



# NOISE MANAGEMENT PLAN

April 2026

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Version	Date	Reviewer	Comments
10	6 <sup>th</sup> September 2017	Luke Pascot	Review following 2017 Triennial Independent Audit recommendations.
11	25 <sup>th</sup> February 2019	Luke Pascot	Annual document review. Delay in review was due waiting for a response from Dept. following submission after last audit. As no response was received, review has been undertaken. Minor changes to PKCT roles only.
13	21 <sup>st</sup> August 2019	Luke Pascot	General review following submission of AEMR. Minor updates to roles only
14	14 <sup>th</sup> September 2020	Luke Pascot	Review following 2020 Triennial Independent Audit recommendations. No material changes.
15	12 <sup>th</sup> February 2021	Luke Pascot	Review and update following DPIE RFI and PKCT site separation for AIE site
16	10 <sup>th</sup> September 2022	Michael Curley	Annual review – no changes made.
17	21 <sup>st</sup> August 2023	Luke Pascot	Annual review – no material changes made. Updates to document I.D's where required.
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20	15 <sup>th</sup> April 2026	Luke Pascot	Review following 2026 Triennial Independent Audit. No changes made.

## 1. INTRODUCTION

### 1.1 Purpose

The purpose of this Noise Management Plan (NMP) is to set out the requirements for the management and monitoring of noise impacts associated with Port Kembla Coal Terminal (PKCT)'s site operations. This plan has been prepared in accordance with the Department of Planning and Environment (DPIE)'s Condition 1 (refer section 4.3) which includes a requirement for PKCT to prepare a noise monitoring program.

### 1.2 Background

PKCT provides a coal product receival, storage and shipping loading service to its customers. PKCT is located on north side of the inner harbour and operates premises leased from NSW Ports.

The PKCT has been in operation since 1990 and operates under an Environmental Protection Licence (EPL No. 1625) in accordance with the *Protection of the Environment Operations Act 1997* (POEO Act).

An important environmental aspect associated with PKCT's activities is to prevent / minimise noise impacts to surrounding receptors. This is done through PKCT's environmental management system.

### 1.3 Scope

This NMP applies to activities and aspects of PKCT operations with the potential to result in noise impacting on amenity on site, the local community and stakeholders external to the PKCT site boundary.

This NMP does not cover health aspects associated with noise and hearing loss. PKCT has health and hygiene management processes and programs covered elsewhere within its Health, Safety, Environment and Community (HSEC) management system.

### 1.4 Objectives

The objectives of this NMP are to:

- Comply with all regulatory requirements set out in EPL 1625 and the DPIE approval conditions (refer Section 4.3)
- Define PKCT's environment management system and the associated measures to control noise compatible with efficient PKCT operations
- Define PKCT's Noise Monitoring Program and the process for assessing noise data against standards
- Outline process for developing preventative, corrective and improvement actions to reduce noise
- Outline the process for investigating noise complaints.



## 2. RESPONSIBILITIES

The roles and responsibilities relevant to the environmental management at PKCT are defined in Table 1 below.

**Table 1 Environmental Management Roles and Responsibilities**

<b>Role</b>	<b>Responsibility</b>
PKCT employees, contractors and site personnel	All PKCT employees, contractors and other site personnel are responsible to comply with this management plan.  PKCT employees, contractors and other site personnel must take appropriate action detailed in this management plan in accordance with PKCT's legal and environmental obligations
Environmental Specialist	Is responsible to the HSER Lead for the coordination and implementation of the management plan to PKCT site operations.
Health Safety Environment and Risk (HSER) Lead	Is responsible to the General Manager for site monitoring and operation of environmental control systems.
Operations Manager	Is responsible for managing and supporting the shift and daywork teams to effectively and safely operate the business in line with customer, community and regulator expectations.
Maintenance Superintendent	Is responsible to the General Manager for work execution ensuring environmental control equipment is maintained, reliable and effective.
Asset Manager	Is responsible for asset management and planning, ensuring environmental control equipment is fit for purpose, reliable and effective.
General Manager	Is accountable for PKCT's legal and environmental compliance.

### **3. LEGISLATIVE AND OTHER REQUIREMENTS**

#### **3.1 Legislative Requirements**

##### **3.1.1 Protection of the Environment Operations Act 1997**

The Protection of the Environment Operations Act 1997 (POEO Act) is the principal legislation which governs the operational environmental management. The POEO Act contains a core list of activities that require a licence issued by the EPA. An activity listed in Schedule 1 is referred to as a 'scheduled activity'. Under the POEO Act, if work is to be undertaken at a premises for a scheduled activity to be carried out (referred to as 'scheduled development work') then the person undertaking the work must hold an EPL issued by the EPA. Scheduled activities referenced on the EPL pertain to Coal Works and Shipping in Bulk. The licencing schedule is based upon potential for environmental impact. PKCT must not cause noise pollution in breach of sections 139 or 140 of the Act.

##### **3.1.2 Protection of the Environment Operations (General) Regulation 2009**

The Protection of the Environment Operations (General) Regulation 2009 (POEO Regulation) provides for the administration of Environmental Protection Licences (EPL) by methods of calculating licence fees, including load-based licence fees, and environmental protection notice fees. The POEO Regulation prescribes requirements in respect of pollution incident response management plans and prescribes the appropriate regulatory authority for certain activities regarding EPL non-compliance.

##### **3.1.3 Protection of the Environment Operations (Noise Control) Regulation 2017**

Protection of the Environment Operations (Noise Control) Regulation 2017 (POEO Noise) provides for the use of various motor vehicle and vehicle accessory devices such as horns, alarms and other plant equipment that may generate noise emissions. The POEO Noise sets noise criteria limits for motor vehicles to ensure there is no unnecessary noise emissions from site operations.

#### **3.2 Environmental Protection Licence (EPL No. 1625)**

PKCT has been licenced by the NSW EPA under the POEO Act 1997. This licence is renewed annually. The conditions of the EPL with respect to noise management are addressed in this NMP. A copy of the EPL can be accessed via the NSW EPA website.

#### **3.3 Department of Planning, Industry and Environment: 2009 Approval Conditions**

On the 12<sup>th</sup> June 2009, the Minister for Planning approved a Project Application (08\_0009) that was submitted by Port Kembla Coal Terminal (PKCT) to change receival arrangements. The project approved by the minister was defined as the development described in the environmental assessment.

The project was approved with conditions, including a requirement for PKCT to prepare and implement a Noise Monitoring Program. The program is to be developed in consultation with the NSW EPA and submitted to the department 6 months from the date of approval. These conditions have been applied to:

- Prevent, minimise, and/or offset environmental impacts
- Set standards and performance measures for acceptable environmental performance
- Provide for regular monitoring and reporting
- Provide for on-going environmental management of the project.

### 3.3.1 Condition 1 – Impact Assessment Criteria

Condition 1 below states PKCT shall ensure that noise generated by the project does not exceed the criteria listed in Table 1 of the Approval Conditions at any privately-owned residence for the location nearest to that residence. Table 2 below identifies the condition details and the area within this NMP.

**Table 2: Condition details**

Condition Details	Area addressed in NMP
<p><b>1. The Proponent shall ensure that the noise generated by the project at any privately-owned residence does not exceed the criteria specified in Table 1 for the location nearest to that residence.</b></p>	<p>Key references herein unless noted otherwise</p> <p>Section 5 and 8</p>

**Noise impact assessment criteria dB(A)  $L_{Aeq}$  (15 min)**

Location	Time Period	Noise Criteria $L_{Aeq}$ (15 min) (dBA)
Cnr of Swan/Kembla Sts	Day	51
	Evening	50
	Night	49
Cnr of Swan/Corrimal Sts	Day	51
	Evening	50
	Night	49
Cnr of Kiera/Fox Sts	Day	55
	Evening	49
	Night	45

**Notes:**

- a) *To determine compliance with the  $L_{Aeq}$  (15 min) noise level limits in the above table, noise from the project is to be measured at the most affected point within the residential boundary. Where it can be demonstrated that direct measurement of noise from the project is impractical, the EPA may accept alternative means of determining compliance (see Chapter*



Condition Details	Area addressed in NMP
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*11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise policy shall also be applied to the measured noise levels where applicable.*

*b) The noise emission limits identified in the above table apply under the meteorological conditions of:*

- Wind speeds of up to 3 m/s at 10 metres above ground level; or
- Temperature inversion conditions of up to 3°C/100m, plus a 2 m/s source-to-receiver component drainage flow wind within 10 metres above ground level for those receivers where applicable in accordance with the NSW Industrial Noise Policy.

*However, if the Proponent has a written negotiated noise agreement with any landowner of the land listed in Table 1, and a copy of this agreement has been forwarded to the Department and EPA, then the Proponent may exceed the noise limits in Table 1 in accordance with the negotiated noise agreement.*

### 3.3.2 Condition 2 – Noise Monitoring Program

Condition Details	Area addressed in NMP
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**2. The Proponent shall prepare and implement a Noise Monitoring Program for the project to the satisfaction of the Director-General. This program must:**

Key references herein unless noted otherwise

*(a) Be developed in consultation with EPA;*

*(b) Be submitted to the Director-General for approval within 6 months from the date of this approval, or as otherwise agreed with the Director-General*

a) & b) references  
 DPIE letter 10/12/09  
 (n.b. EPA letter of 19/11/09)

*(c) Include:*

- I. Combination of attended and unattended noise monitoring measures*
- II. Noise monitoring protocol for evaluating compliance with the noise impact assessment criteria in this approval; and*
- III. Reasonable and feasible best practice noise mitigation measures to ensure project specific noise criteria are met.*

I. Section 8.2  
 II. Section 8.2.3  
 III. Section 8



### 3.3.3 Condition 3 – Continuous Improvement

Condition Details	Area addressed in NMP
<p><b>3. The Proponent shall:</b></p> <p><b>a) Continue to implement all reasonable and feasible best practice noise mitigation measures;</b></p> <p><b>b) Continue to investigate ways to reduce the noise generated by the project, including maximum noise levels which may result in sleep disturbance; and</b></p> <p><b>c) Report on these investigations and the implementation and effectiveness of these measures in the annual environmental monitoring report (AEMR) to the satisfaction of the Director-General.</b></p>	<p>Key references herein unless noted otherwise</p> <p>Section 9.2</p>

### 3.4 Policies and Standards

PKCT is managed by GM3 (Illawarra Coal) and has a management system in place which operates in accordance with its Sustainable Development Policy (PO.003), Environment Policy (PO.002) and Quality Policy (PO.004). These policies are summarised in Table 3 below.

**Table 3 PKCT Policies and Standards**

Policy / Standard	Description
<b>Sustainable Development Policy</b>	<p>The sustainable development policy outlines the objectives PKCT undertake to ensure site operations are undertaken in a sustainable manner which considers the following key concepts:</p> <ul style="list-style-type: none"> <li>• The health and safety values of PKCT staff, contractors and site personnel</li> <li>• Set and achieve sustainable development targets with respect to energy and water efficiency targets which promotes the efficient use of resources and include reducing and preventing pollution throughout the lifecycle of PKCT products</li> <li>• Develop partnerships that foster the sustainable development of our local communities, enhance economic benefits from our operations.</li> <li>• Ongoing consultation with customers, employees, indigenous land owners and the local community.</li> </ul>
<b>Environmental Policy</b>	<p>The environmental policy outlines PKCT commitment to improved environmental performance and ensuring site operations are undertaken in an environmentally responsible manner which includes:</p> <ul style="list-style-type: none"> <li>• Understanding and controlling impacts of site operations on the environment and community</li> </ul>

- Maintain the highest possible standards of environmental management and monitoring
- Compliance with regulatory requirements, conditions of approval and licence conditions
- Ongoing consultation with customers, employees, indigenous land owners and the local community.

**Quality Policy**

PKCT Business Management System provides a framework for managing quality and establishing, achieving and reviewing quality objectives in compliance with the requirements of AS/NZS ISO 9001:2016 and ISO 14001:2015. PKCT staff, contractors and site personnel will fulfil the requirements detailed in the AS/NZS ISO 9001:2016 and ISO 14001:2015 and continually seek opportunities to improve system effectiveness

PKCT has an environment management system in place which is certified to ISO 14001:2015. The system includes documented policies and procedures, environmental aspects assessed and registered with processes for their control and continual improvement. The system is subject to audit and review including biannual surveillance visits by PKCT's external certifier (Lloyd's Register Quality Assurance Limited).



#### **4. EXISTING ENVIRONMENTAL CONDITIONS**

##### **4.1 Sensitive Receivers**

The closest sensitive receivers to the PKCT site are located about 800 metres (m) to the north of the site entrance at Port Kembla Road; these receivers are primarily residential receivers. Directly west, approximately 3.5 kilometres (km) separate PKCT from residences on the western side of the Princes Motorway, and 1.5 km separation exists between the northern tip of the coal stockpiles and residences to the northwest near Springhill Road. Approximately 1.2 km separation exists between the northern tip of the coal stockpiles and residences on Swan Street and Corrimal Street, directly north of the site. Figure 1 illustrates the locations of the nearest receptors to PKCT.

**Figure 1: Sensitive Receptor Location Plan**



## 5. SITE OPERATIONS

### 5.1 Operational Activities and Potential Noise Issues

Excessive noise at PKCT is more likely to be incident based rather than day-to-day noise levels being generated by PKCT. Higher than normal noise levels may also occur if an equipment component is faulty and requires maintenance. When carrying out plant and equipment inspections and maintenance, consideration needs to be given to plant and equipment emitting unusually high noise levels and, if detected, the necessary repairs shall be carried out as appropriate. Key noise sources at PKCT are as follows:

- Operating conveyors particularly around the head end of conveyors
- Ship loader boom hoist area
- Transfer Station 6
- Rail Receival – trains and wagon doors
- Portable equipment such as angle grinders
- Truck compression braking, tail gates and hoists

Impact of noise nuisance on community is a consideration when planning work. In particular, certain types of maintenance and construction work e.g. jack hammering, pile driving, demolition may result in unacceptable noise levels at night. Work needs to be programmed to allow for this or effective sound insulation barriers or other mitigation measure need to be provided.

Noise impacts (operating and during construction) need to be taken into account when considering plant modifications, upgrades and new equipment.

### 5.2 AIE Site Interactions with PKCT

Australian Industrial Energy (AIE) is working to develop Australia's first liquefied natural gas (LNG) import terminal at PKCT's Berth 101. PKCT has reached a commercial agreement with NSW Ports and AIE to surrender the southern area of its lease for AIE to construct and operate the LNG import terminal. The date of surrender is 31/03/2021. The revised site boundary for PKCT, as shown in Figure 2, has resulted in a change in PKCT's site operations, infrastructure and environmental management strategies.

The changes include:

- Reduced lease area due to the surrender of the Bulk Products Area Berth 101 and Seawall Road
- The removal of five (5) collection ponds / sumps and two (2) wet weather discharge points from the PKCT Contaminated Water Collection Treatment System (CWCT), which include:
  - Pump 1 – Southern Pond (wet weather discharge point)
  - Pump 8 – T3 Pond (wet weather discharge point)
  - Pump 9 – Conveyor C7 Sump
  - Pump 16 – Berth 101 North Sump
  - Pump 17 – Berth 101 South Sump

- The addition of two (2) collection ponds / sumps and two (2) wet weather discharge points to the CWCT System, which include:
  - Pump 24 – TS8 Sump (wet weather discharge point)
  - Pump 25 – South Eastern Pond (wet weather discharge point)
- Amendment to the Air Quality Monitoring network which includes the relocation of the southernmost continuous dust monitor (nominated as C1)
- Traffic management and site access arrangements from the southern end of the revised PKCT site boundary.

PKCT and AIE will work collaboratively during the operation of the AIE site to ensure environmental obligations are met, site operations for PKCT and AIE can be run effectively and safely and any issues raised be dealt with in a timely manner. The AIE handover will not result in changes within the PKCT operation that will increase the current noise levels.

**Figure 2: PKCT Site Layout**



## 6. MANAGEMENT STRATEGY

### 6.1 Environmental Aspects and Impacts

Potential for noise impacting on site and on the community is recognised as an important environmental aspect in PKCT's Environmental Aspects and Impacts Register.

Historically, noise has not been the subject of community complaints. Rather, it has been a health and hygiene issue in terms of exposure to site personnel when working in proximity to operating equipment. There are a number of locations which have been identified requiring mandatory hearing protection. Many of these locations are within enclosed structures so that the associated noise off-site is diminished.

Residential areas to the north of the site have undergone significant development in recent years resulting in increased resident density and a changing demographic. PKCT's strategic reviews have concluded that the community are likely to have less tolerance for the neighbouring industrial precinct on aspects impacting on their amenity.

### 6.2 Noise Management and Improvement Programs

#### 6.2.1 Environmental Management System (EMS)

PKCT has an environmental management system (EMS) in place, certified to ISO14001:2015. The EMS is supported by quality, sustainability and environment policies, accessed via the PKCT website, and an Environmental Aspects and Impacts Register which recognises noise as a key aspect for the community.

The system is documented, controlled and supported by management plans and procedures with processes covering:

- Environmental aspects and impacts
- Planning and objectives
- Legal and other requirements
- Training and competency
- Emergency management and investigation
- Monitoring, auditing and review.

#### 6.2.2 Noise Management and Controls

Noise mitigation and control measures will be implemented as required and their exact details will be based on a case by case situation depending on the issue and technical solutions available at the time. The objectives of noise mitigation measures are to minimise noise impacts received beyond the site boundaries.

The equipment and processes established on site to control noise impacts are described in the following sections.

### 6.2.2.1 Plant and Equipment Management and Controls

Plant and equipment management and controls to mitigate noise impacts at the site include the following:

- Enclosing rail receipt within a shed.
- Select plant and equipment to minimise noise emissions where possible, whilst maintaining efficiency of function.
- Road and rail receipt conveyors initially underground then enclosed within the conveyor galleries and transfer stations.
- Maintain all machinery and equipment in proper working order in accordance with the manufacturer's requirements.
- Demonstrate equipment will not cause excessive noise generation in accordance with the Conditions of Approval.
- Prior to any alternative equipment being installed on site, an internal noise assessment will be conducted to ensure that it is in general accordance within the approved parameters as per the Conditions of Approval.

### 6.2.2.2 Traffic Management and Controls

Traffic management and controls to mitigate noise impacts on site include the following:

- Truck driver rules and the Driver Code of Conduct covering requirements relating to driver practices, in particular braking and speed control.

### 6.2.2.3 Administrative Management and Controls

Administrative management and controls to mitigate noise impacts on site include the following:

- Include a noise awareness component in site induction training.
- In the event that noise monitoring indicates an exceedance of the noise limits, the source of the noise will be identified and appropriate action taken including (but not limited to) the replacement of plant and equipment with quieter units, noise barriers or shielding around the work site.
- Job planning and risk assessment processes are in place which considers health, safety, environmental and community impacts. This ensures aspects such as noise are identified, considered and suitable controls are put in place.

## 6.3 Management Strategy and Effectiveness

Improvement strategies are developed through PKCT's Business Planning process. External noise consultant expertise is used where appropriate to identify improvement opportunities. Networking is also undertaken with other coal terminals and within the industry to:

- Ensure PKCT has up to date knowledge of best practice noise management methodologies when developing improvement strategies.
- Benchmark noise levels with other bulk terminals to check its noise performance.

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## 7. EVENT MANAGEMENT

### 7.1 Emergency Response and Investigation

PKCT has emergency response processes in place in case of significant noise events which may be observed internally through site observations or through an external community or stakeholder complaint. These processes provide for action to be taken to mitigate impacts. Events are investigated to develop corrective actions. Events and actions are managed through PKCT's event management system.

Emergency Management Plan MP.001 outlines the emergency activation and response process. It is supported by the Pollution Incident Response Management Plan MP.013, which pertains to environmental pollution events. Both the Emergency Management Plan and the Pollution Incident Response Management Plan can be accessed via the PKCT website.

## 8. MONITORING

### 8.1 General

Following the notification from the NSW Department of Planning, Industry and Environment (DPIE) in 2017 to reduce monitoring frequency to an event-based basis (refer Section 9.4), PKCT has monitored noise impacts through derived monitoring locations to meet the requirements outlined in Schedule 3, Condition 1 of the Project Approval.

A noise monitoring program was prepared by Wilkinson Murray in 2017 (Appendix A) to address the requirements outlined in the Project Approval. The key objectives of the monitoring program are to:

1. Develop a robust noise monitoring procedure that will identify noise levels from PKCT and clearly identified compliance (or otherwise) with the adopted criteria
2. Provide monitoring information and advice to ensure that noise emissions from the site are appropriately managed, and where necessary, reduced.

### 8.2 Noise Monitoring Program

#### 8.2.1 General

PKCT's Noise Monitoring Program is provided in the report prepared by Wilkinson Murray in 2017 (Appendix A). It is noted within the PKCT Noise Monitoring Program that the Conditions Approval require both attended and non-attended noise monitoring, however, the acoustic environment in the area is complex and given the fact the residential receivers are separated by roads and a park, unattended noise monitoring is unlikely to provide any useful information regarding the noise from PKCT.

The Program shall be implemented in accordance with Section 9.2 and as specified herein. PKCT shall ensure suitably qualified external service providers and/or consultants are engaged to carry out the work. Service providers shall ensure that the equipment/instruments used are suitably calibrated in accordance with the relevant Australian Standards and manufacturer's specification.

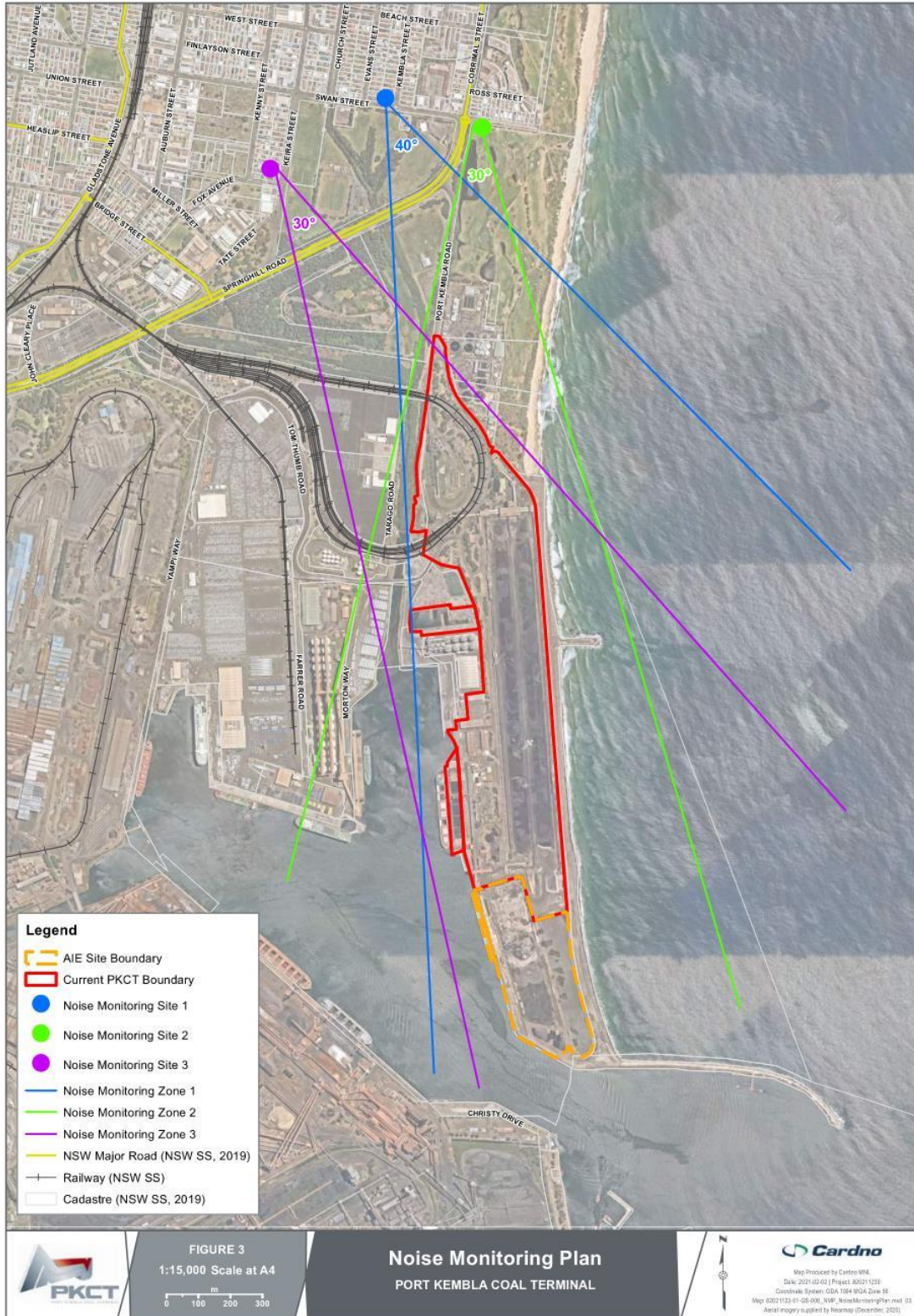
To the extent practical, consideration shall be given to the nature of operations forecast when scheduling a noise survey to ensure it is representative of PKCT operations with road, rail and ship loading operations taking place.

#### 8.2.2 Noise Monitoring Network

The current locations of noise monitoring during operations will be undertaken at the three locations specified below in Figure 3. The monitoring locations have been selected based on representative areas of potentially impacted residences surrounding PKCT. The three monitoring locations are as follows:

- Location 1 – Corner of Swan Street and Kembla Street
- Location 2 – Corner of Swan Street and Corrimal Street
- Location 3 – Corner of Keira Street and Fox Street.

**Figure 3: Noise Monitoring Location Plan**



### 8.2.3 Monitoring Protocol

#### 8.2.3.1 Monitoring Frequency

In August 2016, PKCT made a formal request to the DPIE to remove the requirement for routine, biannual noise monitoring with the intent to undertake event-based monitoring in the event noise concerns are raised. The basis of this request was the original approved Noise Management Plan indicated that noise monitoring would not be required to continue if no exceedance of the criteria occurs for 6 years. As PKCT had no noise exceedances recorded during their monitoring program for the 6-year period, routine noise monitoring was requested to cease.

By letter dated 16<sup>th</sup> March 2017, PKCT received formal notification from DPIE that biannual noise monitoring could be discontinued, refer to Appendix B. As such, noise monitoring will be undertaken on an event-based basis and will be conducted for a single night time period for the following reasons:

- The site operates 24 hours without any operational discrimination between day, evening and night.
- During the night, the lowest criterion applies and as such compliance with this criterion will lead to compliance during the evening and night.
- Atmospheric conditions that enhance noise propagation during the night are more likely to occur during the night.
- Given the generally lower ambient noise levels in the area at night, there is a higher chance that noise from PKCT would be detected.

#### 8.2.3.2 Monitoring Interval

The attended monitoring interval shall be conducted at each of the three monitoring locations throughout the night between the hours of 10.00 pm and 7.00 am, as a minimum. The monitoring interval is a 15-minute period with a minimum of two intervals captured. Received levels from various noise sources would be noted during attended monitoring and particular attention paid to the extent of the PKCT noise contribution, if any.

#### 8.2.3.3 Parameters

Parameters to be recorded include  $L_{A1}$  (1 min),  $L_{Aeq}$  (15 min) and  $L_{A90}$  (15 min).

#### 8.2.3.4 Instruments

Monitoring instruments used for the unattended monitoring shall be the BarnOwl directional noise monitoring system. The BarnOwl is an integrated system of three microphones to give a 360-degree, real time directional noise monitoring and control solution. Directional noise monitoring provides source detection and analysis of noise from PKCT.

Noise monitoring and analysis must be conducted in accordance with the standard method described in the Approved Methods, *Australia Standard (AS) 1055 – Acoustics – Description and Measurement of Environmental Noise*.

#### **8.2.3.5 Observation Records**

Meteorological conditions will be obtained for the time of monitoring, including wind speed, and direction, as well as data suitable for quantifying the presence or absence of temperature inversions from PKCT's two weather stations.

At a minimum for each receptor location, the  $L_{Aeq}$  PKCT direction (in the absence of any other noise) shall be quantified. This parameter would be calculated from measurements using the BarnOwl directional noise monitoring system and will be assessed against the criteria.

#### **8.2.3.6 Evaluation against triggers/limits**

Noise monitoring data will be used to assess against the noise criteria in Project Approval 08\_0009.

If, at any time during the monitoring, meteorological conditions exceed the conditions identified under Condition 1, Note (b) of the Approval Conditions (refer Section 4.3), monitoring and reporting will still be carried out however, it will be outlined within the report that meteorological conditions were in exceedance of applicable levels, and, as such, the limits identified within Section 4.3 will not apply to the results obtained under such conditions.

## 9. REPORTING

### 9.1 Reporting Monitoring Results

The results of the noise monitoring will be reported to PKCT following each monitoring event. The report will confirm compliance (or otherwise) with operational noise limits specified in the Approval Conditions. The report will also, where applicable, provide an assessment of sleep disturbance by comparing measured  $L_{A1(1min)}$  noise levels (from the site) against the screening criteria. Results will be included in the Annual Environmental Management Report (AEMR) forwarded to the Department of Planning in June each year (commencing 2010). In the event that no noise monitoring was required to be undertaken during a licence period, inclusion of results within the AEMR for that reporting period will not be applicable.

Further details for what should be included in the Noise Monitoring Compliance Reports is included within Section 5 of the Noise Monitoring Program prepared by Wilkinson Murray.

### 9.2 Monitoring Data and Exceedances of Criterion Limits

Data shall be recorded, assessed and reported as outlined in Section 8.2. Reporting of noise monitoring results and exceedances of approved site criterion in accordance with Condition 1 of the Project Approval shall include:

- PKCT internal reporting
- Reports to Regulatory Agencies (e.g. EPL Annual Returns and Annual Reports and Annual Environment Management Report)
- Community Reports (e.g. reports to community groups, biannual reports published to PKCT's website).

Upon detecting an exceedance of the limits/performance criteria in the Approval Conditions or the occurrence of an incident that causes (or may cause) harm to onsite and surrounding sensitive receptors, PKCT shall immediately (or as soon as practical thereafter) notify the relevant agencies of the exceedance/incident.

### 9.3 Auditing

PKCT has a number of audit processes to check compliance, assess effectiveness and identify improvement actions. These processes include the following:

- Site level Task Observations i.e. "mini" audit
- Internal Audit Program (including ISO 14001:2015)
- ISO 14001:2015 external surveillance audit- generally, 6-monthly, covering different aspects of PKCT's EMS
- DPIE Approvals Implementation: triennial external audit.

Results of audits and associated corrective actions are tracked by senior management through periodic Business Management System review meetings.

Audits of the noise monitoring program undertaken will ensure that best practice noise mitigation measures are being implemented and to ensure that PKCT continues to investigate ways to reduce the noise generated by the project. The results of the investigations and the implementation of these measures will be reported within the AEMR.

#### **9.4 Corrective Actions**

In the event that the Noise Monitoring Program, site assessment or a local community member identifies an exceedance of the noise criteria stipulated in the Approval Conditions, the Environmental Specialist will investigate the noise source and appropriate corrective action will be undertaken.

In the event that the investigation determines that noise from PKCT operations is likely to be responsible for an exceedance of the noise criteria at nearby residences, the Director-General of DPIE will be notified. Monitoring results will be published in PKCT's AEMR.

#### **9.5 Review**

The noise monitoring program shall be reviewed in consultation with EPA and DPIE at a minimum every three years. The review shall consider monitoring results, changes in environmental expectations, technology and operational procedures.

## 10. COMPLAINTS RECORDING AND REPORTING

PKCT has a 24 hour, 7 day free call community hotline number (1800 111448) and email link i.e. [communitylinks@pkct.com.au](mailto:communitylinks@pkct.com.au) which is advertised on the PKCT website (refer [www.pkct.com.au](http://www.pkct.com.au)). This provides a mechanism by which complaints and general enquiries regarding the environment or community issues associated with operational activities can be managed.

PKCT has a Stakeholder Management Procedure (PR.055) in place which ensures complaints are recorded, registered and investigated. Where appropriate, corrective actions are developed and implemented. If the noise impact assessment criteria are exceeded, aspects of operations will be reviewed to identify improvements. If concerns over noise at a particular location are identified via a complaint or by other means, specific monitoring may be undertaken to quantify the potential noise impact.

## 11. REFERENCES

NSW EPA Environmental Protection Licence (EPL) 1625. New South Wales Environment Protection Authority.

NSW DOP (2009) *Project Approval 08\_009*. New South Wales Government Department of Planning.

PKCT *Stakeholder Management Procedure PR.055*. Port Kembla Coal Terminal

PKCT *Sustainable Development Policy PO.003*. Port Kembla Coal Terminal.

PKCT *Quality Policy PO.004*. Port Kembla Coal Terminal.

PKCT *Emergency Management Plan MP.001*. Port Kembla Coal Terminal.

PKCT *Environmental Aspects and Impacts Register RG.001*. Port Kembla Coal Terminal.

PKCT *Environment Policy PO.002*. Port Kembla Coal Terminal.

PKCT *Pollution Incident Response Management Plan MP.013*. Port Kembla Coal Terminal.

Wilkinson Murray (2017) *Port Kembla Coal terminal Noise Monitoring Program, Version D (07355-C)*.

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**Appendix A: Noise Monitoring Program (Wilkinson Murray, 2017)**

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**AUTHORISED BY: Michael Curley, Health Safety Environment & Risk Lead - Date Authorised: 19/05/2026**

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# PORT KEMBLA COAL TERMINAL NOISE MONITORING PROGRAM

**REPORT NO. 07355-C  
VERSION D**

AUGUST 2017

**PREPARED FOR**

PORT KEMBLA COAL TERMINAL  
PO BOX 823  
WOLLONGONG NSW 2520





## DOCUMENT CONTROL

### Noise Monitoring Program

**PKCT Approval:**

**Authorising Officer**

**Title**

**Signature**

**Date**

**Revision Status:**

Revision	Date	Prepared By	Checked By	Comments
D	31-08-2017	Sam Demasi	NA	Response to DPE & Audit
C	11-11-2011	Sam Demasi	John Wassermann	For OEH Comment
B	16-10-2009	John Wassermann	Adam Bioletti	NA
A	17-09-2009	John Wassermann	Adam Bioletti	NA

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**AAAC**

This firm is a member firm of the Association of Australasian Acoustical Consultants and the work here reported has been carried out in accordance with the terms of that membership.



**Celebrating 50 Years in 2012**

Wilkinson Murray is an independent firm established in 1962, originally as Carr & Wilkinson. In 1976 Barry Murray joined founding partner Roger Wilkinson and the firm adopted the name which remains today. From a successful operation in Australia, Wilkinson Murray expanded its reach into Asia by opening a Hong Kong office early in 2006. Today, with offices in Sydney, Newcastle, Wollongong, Orange, Queensland and Hong Kong, Wilkinson Murray services the entire Asia-Pacific region.





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### APPENDIX A – BarnOwl® Directional Noise Monitoring System



### GLOSSARY

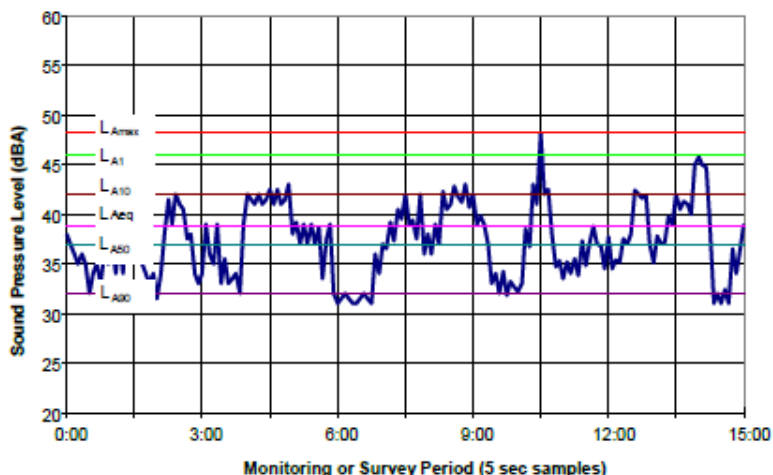
**Sound Absorption** – The ability of a material to absorb sound energy through its conversion into thermal energy.

**Sound Level Meter** – An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure level.

**Sound Pressure Level** – The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.

**Tonal Noise** – Containing a prominent frequency and characterised by a definite pitch.

Typical Graph of Sound Pressure Level vs Time





## 1 INTRODUCTION

---

This Noise Monitoring Program (NMP) has been prepared to address the requirements for noise monitoring as outlined in the Department of Planning's (DoP) Conditions of Approval (CoA) (08/0009), dated 12 June 2009. Please note that the Department of Planning is now known as Department of Planning and Environment (DPE).

The objective of this program is to:

- have a robust noise monitoring procedure that will identify noise levels from Port Kembla Coal Terminal (PKCT) and clearly identify compliance (or otherwise) with the Impact Assessment Criteria; and
- provide monitoring information and advice to ensure that noise emissions from the site are appropriately managed and where necessary reduced.

This protocol is not intended to be a static document, it will be maintained and updated as further information or suggestions become available.

This report (Version D) includes a response to the 2017 Independent Environmental Audit and the ceasing of compliance noise monitoring as approved by DPE.

## 2 SITE DESCRIPTION

---

The Port Kembla Coal Terminal (PKCT) is a major coal intermodal facility that receives coal by road and rail for loading onto ships for export.

Currently PKCT site operations are permitted 24 hours per day, 7 days per week. The site operations typically include:

- Delivery of material by road and rail to receival hoppers;
- Transfer of received coal via conveyor to stackers to be stockpiled prior to arrival of ship;
- Transfer of products received to Bulk Product Berth to stockpile via front end loader;
- Movement of stockpiled coal to the ship loader using bucket wheel reclaimers and conveyors;
- Loading of coal to ship using the ship loader at Berth 102; and
- Loading of product received at Bulk Product Berth to ship via ship loader at Berth 101.

Figure 2-1 shows the site plan of the PKCT site.



### 3 LEGISLATIVE & OTHER REQUIREMENTS

#### 3.1 Legislative Requirements

Legislation relating to the management of noise includes:

- Protection of the Environment Operations Act 1997 (POEO Act);
- Protection of the Environment Operations (General) Regulation 1998; and
- Protection of the Environment Operations (Noise Control) Regulation 2000.

#### 3.2 Conditions of Approval

The CoA specifies the requirements with which PKCT must comply during its operations, with respect to noise, this includes the following:

##### NOISE

##### Impact Assessment Criteria

1. The Proponent shall ensure that the noise generated by the project at any privately-owned residence does not exceed the criteria specified in Table 1 for the location nearest to that residence.

Table 1 Noise impact assessment criteria dB(A)  $L_{Aeq,(15min)}$

Location	Time Period	Noise Criteria
		$L_{Aeq,(15min)}$ (dBA)
Cnr Swan & Kemplla Streets	Day	51
	Evening	50
	Night	49
Cnr Swan & Corrimal Streets	Day	51
	Evening	50
	Night	49
Cnr Keira & Fox Streets	Day	55
	Evening	49
	Night	45

##### Notes:

- a) To determine compliance with the  $L_{Aeq,(15min)}$  noise level limits in the above table, noise from the project is to be measured at the most affected point within the residential boundary. Where it can be demonstrated that direct measurement of noise from the project is impractical, the DECC may accept alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy). The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.
- b) The noise emission limits identified in the above table apply under meteorological conditions of:
  - wind speeds of up to 3m/s at 10m above ground level; or
  - temperature inversion conditions of up to 3°C/100m, plus a 2m/s source-to-receiver component drainage flow wind at 10m above ground level for those receivers where applicable in accordance with the NSW Industrial Noise Policy.



*However, if the Proponent has a written negotiated noise agreement with any landowner of the land listed in Table 1, and a copy of this agreement has been forward to the Department and DECC, then the Proponent may exceed the noise limits in Table 1 in accordance with the negotiated noise agreement.*

*Noise Monitoring Program*

2. *The Proponent shall prepare and implement a Noise Monitoring Program for the project to the satisfaction of the Director-General. This program must:*
- a) be developed in consultation with DECC.*
  - b) be submitted to the Director-General for approval within 6 months from the date of this approval, or as otherwise agreed by the Director-General; and*
  - c) include a:*
    - combination of attended and unattended noise monitoring measures;*
    - noise monitoring protocol for evaluating compliance with the noise impact assessment criteria in this approval; and*
    - reasonable and feasible best practice noise mitigation measures to ensure project specific noise criteria are met.*

Note that the Department of Environment and Climate Change (DECC) is now known as the Office of Environment and Heritage (OEH) and the NSW Environment Protection Authority (EPA) is responsible for noise related aspects.



## 4 NOISE MONITORING

### 4.1 Responsibilities

Table 4-1 presents the personnel at PKCT who are responsible for noise monitoring.

**Table 4-1 Responsibilities for Noise Monitoring**

Procedure	Responsibility
Ensuring environmental noise monitoring is carried out	Planning & Risk Manager
Confirming typical operations during noise monitoring	Operations Manager
Record noise monitoring results	Planning & Risk Manager
Where the levels exceed the targets, implement further controls	Operations Manager

### 4.2 Monitoring Standards

Noise monitoring at PKCT will be undertaken in general accordance with all relevant Australian Standards, Legislation and OEH approved methods for monitoring. The relevant documents are listed below:

- *AS 1055.1-1997: Acoustics – Measurement and Description of Environmental Noise; Part 1: General procedures*
- *AS IEC 61672.1-2004 – Electroacoustics – Sound Level Meters.*
- *Environmental Noise Control Manual (EPA, 1994);*
- *NSW Industrial Noise Policy (EPA, 2000); and*
- *NSW Road Noise Policy (DECCW, 2011).*

### 4.3 Monitoring Locations

Noise monitoring during operations will be undertaken at the locations specified in Table 4-2 representing the catchments areas shown in Figure 4-1. Specific monitoring locations are shown in Figures 4-2 to 4-4. These monitoring locations have been selected as they are representative of potentially impacted residences surrounding PKCT.



**Table 4-2 Responsibilities for Noise Monitoring**

Location	Description	Residential Receivers
1	Cnr Swan & Kembla Sts	Swan St, between Keira & Corrimal Sts
2	Cnr Swan & Corrimal Sts	Swan St, east of Corrimal Sts
3	Cnr Keira & Fox Sts	Keira St, between Swan & Fox Sts

#### 4.4 Monitoring Protocol

To adequately sample the noise environment surrounding PKCT, bi-annual monitoring will be conducted.

Noise monitoring needs only to be conducted at night as this would be the most appropriate time to conduct the measurement for the following reasons:

- The site operates 24 hours without any operational discrimination between day, evening and night.
- During the night, the lowest criterion applies and as such compliance with this criterion will lead to compliance during the evening and night.
- Atmospheric conditions that enhance noise propagation during the night are more likely to occur during the night.
- Given the generally lower ambient noise levels in the area at night, there is a higher chance that noise from PKCT would be detected.

Monitoring shall be bi-annually for a single night time period during Winter and Summer. The frequency of monitoring shall be reviewed after 12 months of operations.

The Conditions of Approval require both attended and unattended noise monitoring however, the acoustic environment in the area is complex and given the fact that the residential receivers are separated by roads and a park, unattended noise monitoring is unlikely to provide any useful information regarding the noise from PKCT.

Noise levels other than from PKCT need to be excluded from the measured level. As such, traditional attended noise monitoring using a unidirectional sound level meter is not suitable for this noise environment. The noise environment around PKCT is dominated by traffic noise from all areas and other industrial sites around the area which unidirectional noise monitoring cannot discern. Therefore, the directional BarnOwl® unattended noise monitoring system will be utilised for the noise monitoring. Using the directional BarnOwl® system will provide the opportunity for identifying noise from the PKCT site (i.e. PKCT direction) and where measurable, quantify such levels.

**Figure 4-1 PKCT & Surrounding Receivers**



Attended noise monitoring would be conducted at each of the three locations throughout the night (10.00pm to 7.00am). The monitoring interval shall be a 15-minute period with at least two intervals captured. If monitoring is to be conducted during the day or evening, a single monitoring period shall be sufficient. The representative arc used for the directional noise monitor for each measurement location is presented in Figures 4-2, 4-3 and 4-4. Both the exact monitoring location and arc used may change slightly in an event where noise from nearby activities might interfere with the noise measurement. It should be noted that BarnOwl® measures in 5-degree increments.

Received levels from various noise sources would be noted during attended monitoring and particular attention will be paid to the extent of the PKCT noise contribution, if any.

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As a minimum for each receptor location, the  $L_{Aeq}$  PKCT Direction (in the absence of any other noise) shall be quantified. This parameter would be calculated from measurements using the BarnOwl® directional noise monitoring system (refer to Appendix A) and will be assessed against the criteria.

If, at any time during monitoring, meteorological conditions exceed the conditions identified under Note (b) of Section 3-2, monitoring and reporting will still be carried out, however, it will be outlined within the report that meteorological conditions were in exceedance of applicable levels, and, as such, the limits identified within Section 3-2 will not apply to the results obtained under such conditions.

In addition, meteorological conditions will be obtained for the time of monitoring. This is to include wind speed and direction, as well as data suitable for quantifying the presence or otherwise of temperature inversions from PKCT's two weather stations.

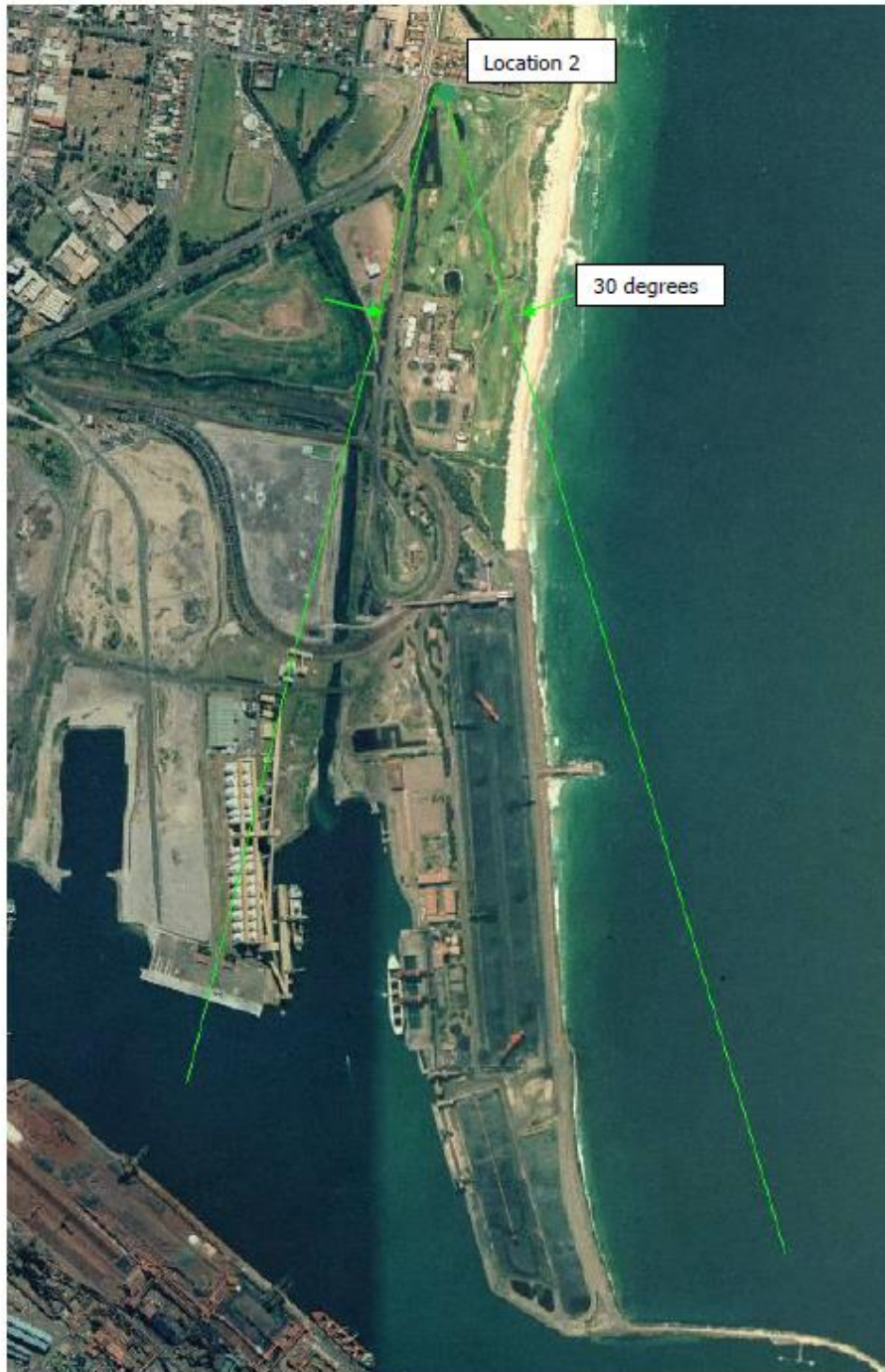


**Figure 4-2 Noise Measurement Sector for Location 1**





**Figure 4-3 Noise Measurement Sector for Location 2**





**Figure 4-4 Noise Measurement Sector for Location 3**





#### 4.5 Summary of Attended Monitoring

##### Frequency:

Monitoring shall bi-annually for a single night time period within the winter and summer seasonal period.

##### Interval:

Attended noise monitoring would be conducted at each of the three locations throughout the night (10.00pm to 7.00am) as a minimum. The monitoring interval shall be a 15-minute period with a minimum two measurements to be conducted.

##### Parameters:

Parameters to be recorded include:  $L_{A1, 1min}$ ,  $L_{Aeq, 15min}$  and  $L_{A90, 15min}$ .

##### Instruments:

Instruments used for unattended monitoring shall be the BarnOwl® direction noise monitoring system. Directional noise monitoring provides source detection and analysis of noise from the PKCT (See Figure 4-2, 4-3 and 4-4).

BarnOwl® uses 3 microphones spaced 500mm apart. The microphone signals are digitised using 24-bit, state-of-the-art A-D conversion. Specially-developed, optimised signal analysis software allows inter-microphone time differences (and therefore source directions) to be evaluated for a ½-second noise sample while the next sample is being acquired. BarnOwl® can therefore provide real time tracking of noise sources, with source locations displayed on a monitor and/or saved for later analysis. The system can simultaneously record total noise, and a filtered signal excluding high-frequency sources, such as insects. BarnOwl® measures in 5-degree increments.

Measurements methodology shall be in general compliance with Australian Standard 1055 – Acoustics - Description and Measurement of Environmental Noise. Pre- and post-calibrations shall be recorded.

##### Locations:

Location 1 – Corner Swan and Kembla Streets;

Location 2 – Corner Swan and Corrimal Streets; and

Location 3 – Corner Keira and Fox Streets.

Outdoor noise levels should normally be measured 1.2m to 1.5m above ground level. The position(s) should be located within the apparent boundaries of land or within 30m of an effected residential receiver. The arc used shall be recorded for each location.

##### Observation Logs:

During the noise measurements, the operator shall record any significant noise sources generated on-site by PKCT. It is recommended that any observations of noise from PKCT trucks are also taken. In addition, the general ambient noise and weather are to be recorded.

Following the completion of measurements, PKCT shall provide Wilkinson Murray (WM) with a summary of the site activities that occurred during the monitoring period. The summary shall include number of truck/rail movements, ships loaded and times.



## 5 REPORTING

---

The following information should be provided in the compliance noise measurement report.

### 1. Description of Source(s) and Surroundings

The report should include the following:

- description of the sound source(s);
- location of source(s);
- description and sketch of physical environment e.g. trees, structures, reflecting objects, topographical features, and any other relevant features;
- photographs if appropriate; and
- operating conditions of sound source(s).

### 2. Instrumentation

For all items of equipment used for the measurements, including calibration equipment, the following information should be recorded:

- name;
- manufacturer;
- type;
- serial number(s) (also of microphones, if removable);
- record of field calibration; and
- date of most recent laboratory calibration.

### 3. Acoustic Data

The report should include the following, as appropriate:

- location(s) of the measurement position(s), and microphone orientations;
- type of noise being measured;
- noise levels measured;
- frequency weighting and time-weighting characteristic used for each measurement;
- duration of each measurement period;
- background noise level with the source not in operation if possible;
- date and time when each measurement was performed (include justification of measurement period);
- tonality adjustment;

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- tonality adjustment;
- impulsiveness adjustment; and
- any other data considered appropriate.

4. Weather Data

All noise measurements shall be accompanied by both qualitative and quantitative weather data throughout the duration of the noise survey.

The report should include the following, as appropriate:

- mean wind speed;
- mean wind direction;
- Rain fall; and
- Sigma theta and Pasquill stability class.

5. Site Operational Reports

PKCT shall provide WM with a summary of all operations that occurred during each noise monitoring period. The summary should include the following:

- Truck movements;
- Rail movements and start/stop time for unloading;
- Ship loading and start/stop time for loading; and

6. Statement of Compliance

A Noise Compliance Monitoring Statement will be submitted for each monitoring period. The Report will confirm compliance (or otherwise) with the operational noise limits specified in the DPE Approval. In addition, the Report will include, where applicable, an assessment of sleep disturbance by comparing measured  $L_{A1(1min)}$  noise levels (from the site) against the screening criteria.



## 6 REVIEW

---

Monitoring results will be reviewed on a bi-annual basis following the conclusion of the monitoring period by the Planning & Risk Manager to assess compliance with the noise criteria presented in Section 3.2.

### 6.1 Corrective Action

If the monitoring program or local community identifies an exceedance of the noise criteria stipulated in the development consent, the Planning & Risk Manager will investigate the noise source and appropriate corrective action will be undertaken.

If the investigation determines that noise from PKCT operations is likely to be responsible for an exceedance of the noise criteria at nearby residences the Director-General of DPE will be notified. Monitoring results will be published in PKCT's Annual Environmental Management Report.

### 6.2 Complaints

A procedure for handling complaints has been implemented as part of the PKCT Environmental Management System (EMS) to ensure a consistent approach to handling any complaints.

All legitimate complaints will be investigated by the PKCT Planning & Risk Manager . Feedback to the complainant will be provided.

In addition to the monitoring outlined in this plan, if PKCT receives a complaint regarding noise at a particular location, specific monitoring may be undertaken to quantify the potential noise impact.

### 6.3 Review

The noise monitoring program is to be reviewed in consultation with OEH and DPE at least every three years. The review will reflect changes in environmental expectations technology and operational procedures. If no exceedance of the criteria occurs for 6 years, noise monitoring will not be required to continue. On this basis and following consultation between DPE and PKCT, it has been agreed by DPE (Ref: 12/08896; 16/08990, dated 16 March 2017) that noise monitoring is no longer required.

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## APPENDIX A

### BARNOWL® DIRECTIONAL NOISE MONITORING SYSTEM



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AUTHORISED BY: Michael Curley, Health Safety Environment & Risk Lead - Date Authorised: 19/05/2026



## BarnOwl<sup>®</sup> – Real time directional noise monitoring

*World first patented technology for multiple noise source detection & analysis*

*'With BarnOwl<sup>®</sup> you can now tell in real time not only how loud the noise is, but also where it is coming from'*

### The BarnOwl<sup>®</sup> Solution

BarnOwl<sup>®</sup> is an integrated system of 3 microphones, precision engineered mounting plate, acoustical hardware and sophisticated signal processing and reporting software.

It provides the world's only 24/7, 360 degree, real time directional noise monitoring and control solution.

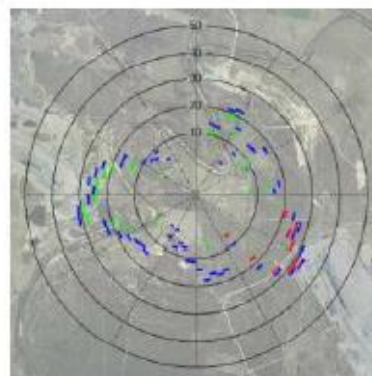
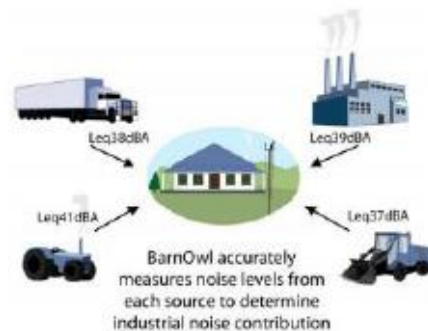
#### Accurate real time noise levels & direction:

The benefits of the BarnOwl<sup>®</sup> noise monitoring method over traditional techniques are:

- Allows noise professionals to provide more accurate advice to their clients;
- Quicker and more accurate resolution of noise issues;
- Allows industry to improve operational efficiency;
- Fairer negotiations between industry and regulators; and
- Better outcome for affected communities.

#### BarnOwl<sup>®</sup> achieves this by:

- Providing accurate measurements with true directional monitoring;
- Eliminating debate over the subjective nature of attended measurements;
- Allowing longer measurement durations to give proper consideration to variable conditions (weather and site operations);
- Providing fully automated and unattended monitoring that reduces the resource overhead associated with attended monitoring; and
- Allowing real time noise data to be received and acted on by site personnel to reduce noise.



*BarnOwl<sup>®</sup> radar plot showing direction & strength of noise sources*



**BarnOwl® Applications**

**Accurate Compliance Monitoring**

BarnOwl's® accurate measurement of noise levels and direction gives both industry and regulatory authorities certainty as to whether noise from a site meets the required limits. In summary BarnOwl® can:

- Check compliance with consent conditions, without interference from other noise sources;
- Watch the movement of noise sources on a remote monitor in real time;
- Track and report on the noise level from multiple sources over days, weeks or years;
- Exclude extraneous noise from measurement results, such as high frequency insect noise; and
- Identify the source of intermittent, unpredictable noise.

**Real Time Noise Monitoring & Control (including Audio)**

BarnOwl's® second-by-second noise monitoring gives operations managers a way to manage and control noise in real time.

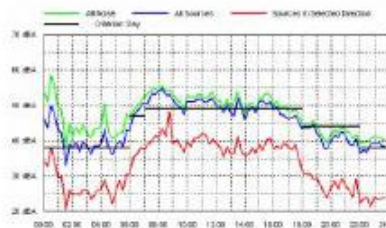
- Multiple noise sources can be monitored ensuring the site's noise contribution is accurately presented alongside other sources e.g. nearby road traffic.
- Alerts can be sent immediately when noise contribution exceeds a threshold.
- Real time data reports and real time audio feeds are available immediately to a site controller.
- If required, immediate action can be taken by operational managers to rectify the potential problem.

**BarnOwl® Feature Summary**

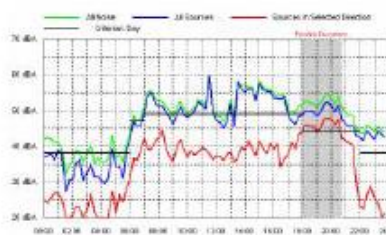
- Multiple noise source detection
- Automatic unattended real time noise detection (every second) from 72 directions (5 degrees)
- Directional monitoring with low pass filter to eliminate insect noise
- Real time graphical display and reporting
- Noise levels in  $L_{Aeq}$  and  $L_{A20}$
- Trigger and alert options for real time control
- Networked and wireless connectivity
- Configurable for access by SCADA or similar system
- Records samples of audio signals
- Direct real time audio over network connection
- Automated microphone calibration
- Archiving facility
- Permanent and mobile (low power) options



*BarnOwl® added as one component at a BHP Billiton environmental monitoring station*



*BarnOwl® real time report shows that sources other than the designated industrial site (red line) are causing the exceedance of the specified noise limit (black line)*



*BarnOwl® real time report shows that there is a possible exceedance in the evening from the designated industrial source (red line)*

