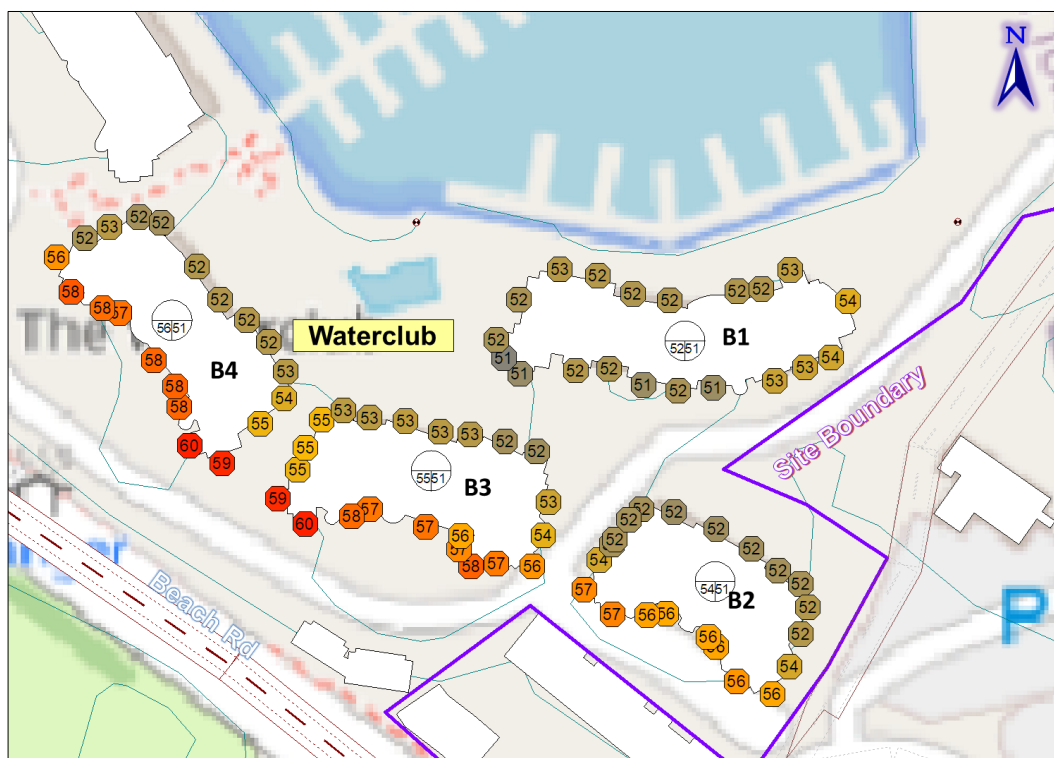


**Figure 4-13. Scenario 3: Predicted Cumulative Façade Noise Levels at the Waterclub
(Existing Traffic + Construction Activities + General Ambient Sources) (L_{Aeq})**

Based on the findings of the construction noise assessment, a series of mitigation and monitoring measures have been identified. These measures are summarised in APPENDIX D (Table D-1) and are recommended for inclusion in the Environmental Management Programme (EMPr).

5 CONSTRUCTION NOISE CONCLUSIONS AND RECOMMENDATIONS

5.1 Construction Scenario 1 – Western Breakwater

5.1.1 Conclusion

Construction Scenario 1 represents the worst-case construction noise scenario assessed in this study. During this phase, construction activities associated with the western breakwater, replacement slipway and adjacent revetment are undertaken closest to the Waterclub buildings, resulting in the highest predicted construction noise levels at the nearest sensitive receptors.

Additional modelling was undertaken to evaluate the effectiveness of a 3 m high temporary noise barrier positioned along the haul road serving the western breakwater construction area. The mitigated modelling results, presented in APPENDIX D, demonstrate that the proposed barrier provides an effective reduction in construction noise propagation towards the Waterclub buildings. The greatest benefit is achieved at Buildings B1 and B2, where the barrier interrupts the direct line-of-sight between the principal construction activities and the nearest residential receptors. Buildings B3 and B4 experience comparatively smaller reductions, as the existing acoustic environment at these buildings continues to be dominated primarily by road traffic and other established urban noise sources.

With implementation of the proposed 3 m temporary noise barrier along the western haul road, the predicted cumulative daytime noise levels at the nearest Water Club buildings are reduced and remain broadly consistent with the existing elevated urban waterfront acoustic environment. The mitigated construction noise impacts are therefore considered acceptable for the temporary duration of the construction works.

5.1.2 Recommendations

To minimise construction noise impacts during this phase, the following mitigation measures are recommended:

- Install and maintain a minimum 3 m high temporary noise barrier along the haul road serving the western breakwater construction area for the duration of Construction Scenario 1. The barrier should be positioned as close as reasonably practicable to the haul road and active construction activities to maximise acoustic screening of the Waterclub buildings. The mitigated noise modelling results and the recommended specifications for the temporary acoustic barrier are presented in APPENDIX D. The recommended construction noise mitigation and monitoring measures, summarised in Table D-1 of APPENDIX D, should be incorporated into the Environmental Management Programme (EMPr).
- Restrict construction activities to the approved daytime working hours.
- Ensure that all construction equipment is maintained in accordance with the manufacturer's specifications and fitted with effective silencers where applicable.
- Avoid unnecessary idling of heavy construction plant and equipment.
- Where practicable, avoid the simultaneous operation of multiple high-noise construction activities immediately adjacent to the Waterclub.
- Undertake quarterly environmental noise monitoring during construction of the western breakwater to verify the effectiveness of the proposed mitigation measures, validate the noise model predictions and identify whether any additional practicable mitigation measures are required during construction. Monitoring should be undertaken at representative locations

within the Waterclub precinct using the same methodology adopted for the baseline monitoring programme. Where measured noise levels differ materially from the predicted levels, the construction methodology and mitigation measures should be reviewed and, where necessary, additional mitigation implemented.

5.1.3 Impact Rating

The significance of the predicted construction noise impact was assessed in accordance with the impact assessment methodology presented in APPENDIX F. Construction activities associated with the western breakwater represent the highest potential construction noise impact of the three phases due to the proximity of the active work face to the Water Club buildings. The significance of the unmitigated impact is assessed as **MODERATE**. Mitigation modelling demonstrated that the installation of a 3 m high temporary noise barrier along the western haul road reduces the predicted construction noise contribution at the nearest sensitive receptors, resulting in a **LOW** significance impact. The impact assessment is summarised in Table 5-1.

Table 5-1. Construction Noise Impact Ratings

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Moderate 2	Medium-term 2	Medium 5	Probable	MEDIUM	– ve	High
	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
With mitigation	Local 1	Low 1	Medium-term 2	Low 4	Probable	LOW	– ve	High

5.2 Construction Scenario 2 – Middle Reclamation Area

5.2.1 Conclusion

As construction activities progress towards the middle reclamation area, the separation distance between the active work face and the Waterclub buildings increases. Consequently, the predicted construction noise contribution decreases relative to Construction Scenario 1, with cumulative noise levels remaining broadly consistent with the existing ambient noise environment.

The modelling indicates that the existing road traffic, harbour activities and general Waterfront noise continue to dominate the acoustic environment at the nearest sensitive receptors, with construction activities contributing only a relatively small increase to the overall daytime noise climate.

5.2.2 Recommendations

No additional project-specific mitigation measures are considered necessary during this phase beyond the implementation of good construction noise management practices, including:

- compliance with approved daytime working hours;
- routine maintenance of construction equipment;
- minimisation of unnecessary equipment idling; and
- implementation of the general construction noise management measures contained within the Environmental Management Programme (EMPr).

5.2.3 Impact Rating

As construction activities progress towards the middle reclamation area, the increased separation distance between the active work face and the surrounding sensitive receptors results in a noticeable reduction in construction noise levels. The significance of the predicted impact is assessed as **LOW**, with construction noise remaining largely superimposed on the existing elevated urban waterfront acoustic environment. No additional project-specific mitigation measures are considered necessary other than maintaining the noise barrier along the haul road the implementation of good construction noise management practices. The impact assessment is summarised in Table 5-2.

Table 5-2. Construction Noise Impact Ratings

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local 1	Moderate 2	Medium-term 2	Medium 5	Possible	LOW	– ve	High
	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
With mitigation	Local 1	Low 1	Medium-term 2	Low 4	Possible	VERY LOW	– ve	High

5.3 Construction Scenario 3 – Eastern Breakwater

5.3.1 Conclusion

Construction Scenario 3 represents the lowest construction noise impact of the three scenarios assessed. The increased separation distance between the eastern breakwater works and the Waterclub buildings substantially reduces the contribution of construction activities to the cumulative noise environment.

Predicted cumulative noise levels remain comparable with the calibrated baseline noise environment, indicating that the prevailing urban waterfront acoustic environment continues to be the dominant contributor to the overall daytime noise climate at the nearest sensitive receptors.

5.3.2 Recommendations

No additional project-specific mitigation measures are considered necessary during this phase beyond the implementation of standard construction noise management practices and compliance with the approved construction working hours.

Construction activities should nevertheless continue to be undertaken in accordance with the EMP, including regular equipment maintenance, minimisation of unnecessary plant idling and effective site supervision to minimise avoidable noise emissions.

5.3.3 Impact Rating

Construction activities associated with the eastern breakwater are located furthest from the Water Club buildings and consequently produce the lowest construction noise impacts of the three construction phases. The significance of the predicted impact is assessed as **VERY LOW**, with the prevailing road traffic and other existing waterfront noise sources remaining the dominant contributors to the overall daytime acoustic environment. The impact assessment is summarised in Table 5-3.

Table 5-3. Construction Noise Impact Ratings

	Extent	Intensity	Duration	Consequence	Probability	Significance	Status	Confidence
Without mitigation	Local	Low	Short-term	Low	Possible	VERY LOW	– ve	High
	1	1	2	4				

5.4 Overall Conclusions

The construction noise assessment demonstrates that the predicted noise impacts vary according to the location of the active construction work face.

Construction activities associated with the western breakwater (Scenario 1) produce the highest predicted construction noise levels at the Waterclub buildings due to their proximity to the nearest sensitive receptors. As construction progresses towards the middle reclamation area (Scenario 2) and subsequently the eastern breakwater (Scenario 3), the increased separation distance between the construction activities and the Waterclub buildings results in progressively lower construction noise contributions.

The modelling further demonstrates that the Waterclub buildings are already located within an elevated urban waterfront acoustic environment influenced by existing road traffic, recreational marine activities, harbour operations, helicopter movements and general Waterfront activity. Consequently, the predicted construction noise impacts are superimposed upon an existing daytime ambient noise climate that is already relatively high.

Additional mitigation modelling undertaken for Construction Scenario 1 demonstrates that installation of a 3 m high temporary noise barrier along the western haul road provides an effective reduction in construction noise propagation towards the nearest Waterclub buildings. The modelling indicates that the greatest benefit is achieved at Buildings B1 and B2, while smaller reductions are predicted at Buildings B3 and B4, where the existing acoustic environment continues to be dominated by the surrounding road network. The mitigated modelling results are presented in APPENDIX D.

With the implementation of the recommended 3 m high temporary noise barrier during Construction Scenario 1, together with the recommended quarterly environmental noise monitoring and the application of good construction noise management practices throughout the construction programme, the predicted construction noise impacts are expected to remain acceptable and consistent with the temporary nature of the proposed construction activities.

The recommended construction noise mitigation and monitoring measures for inclusion in the Environmental Management Programme (EMPr) are summarised in APPENDIX D (Table D-1).

6 REFERENCES

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APPENDIX A Checklist of Specialist Report

Requirements as per the EIA Regulations (2014) - Appendix 6

Table A-1. Checklist of Specialist Report

EIA REGULATIONS 2014 GNR 982 Appendix 6 CONTENT OF THE SPECIALIST REPORTS	Required at Scoping/Desk- top Phase	Required at BA/EIA Phase	Cross-reference in this report
(a) details of— the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a curriculum vitae;	X	X	Appendix E
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	X	X	Page iii
(c) an indication of the scope of, and the purpose for which, the report was prepared	X	X	Introduction
(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	X	X	The site visit was conducted on 29 May 2026. The seasons are not relevant to project.
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process;	X	X	Section 1.3
(f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;	X	X	Section 3
(g) an identification of any areas to be avoided, including buffers;	X	X	N/A
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	X	X	Figure 1-1
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	X	X	Section 1.3
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;	X	X	Section 4
(k) any mitigation measures for inclusion in the EMPr		X	Section 5.1
(l) any conditions for inclusion in the environmental authorisation;		X	Section 5
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;		X	Section 5.1
(n) a reasoned opinion— i. as to whether the proposed activity or portions thereof should be authorised; and ii. if the opinion is that the proposed activity or portions thereof should be authorised, any		X	Section 5

EIA REGULATIONS 2014 GNR 982 Appendix 6 CONTENT OF THE SPECIALIST REPORTS	Required at Scoping/Desk- top Phase	Required at BA/EIA Phase	Cross-reference in this report
avoidance, management and mitigation measures that should be included in the EMP, and where applicable, the closure plan;			
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	X	X	N/A
(p) any other information requested by the competent authority	X	X	N/A

APPENDIX B Internal Haul Routing and Offloading Locations

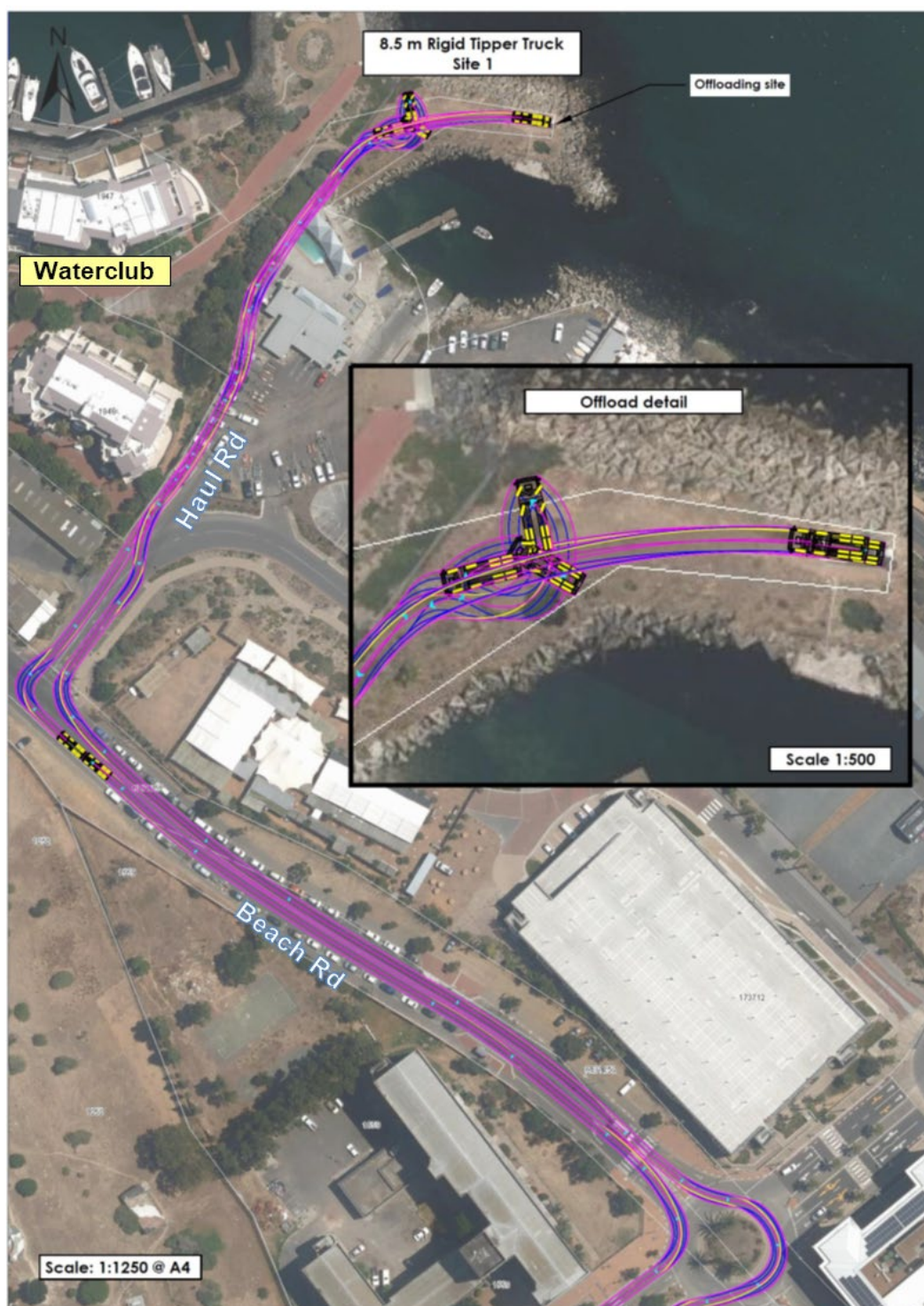


Figure B-1. Internal Haul Routing and Offloading Location Utilised in Construction Scenario 1

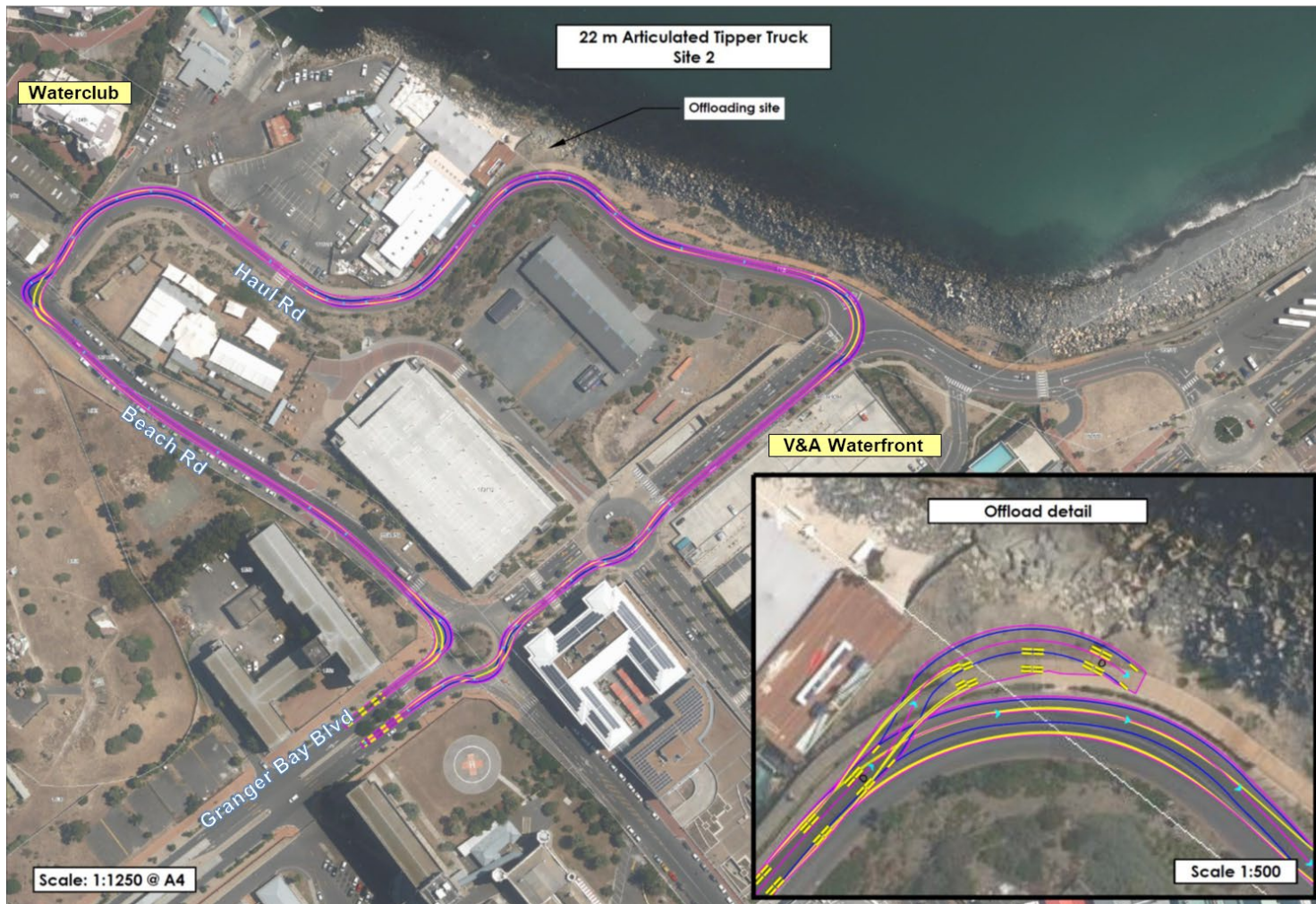


Figure B-2. Internal Haul Routing and Offloading Location Utilised in Construction Scenario 2

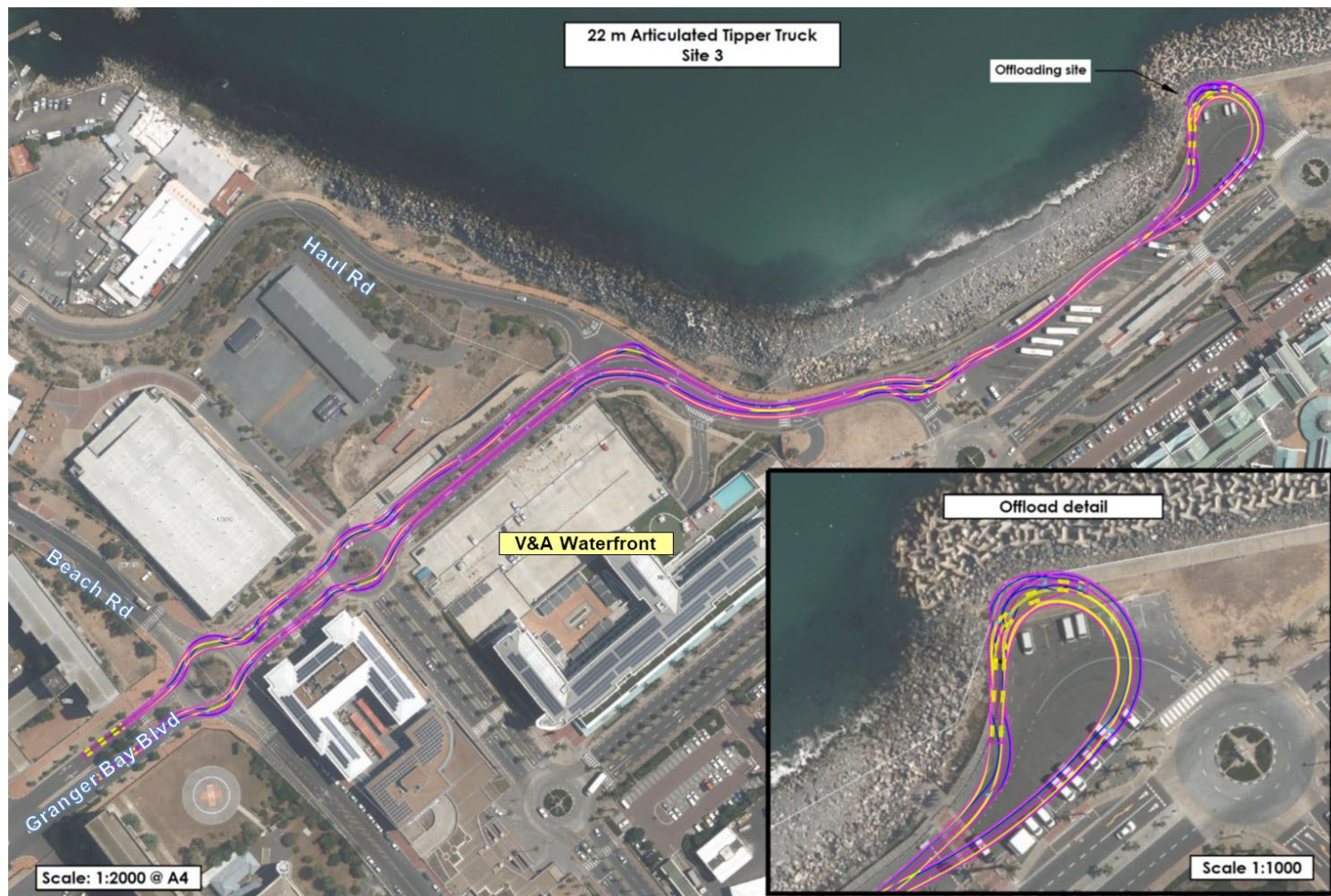


Figure B-3. Internal Haul Routing and Offloading Location Utilised in Construction Scenario 3

APPENDIX C Construction Equipment Sound Power Emissions

Table C-1. Sound Power Levels of Construction Equipment Used in the Noise Model

Name	ID	Type	Octave Spectrum Hz									
			31.5	63	125	250	500	1000	2000	4000	8000	A
			Sound Power Level (dB), re 1 pW									dB(A)
Truck_H	Truck_H	Lw (c)	28	105	105	104	100	99	97	92	82	104.1
TrS_offL	TrS_offL	Lw (c)	28	117	112	108	110	108	106	100	92	112.8
ExvLR1	ExvLR1	Lw (c)	28.8	102.8	111.8	104.8	103.8	98.8	99.8	91.8	85.8	106.2
P_crane2	P_crane2	Lw (c)	28	108	107	101	102	101	101	92	83	106.2
CementTR	CementTR	Lw (c)	28	108	97	94	98	99	97	92	86	103.1
ExvJH	ExvJH	Lw (c)	25	111	111	108	103	105	103	101	96	109.9

Table C-2. Point Noise Source Characteristics Adopted for Construction Noise Modelling

Description	ID	Result. PWL		Lw / Li		Operating Time		Height	Coordinates	
		Day	Evening	Type	Value	Day	Special		X	Y
		(dBA)	(dBA)			(min)	(min)	(m)	(m)	(m)
Dump truck discharging	TR_offL	112.8	112.8	Lw	TrS_offL	19	0	2	-54021.5	-3752817
Long reach tracked excavator	ExcLR1	106.2	106.2	Lw	ExvLR1	672	0	1	-54001.1	-3752805
Crane	Crane	106.2	106.2	Lw	P_crane2	384	0	2	-54020.9	-3752860
Cement mixer truck (discharging)	CementTr	103.1	103.1	Lw	CementTR	480	0	2	-54022.6	-3752865
Excavator mounted rock breaker	ExvJH	109.9	109.9	Lw	ExvJH	192	0	2	-53958.2	-3752897

Table C-3. Line Noise Source Characteristics Adopted for Construction Noise Modelling

Name	ID	Result. PWL		Result. PWL'		Lw / Li		Operating Time		Moving Pt. Src		
		Day	Evening	Day	Evening	Type	Value	Day	Special	Number		Speed
		(dBA)	(dBA)	(dBA)	(dBA)			(min)	(min)	Day	Evening	(km/h)
Haul trucks on haul road	Hline1	94.6	-	71.1	-	PWL-Pt	Truck_H			10	0	20
Long reach tracked excavator	ExvLR1alt	103.4	-	83.2	-	PWL-Pt	ExvLR1	672	0	1	0	0.2

APPENDIX D Predicted Mitigated Noise Levels

D.1. Introduction

This appendix presents the results of the mitigated construction noise assessment undertaken for the western breakwater construction phase, together with the recommended design guidance for the temporary acoustic barrier incorporated into the noise model.

The temporary acoustic barrier was modelled to evaluate its effectiveness in reducing construction noise propagation towards the nearest sensitive receptors, namely the Waterclub buildings, during the period when the active construction work face is located closest to the surrounding residential environment.

The appendix further provides recommended construction noise mitigation and monitoring measures for inclusion in the Environmental Management Programme (EMPr).

D.2. Mitigated Construction Noise Modelling

D.2.1. Mitigated Modelling Results

The predicted cumulative daytime noise contours for the mitigated Construction Scenario 1 are presented in Figure D-4, while the corresponding cumulative façade noise levels at the Waterclub buildings are shown in Figure D-5.

The mitigation scenario incorporates a 3 m high temporary noise barrier positioned along the haul road serving the western breakwater construction area. The barrier is intended to provide acoustic screening between the principal construction activities and the Waterclub buildings during the construction of the western breakwater and replacement slipway.

The predicted cumulative noise contours demonstrate a noticeable reduction in the propagation of construction noise towards the Waterclub precinct. Compared to the unmitigated scenario, the 60 dB(A) contour is drawn closer to the active construction area, indicating that the temporary barrier effectively reduces noise propagation towards the nearest sensitive receptors. The highest noise levels remain confined to the immediate vicinity of the western breakwater construction works.

The predicted cumulative façade noise levels following implementation of the noise barrier are approximately:

- Building B1: 52–57 dB(A);
- Building B2: 52–59 dB(A);
- Building B3: 52–59 dB(A); and
- Building B4: 52–59 dB(A).

Comparison with the unmitigated Construction Scenario 1 indicates that the temporary noise barrier provides the greatest benefit at the façades directly exposed to the western breakwater construction area. The eastern façades of Buildings B1 and B2, which have a direct line-of-sight towards the haul road and active construction works, experience reductions of approximately 2 to 3 dB(A). This reduction is consistent with the expected performance of a temporary acoustic barrier positioned close to the source.

The reduction in predicted noise levels becomes progressively smaller with increasing distance from the active construction area. Buildings B3 and B4 exhibit only marginal reductions relative to the

unmitigated scenario, as the existing acoustic environment at these buildings continues to be dominated by road traffic on Beach Road and other established urban noise sources. Consequently, the overall cumulative noise environment at these buildings changes only slightly following implementation of the barrier.

Comparison with the calibrated baseline acoustic environment indicates that the mitigated scenario noticeably reduces the construction noise contribution at the nearest receptors. Although the predicted cumulative noise levels remain above the baseline at the façades closest to the construction activities, the magnitude of the increase is reduced, resulting in cumulative noise levels that more closely resemble the existing daytime ambient noise environment.

Overall, the modelling demonstrates that the proposed 3 m high temporary noise barrier provides an effective and practicable mitigation measure during construction of the western breakwater. The barrier reduces construction noise propagation towards the nearest residential receptors and lowers the cumulative façade noise levels at the most affected buildings. The greatest benefit is achieved at Buildings B1 and B2, where the barrier interrupts the direct line-of-sight between the haul road, construction equipment and the Waterclub buildings. The implementation of the barrier, together with the recommended construction noise management measures and quarterly environmental noise monitoring, is therefore recommended for the duration of the western breakwater construction phase.

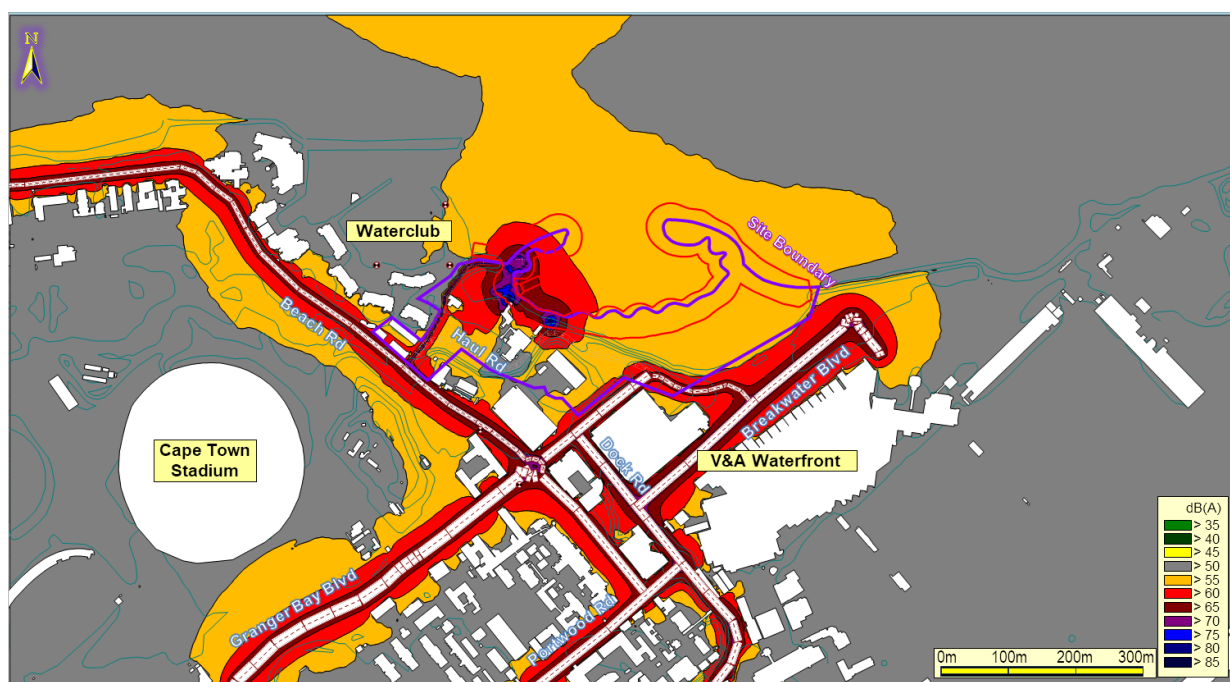


**Figure D-4. Scenario 1: Predicted Mitigated Cumulative Noise Levels
(Existing Traffic + Construction Activities + General Ambient Sources) (L_{Aeq})**

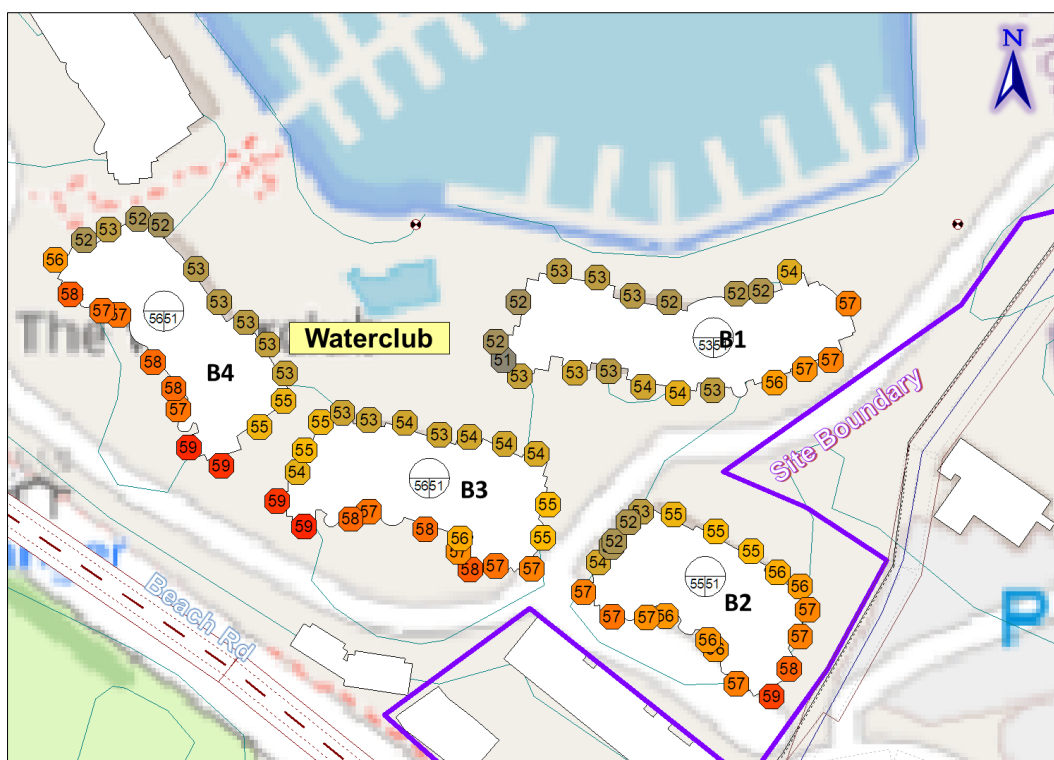


Figure D-5. Scenario 1: Predicted Mitigated Cumulative Façade Noise Levels at the Waterclub (Existing Traffic + Construction Activities + General Ambient Sources) (L_{Aeq})

D.3. Recommended Temporary Acoustic Barrier

A continuous temporary acoustic barrier is recommended along the haul road serving the western breakwater construction area for the duration of the initial construction phase. The barrier should be positioned as close as reasonably practicable to the haul road and active construction activities to maximise acoustic screening of the Waterclub buildings.

The barrier should be continuous over the section of the haul road where construction activities have a direct line-of-sight to the Waterclub buildings and should extend beyond the principal construction activity where practicable to minimise noise diffraction around the barrier ends.

D3.1 Functional Design Requirements

For the purposes of this assessment, the temporary barrier should satisfy the following functional requirements:

- minimum barrier height of 3 m above the adjacent haul road;
- continuous installation with no significant openings at ground level or between adjoining panels;
- adjoining panels should be sealed or overlapped to minimise sound leakage;
- the barrier should comprise a temporary acoustic screening system typically having a surface mass of approximately 7–10 kg/m² and an airborne sound insulation performance of approximately R_w 25 dB (or STC 25 equivalent);

- where practicable, the construction-facing side should incorporate sound-absorptive treatment to minimise sound reflections back towards the construction activities;
- the barrier should be maintained in good condition throughout the construction period and repaired should any damage or openings occur.

D3.2. Structural Requirements

The temporary acoustic barrier should be supported by a suitably designed temporary structural system capable of withstanding the anticipated wind loading and construction site conditions. The support system, foundations, ballast and bracing should be designed and certified by a suitably qualified structural engineer.

D3.2. Performance Verification

The effectiveness of the temporary acoustic barrier should be verified through the recommended quarterly environmental noise monitoring programme during construction of the western breakwater. Where monitoring identifies materially higher noise levels than those predicted in this assessment, the effectiveness of the barrier should be reviewed and additional practicable mitigation measures implemented where necessary.

D.4 Recommended Construction Noise Mitigation and Monitoring Measures

The construction noise assessment identified a number of mitigation measures and monitoring requirements to manage potential noise impacts during the construction phase. The recommendations presented in Table D-1 should be incorporated into the Environmental Management Programme (EMPr) and implemented throughout construction to minimise noise impacts at surrounding sensitive receptors and to verify the effectiveness of the proposed mitigation measures.

Table D-1. Recommended Construction Noise Mitigation and Monitoring Measures for Inclusion in the EMPr

Ref.	Commitment	Timing
CN-01	Install and maintain a minimum 3 m high temporary noise barrier along the western haul road during construction of the western breakwater.	Prior to commencement of Scenario 1
CN-02	Undertake quarterly environmental noise monitoring at representative Waterclub receptor locations during construction of the western breakwater to verify the effectiveness of the mitigation measures and confirm compliance with the predicted construction noise environment.	Quarterly during Scenario 1 and Scenario 2
CN-03	Review the monitoring results after each quarterly survey. Where measured noise levels are materially higher than predicted, investigate the cause and implement additional practicable noise mitigation measures where necessary.	Following each monitoring survey

APPENDIX E Ambient Noise Measurement Photographs

- **MP01**



View south towards Waterclub



View east towards the development site

- **MP02**

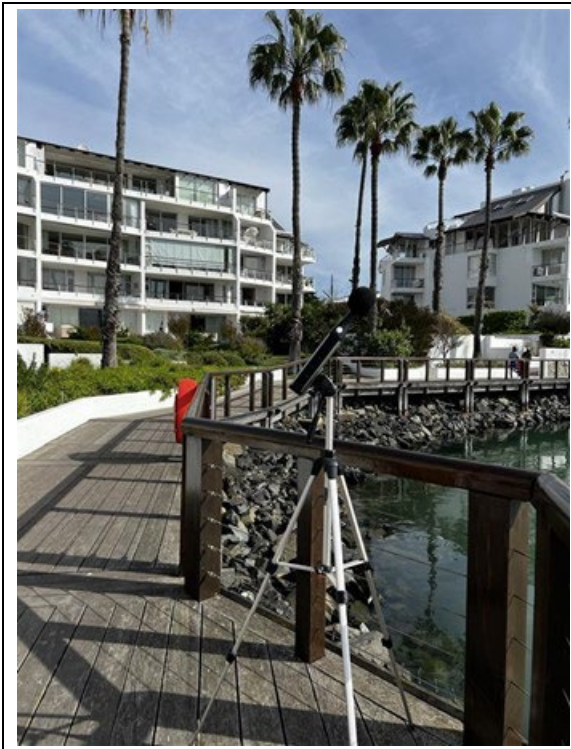


View towards west

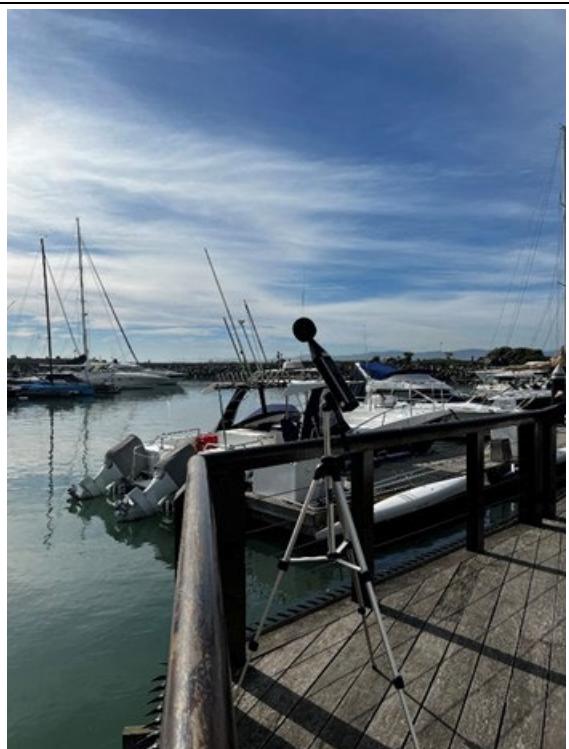


View south towards the Waterclub

• MP03



View towards west



View towards east

• MP04

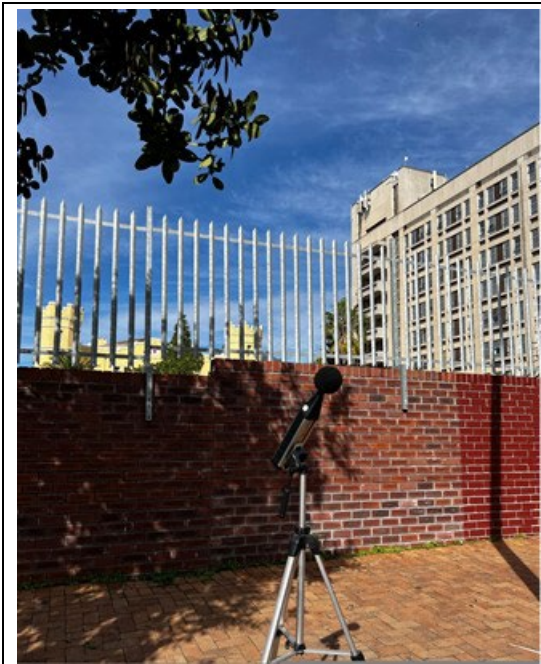
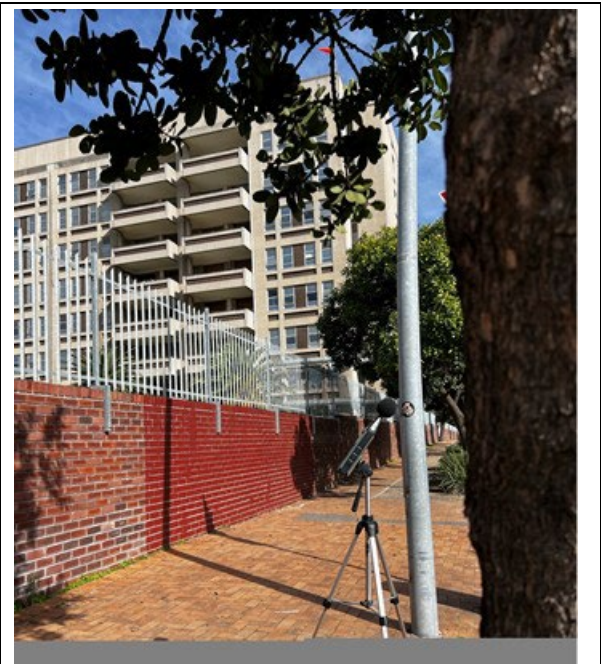


View towards east



View towards west

• MP05

	
View towards east	View towards south

APPENDIX F Impact Assessment Methodology

The significance of all potential impacts that would result from the proposed project is determined in order to assist decision-makers. The significance rating of impacts is considered by decision-makers, as shown below.

- **INSIGNIFICANT:** the potential impact is negligible and **will not** have an influence on the decision regarding the proposed activity.
- **VERY LOW:** the potential impact is very small and **should not** have any meaningful influence on the decision regarding the proposed activity.
- **LOW:** the potential impact **may not** have any meaningful influence on the decision regarding the proposed activity.
- **MEDIUM:** the potential impact **should** influence the decision regarding the proposed activity.
- **HIGH:** the potential impact **will** affect a decision regarding the proposed activity.
- **VERY HIGH:** the proposed activity should only be approved under special circumstances.

The **significance** of an impact is defined as a combination of the **consequence** of the impact occurring and the **probability** that the impact will occur. The significance of each identified impact^c must be rated according to the methodology set out below:

Step 1 – Determine the **consequence** rating for the impact by determining the score for each of the three criteria (A-C) listed below and then **adding** them. The rationale for assigning a specific rating, and comments on the degree to which the impact may cause irreplaceable loss of resources and be irreversible, must be included in the narrative accompanying the impact rating:

Rating	Definition of Rating	Score
A. Extent – the area over which the impact will be experienced		
Local	Confined to project or study area or part thereof	1
Regional	The region, which may be defined in various ways, e.g. cadastral, catchment, topographic	2
(Inter) national	Nationally or beyond	3
B. Intensity – the magnitude of the impact in relation to the sensitivity of the receiving environment, taking into account the degree to which the impact may cause irreplaceable loss of resources		
Low	Site-specific and wider natural and/or social functions and processes are negligibly altered	1
Medium	Site-specific and wider natural and/or social functions and processes continue albeit in a modified way	2
High	Site-specific and wider natural and/or social functions or processes are severely altered	3
C. Duration – the timeframe over which the impact will be experienced and its reversibility		
Short-term	Up to 2 years	1

^c This does not apply to minor impacts which can be logically grouped into a single assessment.

Medium-term	2 to 15 years	2
Long-term	More than 15 years	3

The combined score of these three criteria corresponds to a **Consequence Rating**, as follows:

Combined Score (A+B+C)	3 – 4	5	6	7	8 – 9
Consequence Rating	Very low	Low	Medium	High	Very high

Step 2 – Assess the **probability** of the impact occurring according to the following definitions:

Probability – the likelihood of the impact occurring	
Improbable	< 40% chance of occurring
Possible	40% - 70% chance of occurring
Probable	> 70% - 90% chance of occurring
Definite	> 90% chance of occurring

Step 3 – Determine the overall **significance** of the impact as a combination of the **consequence** and **probability** ratings, as set out below:

		Probability			
		Improbable	Possible	Probable	Definite
Consequence	Very Low	INSIGNIFICANT	INSIGNIFICANT	VERY LOW	VERY LOW
	Low	VERY LOW	VERY LOW	LOW	LOW
	Medium	LOW	LOW	MEDIUM	MEDIUM
	High	MEDIUM	MEDIUM	HIGH	HIGH
	Very High	HIGH	HIGH	VERY HIGH	VERY HIGH

Step 4 – Note the **status** of the impact.

Status of impact	
Indication whether the impact is adverse (negative) or beneficial (positive).	+ ve (positive – a ‘benefit’)
	– ve (negative – a ‘cost’)

Step 5 – State your level of **confidence** in the assessment of the impact (high, medium or low).

Confidence of assessment	
The degree of confidence in predictions based on available information, and/or specialist knowledge.	Low
	Medium
	High

Step 6 – Identify and describe practical mitigation and optimisation measures that can be implemented effectively to reduce or enhance the significance of the impact.

APPENDIX G Specialist CV