



**Transport
for NSW**



Volume 4 of 6

**SYDNEY METRO CITY & SOUTHWEST
DEMOLITION CONTRACT**

Contract Number: SMCSW-131

Contract Schedules

Between

Transport for NSW

(PRINCIPAL)

ABN 18 804 239 602

and

Metropolitan Demolitions Pty Limited

(CONTRACTOR)

ABN 67 099 769 052

22 Giffnock Avenue Macquarie Park NSW 2113



Transport
for NSW

Sydney Metro Requirement – Environment – Demolition (SMR E)

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1. Introduction

1.1. Purpose

This Sydney Metro Requirement – Environment - Demolition (SMR E) describes requirements and processes the Contractor must comply with in relation to the environment. This SMR E must be read in conjunction with the Contract.

1.2. Interpretation

Unless identified otherwise, wherever used in this SMR E, words and phrases have the meaning given to them in the General Conditions or the SMR Prelude.

2. CEMF Requirements

The Contractor must comply with the Sydney Metro Construction Environmental Management Framework dated February 2016 (CEMF) as amended by Table 1 in Annexure A.

3. Sustainability Requirements

3.1. Carbon and Energy Management

- a) The Contractor must ensure that, as a minimum, 25% of the electricity needs of the Contractor's Activities is offset through either one or a combination of the following:
 - i. purchase of Australian Carbon Offset Credits; and/or
 - ii. purchase of renewable energy from an Accredited Renewable Energy Supplier.
- b) The Contractor must use a minimum 5% biodiesel mix for all diesel powered plant and equipment and a minimum 10% blended ethanol mix for all petrol powered plant and equipment, where applicable.
- c) All newly purchased electrical equipment for use on the project must achieve the "market average star rating", as described in the NSW Government Resource Efficiency Policy (GREP). In categories where no "star ratings" exist in GREP, purchased equipment must meet the GREP E3 - Minimum Standards for New Electrical Appliances and Equipment, and be either:
 - i. ENERGY STAR® accredited;
 - ii. in a high efficiency band by being included in the Australian Standards listed in GREP, and categorised as "high efficiency" under the *Greenhouse and Energy Minimum Standards Act 2012* (GEMS); or
 - iii. above average efficiency under the GEMS for their registered products.

3.2. Water Efficiency

- a) The Contractor must not use potable water as a substitute for non-potable water where Site or local sources of non-potable water suitable for demolition activities are available.

- b) All new water using appliances, shower heads, taps and toilets must achieve the “average water star” rating by product type under the Water Efficiency Labeling Scheme (WELS) scheme, as detailed in the GREP W3 Minimum Standards for New Water Using Appliances.

3.3. Waste and Materials

- a) For work related to the demolition of the Base Building the Contractor must ensure at least 95 per cent of demolition waste (by weight) is diverted from landfill, and either recycled or reused.
- b) For work related to the removal of equipment, fittings and fit out materials from buildings, the Contractor must salvage, reuse and recycle equipment, fittings and materials to the maximum extent practicable, and provide a report to the Principal’s Representative on how this has been accomplished.

4. Reporting

4.1. Environmental Reporting

- a) The Contractor must provide a monthly report, using the SM ES-FT-421 Sydney Metro City & Southwest Environmental Reporting Template.
- b) Within 5 Business Days each Calendar Quarter Date, a register of ongoing Environmental Compliance Requirements (ECRs) must be submitted to the Environmental Representative for review in accordance with the Contract, which identifies progress and evidence of compliance against each ECR.
- c) The register of ECRs must classify each ECR as:
 - i. Ongoing or Complete, to indicate their progress; and
 - ii. Compliant or Non Compliant, to indicate compliance.

4.2. Sustainability Reporting

- a) The Contractor must provide a monthly report which includes the following information, using the Sydney Metro City & Southwest Sustainability Reporting Template SME ES-FT-420.
 - i. Electricity consumed (kWh)
 - ii. Fuel types and volumes of fuels consumed
 - iii. Types and quantities of waste generated
 - iv. Types and quantities of waste reused or recycled
 - v. Types and quantities of waste disposed to landfill
 - vi. Types and quantities of materials salvaged for reuse
 - vii. Source and quantity of water used

- b) The Contractor must prepare and submit a Greenhouse Gas Inventory Report using the “TfNSW Carbon Estimation and Reporting Tool (CERT)” to the Principal’s Representative for review in accordance with the Contract, at the completion of the Contractor’s Activities.
- c) The Contractor must provide an inventory of non-road diesel vehicles to be used for the Contractor’s Activities within 1 month of the date of the Contract, and subsequently, annually using the TfNSW’s “Air Emission Data Collection Workbook 9TP-FT-439”.

5. Guidelines and Requirements

The Contractor must comply with the requirements of the Reference Documents listed in Annexure B as amended by Table 1 in Annexure A.

Annexure A: Requirements of the Sydney Metro Construction Environment Framework

Table 1 Construction Environmental Management Framework Requirements

CEMF Clause	CEMF Requirements included in the Contractor's Activities
2.1	The Contractor must comply with these requirements, except the Principal retains the obligation to address any legislation which is not relevant to the Contractor's Activities.
2.2	The Contractor must comply with these requirements except the Principal retains the obligation to address any Planning Approval requirements not relevant to the Contractor's Activities.
2.3	The Contractor must comply with these requirements.
2.4	The Contractor must comply with these requirements.
3.1	The Contractor must comply with 3.1 e. and 3.1 f. The Principal retains the obligation to comply with this 3.1 a. to 3.1 d. inclusive.
3.2	<p>The Contractor must comply with these requirements, except that in:</p> <ul style="list-style-type: none"> a) 3.2 a. the Sustainability Management Plan (SMP) is to be a sub plan to the CEMP; and b) the following components listed under Section 3.2 b. of the CEMP, are not required to be included in the Sustainability Management Plan: <ul style="list-style-type: none"> i. A sustainability policy statement; ii. Details of the processes and methodologies which will be used to achieve the required scores under rating systems identified in Contract; iii. Details of the processes and procedures for undertaking climate change risk assessments; iv. Details of the processes and procedures for the identification and implementation of climate change adaption measures; v. Details of the approach to sustainable procurement; vi. A Construction Carbon and Energy Management Plan; and vii. A Construction Workforce Development Plan.
3.3	<p>The Contractor must comply with these requirements, and in addition to the requirements of Section 3.3 g. the Principal Contractor's procedures included in the CEMP must be consistent with the following Reference Documents:</p> <ul style="list-style-type: none"> i. City and Southwest Construction Noise and Vibration Strategy (SM ES-ST-210); ii. Environmental Incident Classification and Reporting Procedure (SM ES-PW-303);

CEMF Clause	CEMF Requirements included in the Contractor's Activities
	<ul style="list-style-type: none"> iii. Water Discharge and Reuse Procedure (SM ES-PW-309); iv. Planning Approval Consistency Procedure (SM ES-PW-314); and v. Environment & Sustainability Policy (SM SE MM 102).
3.4	<p>The Contractor must comply with these requirements and in relation to Section 3.4 a. only the following issue-specific environmental sub-plans to the CEMP, are required:</p> <ul style="list-style-type: none"> i. Construction Traffic Management Plan (and its sub-plans per Section 8.2); ii. Construction Noise and Vibration Management Plan; iii. Heritage Management Plan; iv. Waste Management and Recycling Plan; v. Sustainability Management Plan; and vi. Pollution Incident Response Management Plan.
3.5	<p>The Contractor must comply with these requirements and must include the following activity specific environmental procedures:</p> <ul style="list-style-type: none"> a) the development and implementation of progressive erosion and sediment control plans; b) dealing with unexpected Endangered Ecological Communities threatened species identified during demolition, including cessation of work and notification of the Department of Planning and Environment, determination of appropriate mitigation measures in consultation with the Office of Environment and Heritage (including relevant re-location measures); c) air quality and dust monitoring procedure for monitoring and mitigation of air quality and dust impacts; d) the demarcation and protection of retained vegetation, including all vegetation outside and adjacent to the demolition footprint; and e) The maintenance of outward facing elements of Site hoarding or noise barriers, including the removal of graffiti and weeds, and checking the health of retained vegetation around Site boundaries, and direction of any Site lighting.
3.6	The Contractor must comply with these requirements.
3.7	The Contractor must comply with these requirements.
3.8	The Contractor must comply with these requirements.

CEMF Clause	CEMF Requirements included in the Contractor's Activities
3.9	The Contractor must comply with these requirements except the Principal retains the obligation to comply with Section 3.9 d.
3.10	The Contractor must comply with these requirements.
3.11	Not applicable. The Principal retains the obligation to comply with this requirement.
3.12	The Contractor must comply with these requirements.
3.13	The Contractor must comply with these requirements except the Principal retains the obligation to comply with Section 3.13 e. and f.
3.14	The Contractor must comply with these requirements.
3.15	The Contractor must comply with these requirements.
3.16	Not applicable. The Principal retains the obligation to comply with this requirement.
4.1	Not applicable. The Contractor must comply with SMR C in relation to Stakeholder and Community Involvement.
4.2	Not applicable. The Contractor must comply with SMR C in relation to Stakeholder and Community Involvement.
4.3	Not applicable. The Contractor must comply with SMR C in relation to Stakeholder and Community Involvement.
4.4	A Landscape and Temporary Works Management Plan is not required to be developed by the Contractor, however the Contractor's Activities must comply with the other requirements of Section 4.4 and SMR C
4.5	The Contractor must comply with the requirements of Section 4.5 to the extent detailed in SMR C.
5.1	The Contractor must comply with these requirements.
5.2	The Contractor must comply with these requirements.
5.3	The Contractor must comply with these requirements.
6.1	The Contractor must comply with these requirements.
6.2	Not applicable. The Principal retains the obligation to comply with this requirement.
6.3	Not applicable. The Principal retains the obligation to comply with this requirement.
7.1	The Contractor must comply with these requirements.
7.2	Not applicable. The Principal retains the obligation to comply with this requirement.
7.3	Not applicable. The Principal retains the obligation to comply with this requirement.

CEMF Clause	CEMF Requirements included in the Contractor's Activities
8.1	<p>The Contractor must comply with these requirements, except that Section 8.1 no longer applies and the Contractor must comply with the Reference Documents included in Annexure B subject to the following requirements of the Framework Construction Traffic Management Plan Revision 1 (November 2016):</p> <ul style="list-style-type: none"> • The requirement to comply with truck capacity of 10m³ outlined in section 3.7.6 second paragraph does not apply to demolition; and • Notwithstanding the wording in section 3.7.6 second paragraph, the restrictions on the daytime use of truck and dog combinations for demolition will only apply within the Sydney CBD.
8.2	<p>The Contractor must comply with these requirements, except that Section 8.2 no longer applies and the Contractor must comply with the Reference Documents included in Annexure B subject to the following requirements of the Framework Construction Traffic Management Plan Revision 1 (November 2016):</p> <ul style="list-style-type: none"> • The requirement to comply with truck capacity of 10m³ outlined in section 3.7.6 second paragraph does not apply to demolition; and • Notwithstanding the wording in section 3.7.6 second paragraph, the restrictions on the daytime use of truck and dog combinations for demolition will only apply within the Sydney CBD.
8.3	<p>The Contractor must comply with these requirements, except that Section 8.3 no longer applies and the Contractor must comply with the Reference Documents included in Annexure B subject to the following requirements of the Framework Construction Traffic Management Plan Revision 1 (November 2016):</p> <ul style="list-style-type: none"> • The requirement to comply with truck capacity of 10m³ outlined in section 3.7.6 second paragraph does not apply to demolition; and • Notwithstanding the wording in section 3.7.6 second paragraph, the restrictions on the daytime use of truck and dog combinations for demolition will only apply within the Sydney CBD.
9.1	The Contractor must comply with these requirements.
9.2	The Contractor must comply with these requirements.
9.3	The Contractor must comply with these requirements.
10.1	The Contractor must comply with these requirements, except the Principal retains the obligation to comply with this requirement with regard to Non Indigenous Heritage
10.2	The Contractor must comply with these requirements, except the Principal retains the obligation to comply with this requirement with regard to Non Indigenous Heritage
10.3	The Contractor must comply with these requirements, except the Principal retains the obligation to comply with this requirement with regard to Non Indigenous Heritage

CEMF Clause	CEMF Requirements included in the Contractor's Activities
11.1	The Contractor must comply with these requirements.
11.2	Not applicable. The Principal retains the obligation to comply with this requirement.
11.3	Not applicable. The Principal retains the obligation to comply with this requirement.
12.1	Not applicable. The Principal retains the obligation to comply with this requirement.
12.2	Not applicable. The Principal retains the obligation to comply with this requirement.
12.3	Not applicable. The Principal retains the obligation to comply with this requirement.
13.1	Not applicable. The Principal retains the obligation to comply with this requirement.
13.2	Not applicable. The Principal retains the obligation to comply with this requirement.
13.3	Not applicable. The Principal retains the obligation to comply with this requirement.
14.1	The Contractor must comply with these requirements.
14.2	Not applicable. The Principal retains the obligation to comply with this requirement.
14.3	Not applicable. The Principal retains the obligation to comply with this requirement.
15.1	The Contractor must comply with these requirements.
15.2	Not applicable. The Principal retains the obligation to comply with this requirement.
15.3	Not applicable. The Principal retains the obligation to comply with this requirement.
16.1	The Contractor must comply with these requirements.
16.2	Not applicable. The Principal retains the obligation to comply with this requirement.
16.3	Not applicable. The Principal retains the obligation to comply with this requirement.
17.1	The Contractor must comply with these requirements.
17.2	The Contractor must comply with these requirements.
17.3	The Contractor must comply with these requirements.
	Framework Construction Traffic Management Plan Revision 1 (November 2016)

Table 2 Reference Documents Requirements

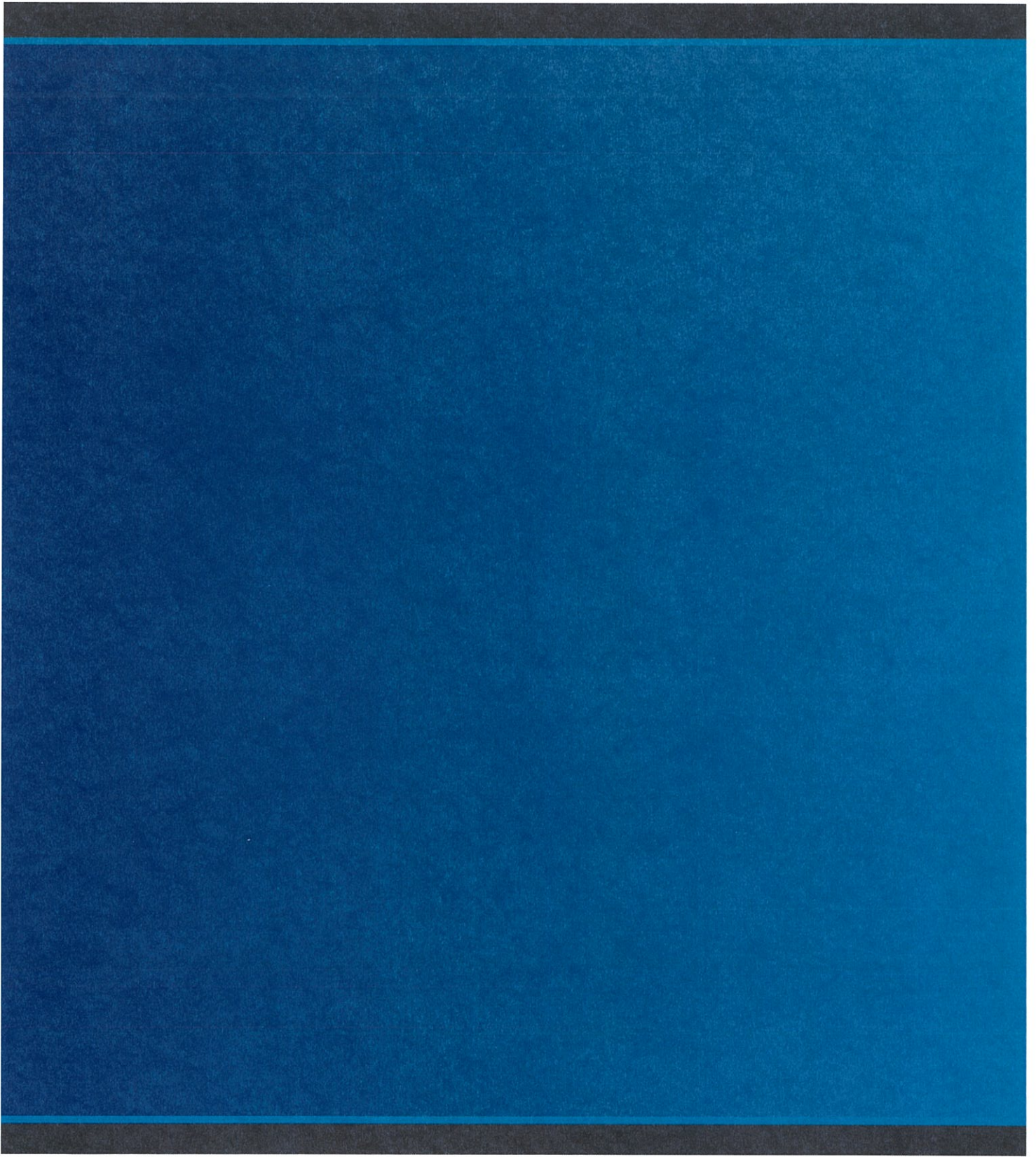
Reference Document	
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Annexure B: Reference Documents

- Sydney Metro Construction Environmental Management Framework SM ES-ST-204
- City and Southwest Construction Noise and Vibration Strategy SM ES-ST-210
- Environmental Incident Classification and Reporting Procedure SM ES-PW-303
- Water Discharge and Reuse Procedure SM ES-PW-309
- Planning Approval Consistency Procedure SM ES-PW-314
- Environment & Sustainability Policy SM SE MM 102
- TfNSW Carbon Estimation and Reporting Tool (CERT)
- TfNSW CERT reporting Tool Guideline 7TP-ST-035
- Air Emission Data Collection Workbook 9TP-FT-439
- Sydney Metro City & Southwest Sustainability Reporting Template SM ES-FT-420
- Sydney Metro City & Southwest Environmental Reporting Template SM ES-FT-421
- Sydney Metro City & Southwest Principal's General Specification G10 Traffic and Transport Management SM ES-ST-214
- Sydney Metro City & Southwest Road Occupancy License SM ES-ST-460
- Framework Construction Traffic Management Plan Revision 1 (November 2016)

CONSTRUCTION ENVIRONMENTAL MANAGEMENT FRAMEWORK

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1. Introduction

1.1 Purpose and Scope

This Construction Environmental Management Framework (CEMF) is a Sydney Metro project framework which sets out the environmental, stakeholder and community management requirements for construction. It provides a linking document between the planning approval documentation and the construction environmental management documentation to be developed by the Principal Contractors relevant to their scope of works.

Sydney Metro Principal Contractors will be required to implement and adhere to the requirements of this CEMF. The requirements of this CEMF will be included as a contract document in all design and construction contracts.

1.2 Status

This is a controlled document, please refer to the version register below which is updated as required.

Version	Description	Date
1.0	For EIS 1	4 April 2012
1.1	For EIS 1 Submissions Report	26 July 2012
1.2	For EIS 2 and the Rapid Transit Rail Facility (RTRF)	31 October 2012
1.3	Updated to incorporate all planning approvals, including ECRL conversion Part 5 approvals	11 July 2014
3.0	Updated to encompass the scope of Sydney Metro – Chatswood to Sydenham EIS	16 February 2016

Previous versions of the CEMF (shown above) still apply to their respective works packages and form part of the contract requirements for the relevant Principal Contractors. The CEMF will continue to be updated and form part of future contract requirements for Sydney Metro works packages.

1.3 Environment and Sustainability Policy

Transport for NSW (TfNSW) has developed an Environment and Sustainability Policy (Appendix A) for Sydney Metro. Principal Contractors will be required to undertake their works in accordance with this policy. The policy reflects a commitment in the delivery of the project to:

- Align with, and support, Transport for NSW (TfNSW) Environment & Sustainability Policy.
- Optimise sustainability outcomes, transport service quality, and cost effectiveness.
- Develop effective and appropriate responses to the challenges of climate change, carbon management, resource and waste management, land use integration, customer and community expectation, and heritage and biodiversity conservation.
- Be environmentally responsible, by avoiding pollution, enhancing the natural environment and reducing the project ecological footprint, while complying with all applicable environmental laws, regulations and statutory obligations.
- Be socially responsible by delivering a workforce legacy which benefits individuals, communities, the project and industry, and is achieved through collaboration and partnerships.

1.4 Project Description

The New South Wales (NSW) Government is implementing Sydney's Rail Future, a plan to transform and modernise Sydney's rail network so that it can grow with the city's population and meet the needs of customers in the future.

Sydney Metro is a new standalone rail network identified in Sydney's Rail Future. The Sydney Metro network consists of Sydney Metro Northwest (previously known as the North West Rail Link) and Sydney Metro City & Southwest. The proposed Sydney Metro network is shown in Figure 1-1.

The proposed Sydney Metro City & Southwest (SM C&SW) comprises two core components:

- The Chatswood to Sydenham project (the project), which is the subject of this Environmental Impact Statement. The project would involve construction and operation of an underground rail line, about 15.5 kilometres long, and new stations between Chatswood and Sydenham
- The second core component would involve upgrading the 13.5 kilometre rail line and existing stations from Sydenham to Bankstown which will be subject to a separate environmental assessment process.

Investigations have started on the possible extension of Sydney Metro from Bankstown to Liverpool. The potential extension would support growth in Sydney's south west by connecting communities, businesses, jobs and services as well as improving access between the south west and Sydney's CBD. It would also reduce growth pressure on road infrastructure and the rail network, including the potential to relieve crowding on the T1 Western Line, T2 South Line and T2 Airport Line.

The Sydney Metro Delivery Office has been established as part of Transport for NSW to manage the planning, procurement and delivery of the Sydney Metro network.

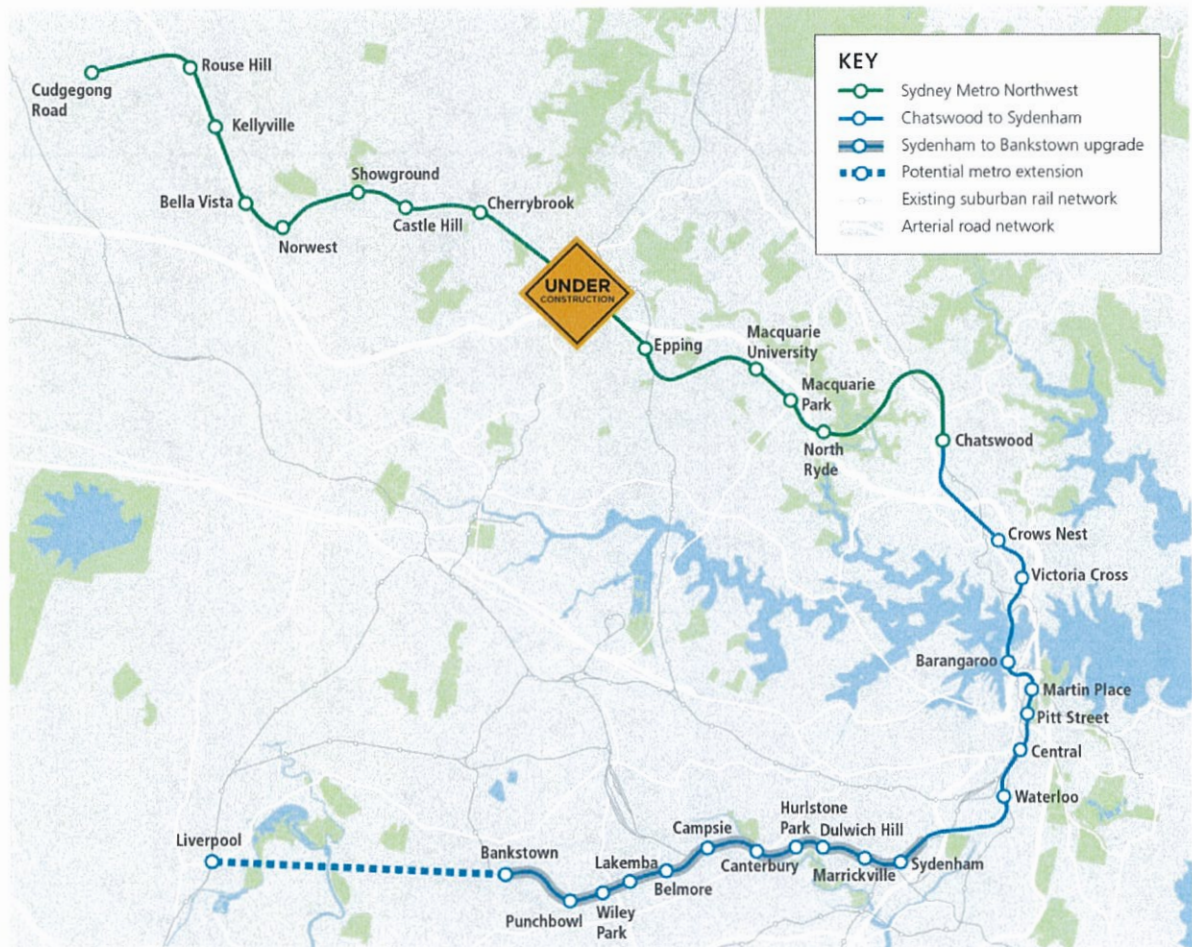


Figure 11 The Sydney Metro network

2. Legislative and Other Requirements

The key environmental obligations to be addressed are contained within:

- Legislative requirements.
- Project approval documentation.
- Conditions of Approval.
- Environment Protection Licences.
- Other permits, approval and licences.
- Standards and guidelines.

2.1 Key Legislative Requirements

Table 1.1 below identifies key NSW environmental legislative requirements and their application to SM C&SW construction works, current as at the date of this document. TfNSW and its Contractors should regularly review their legislative requirements.

Table 1.1 NSW Legislative Requirements

Legislation and Administering Authority	Requirements	Application to Sydney Metro
Contaminated Land Management Act 1997 NSW Environment Protection Authority (EPA)	The Act provides a process for the investigation and remediation of land where contamination presents a significant risk of harm to human health or some other aspect of the environment.	Sydney Metro must follow the process where contaminated land is identified.
Dangerous Goods (Road and Rail Transport) Act 2008 EPA / Workcover	A licence is required for the storage (Workcover) and /or transport (EPA) of prescribed quantities of dangerous goods.	Sydney Metro Principal Contractors must obtain a licence where storage of dangerous goods would exceed licensable quantities.
Environmental Planning and Assessment Act 1979 Department of Planning and Environment (DP&E)	Encourages proper environmental impact assessment and management of development areas for the purpose of promoting the social and economic welfare of the community and a better environment.	Sydney Metro must adhere to mitigation measures and conditions within the planning approval documentation. The proponent and their contractors must endeavor to deliver in a consistent manner within the assessed scope of works.
Fisheries Management Act 1994 Department of Primary Industries (Fisheries)	The relevant objectives of the Act are to conserve threatened species, populations and ecological communities and promote ecologically sustainable development, including the conservation of biological diversity.	Sydney Metro projects assessed under Part 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act) are exempt from permits required under sections 201, 205 or 219.
Heritage Act 1977 NSW Office of Environment and Heritage (OEH)	The Act aims to encourage the conservation of the State's heritage and provides for the identification and registration of items of State heritage significance.	Sydney Metro projects assessed under Part 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act) are exempt from approvals required under Part 4 and permits required under section 139.

Legislation and Administering Authority	Requirements	Application to Sydney Metro
National Parks and Wildlife Act 1974 OEH	The objectives of the Act are for the conservation of nature and the conservation of objects, places or features (including biological diversity) of cultural value within the landscape.	Sydney Metro projects assessed under Part 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act) are exempt from obtaining an Aboriginal Heritage Impact Permit required under section 90.
Native Vegetation Act 2003 OEH	The objective of the Act is to protect and improve the value of native vegetation.	Sydney Metro projects assessed under Part 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act) are exempt from section 12 authorisation to clear native vegetation.
Noxious Weeds Act 1993 Department of Primary Industries	The Act aims to prevent the introduction of new weeds and restrict the spread of existing weeds.	Sydney Metro Principal Contractors must control weeds as required on land under the management of the Contractor.
Protection of the Environment Operations Act 1997 EPA	The relevant objective of the Act is to prevent environmental pollution.	Where Sydney Metro projects are scheduled activities under Schedule 1 of the Act an Environment Protection Licence (EPL) must be obtained. Further details on the requirements to obtain an EPL are provided in Section 2.3.
Roads Act 1993 Roads and Maritime Service	The relevant objective of the Act is to regulate the carrying out of various activities on public roads.	Sydney Metro Principal Contractors must obtain consent under section 138 for carrying out work in, on or over a public road, or digging up or disturbance of the surface of the road.
Waste Avoidance and Resource Recovery Act 2001 EPA	The objectives of the Act are to reduce environmental harm and provide for the reduction in waste generation.	Sydney Metro Principal Contractors must implement strategies to reduce waste volumes and report on waste generated.

Legislation and Administering Authority	Requirements	Application to Sydney Metro
Water Management Act 2000 NSW Office of Water	The relevant objective of the Act is to protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality.	Sydney Metro projects assessed under Part 5.1 of the Environmental Planning and Assessment Act 1979 (EP&A Act) are exempt from obtaining water use approval under section 89, a water management work approval under section 90 or an activity approval (other than an aquifer interference approval) under section 91.

Table 1.2 identifies key Commonwealth environmental legislative requirements and their application to SM C&SW construction works, current as at the date of this document. TfNSW and its Contractors should regularly review their legislative requirements.

Table 1.2 Commonwealth Legislative Requirements

Legislation and Administering Authority	Requirements	Application to Sydney Metro
Environment Protection and Biodiversity Conservation Act 1999 Department of the Environment	The relevant objective of the Act is to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance.	A project may be defined as a controlled action under the Act due to impacts on matters of national environmental significance.
National Greenhouse and Energy Reporting Act 2007 Department of Climate Change and Energy Efficiency	The Act established a framework for reporting of greenhouse gas emissions, abatement actions, energy consumption and production data.	Sydney Metro Principal Contractors must report on greenhouse gas and energy usage data as required by the Act.

2.2 Environmental Approvals

Sydney Metro Northwest is classified as Critical State Significant Infrastructure and was approved under the following in accordance with Section 115W of the Environmental Protection and Assessment Act 1997:

- Staged State Infrastructure Approval (1 October 2011, modified on 25 September 2012)
- Stage 1 - Major Civil Construction Works (25 September 2012, modified on 18 April 2013)
- Stage 2 - Stations, Rail Infrastructure and Systems (8 May 2013, modified on 20 May 2014).

Some components of Sydney Metro Northwest (such as the conversion of the Epping to Chatswood component of the project) have also been approved under Part 5 of the Environmental Protection and Assessment Act. in which case TfNSW is the consent authority.

Sydney Metro City and Southwest is also classified as Critical State Significant Infrastructure and requires approval from a consent authority under the requirements of the Environmental Protection and Assessment Act 1997 (Section 115W). Two separate approvals will be sought:

- Sydney Metro City and Southwest – Chatswood to Sydenham
- Sydney Metro City and Southwest – Sydenham to Bankstown

The requirements of the approval are required to be complied with by TfNSW. Responsibility for implementing mitigation measures and conditions of approval will be allocated between TfNSW and Principal Contractors as appropriate. Typically TfNSW will produce a Staging Report which sets out the applicability and allocation of approval requirements within the project's program of works.

2.3 Environment Protection Licence Requirements

Sydney Metro projects often meet the definition of a number of scheduled activities under Schedule 1 of the *Protection of the Environmental Operation Act 1997* (POEO Act) and as such our contractors may be required to obtain an Environment Protection Licence (EPL).

Where required Sydney Metro Principal Contractors will:

- a. Apply for and be granted an EPL from the EPA.
- b. Hold an EPL which covers their scope of works as necessary under the POEO Act.
- c. Undertake their scope of works in accordance with the conditions of the applicable EPLs as issued by the EPA.

2.4 Standards and Guidelines

Numerous environmental publications, standards, codes of practice and guidelines are relevant to Sydney Metro construction and are referenced throughout this Construction Environmental Management Framework. A summary of these applicable standards and guidelines is provided in Table 1.3.

Table 1.3 Environmental Standards and Guidelines

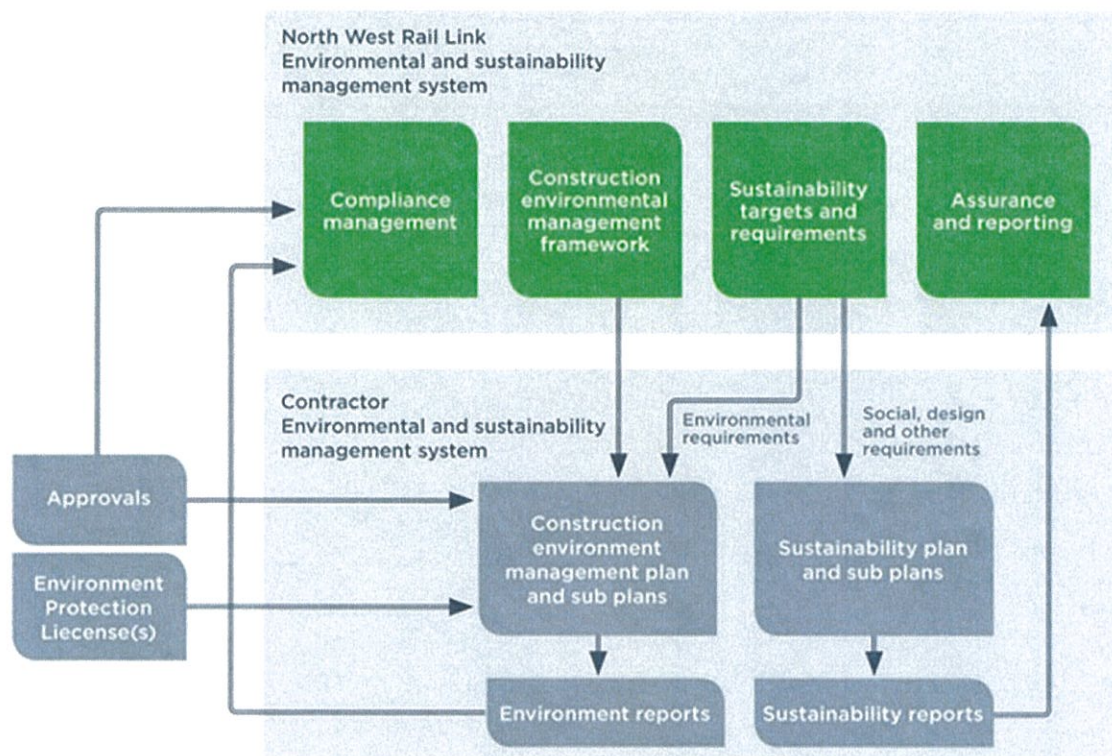
Standard / Guideline	Relevant Authority	CEMF Reference
ISO14001 Environmental Management System – Requirements with Guidelines for Use	DP&E	Section 3.1
Interim Construction Noise Guidelines (Department of Environment and Climate Change, 2009)	EPA	Section 9.2
Managing Urban Stormwater: Soil and Construction (Landcom, 2008)	EPA	Section 15.2
AS4282:1997 Control of the Obtrusive Effect of Outdoor Lighting	OEH	Section 12.3
Waste Classification Guidelines (Department of Environment, Climate Change and Water, 2008)	EPA	Section 17.3

3. Environmental Management Requirements

3.1 Environmental and Sustainability Management System

- a. Principal Contractors are required to have a corporate Environmental Management System certified under AS/NZS ISO 14001:2004.
- b. Principal Contractors are required to develop a project based Environment and Sustainability Management System (E&SMS). The E&SMS will:
 - ◆ be consistent with the Principal Contractors corporate Environmental Management System and the principles of AS/NZS ISO 14001:2004: Environmental Management Systems – Requirements with Guidelines for Use;
 - ◆ be supported by a process for identifying and responding to changing legislative or other requirements;
 - ◆ include processes for assessing design or construction methodology changes for consistency against the planning approvals;
 - ◆ include processes for tracking and reporting performance against sustainability targets;
 - ◆ include a procedure for the identification and management of project specific environmental risks and appropriate control measures.
 - ◆ be consistent with the SM C&SW Sustainability Strategy and Sydney Metro Environment and Sustainability Policy;
- c. All sub-contractors engaged by the Principal Contractor will be required to work under the Principal Contractor's E&SMS.
- d. the relationship between key documents within the Sydney Metro Environment and Sustainability Management System and the Principal Contractor's Environment and Sustainability Management System is shown in Figure 2.
- e. the Principal Contractors Sustainability Plan and its sub plans will capture governance and design requirements as well as social sustainability initiatives as required by the Sydney Metro Sustainability Strategies.
- f. These plans vary in scope across different delivery packages.

Figure 2 - Environmental Management and Sustainability Structure



3.2 Construction Sustainability Management Plan

- a. Principal Contractors are required to prepare and implement a Sustainability Management Plan (SMP) relevant to the scale and nature of their scope of works. The SMP shall comprise of a main SMP document and issue-specific sub-plans.
- b. Depending on the scope and scale of the works, TfNSW may decide to streamline the SMP and sub-plan requirements. As a minimum the SMP will address and detail:
 - ◆ The requirements of the relevant planning approval documentation, any relevant conditions of all other permits and licences, the Contractor's corporate EMS, the sustainability provisions of the contract documentation and this Construction Environmental Management Framework.
 - ◆ The sustainability management team structure, including key personnel authority and roles of key personnel, lines of responsibility and communication, minimum skill levels of each role and interfaces with the overall project organisation structure;
 - ◆ A sustainability policy statement and strategies for adaptation to climate change, resource management (including energy, water and waste), workforce development, procurement and biodiversity enhancement;
 - ◆ Sustainability initiatives to be implemented during the project.
 - ◆ How sustainability initiatives will be identified and implemented;
 - ◆ The processes and methodologies for assurance, monitoring, auditing, corrective action, continuous improvement and reporting on sustainability performance;

- ◆ The processes and methodologies which will be used to achieve the required scores under rating systems identified in contract documents;
 - ◆ The processes and procedures for undertaking climate change risk assessments;
 - ◆ The processes and procedures for the identification and implementation of climate change adaptation measures;
 - ◆ The approach to sustainable procurement including:
 - The processes and procedures that will be used to provide environmental and social improvement;
 - The processes and environmental and social criteria that will be used for the selection of Subcontractors;
 - The processes that will be used to ensure ethical sourcing of labour and materials
 - Where equipment, materials or labour are procured from locations outside Australia, the processes that will be used to ensure human rights impacts and risks are identified and mitigated.
 - Interfaces with other Project Plans.
- c. Depending on the scope of the works, the SMP will also include, as a separate sub-plans:
- ◆ A Construction Workforce Development Plan
 - ◆ A Construction Carbon and Energy Management Plan
 - ◆ A Waste Management & Recycling Plan
- d. The Workforce Development Plan will address and detail:
- ◆ The proposed response to workforce-related regulatory, planning approval, and contract requirements which will be addressed for the project
 - ◆ The workforce development team structure, including key personnel authority and roles of key personnel, lines of responsibility and communication, minimum skill levels of each role and interfaces with the overall project organisation structure;
 - ◆ A description of the workforce development initiatives which will be implemented, and the implementation methodology, including for:
 - Assessing current and future workforce skill needs and workforce profiles including a skills and workforce gap plan.
 - Increasing local employment, local business opportunities and involvement of local SMEs.
 - Provision of relevant Nationally Recognised Accredited Training.
 - Increasing workforce diversity and inclusion, targeting indigenous workers and businesses, female representation in non-traditional trades and long-term unemployed.
 - Participation in work placement and education programs for young people.
 - Increasing participation of apprentices and trainees.
 - ◆ The processes and methodologies for assurance, monitoring, auditing, corrective action, continuous improvement and reporting on workforce development performance.

3.3 Construction Environmental Management Plans

- a. Principal Contractors are required to prepare and implement a Construction Environmental Management Plan (CEMP) relevant to the scale and nature of their scope of works.
- b. The CEMP shall comprise of a main CEMP document, issue specific sub-plans, activity specific procedures and site based control maps. The CEMP framework shall show the relationship between the contractors corporate EMS, other relevant project based documentation, and the CEMP.
- c. Depending on the scope and scale of the works, TfNSW may decide to streamline the CEMP and sub-plan requirements. For example, depending on the risk associated with particular environmental issues it may be appropriate to remove the need for a sub plan and replace with a procedure as part of the CEMP.
- d. The CEMP will cover the requirements of the relevant planning approval documentation, the conditions of all other permits and licences, the Principal Contractor's corporate EMS, the environmental provisions of the contract documentation and this Construction Environmental Management Framework.
- e. As a minimum the CEMP will:
 - ◆ Include description of activities to be undertaken during construction
 - ◆ Include a contract specific environmental policy
 - ◆ For each plan under the CEMP include a matrix of the relevant Conditions of Approval or Consent showing where each requirement is addressed.
 - ◆ For each plan under the CEMP, set objectives and targets, and identify measurable key performance indicators in relation to these.
 - ◆ Identify a clear organisational structure for the project including the roles responsible for environmental management activities, accompanied by a description of those roles and responsibilities.
 - ◆ Assign the responsibility for the implementation of the CEMP to the Environment Manager, who will have appropriate experience. The Principal Contractor's Project Director will be accountable for the implementation of the CEMP.
 - ◆ Identify communication requirements, including liaison with stakeholders and the community.
 - ◆ Include induction and training requirements.
 - ◆ Include procedures for monitoring and evaluating environmental performance.
 - ◆ Include reporting requirements.
 - ◆ Include procedures for emergency and incident management, non-compliance management, and corrective and preventative actions.
 - ◆ Include procedures for audit and review.
 - ◆ Include procedures for the control of environmental records.
 - ◆ Provide a clear description of the relationship to other plans required by the contract, in particular those that relate to design management.

- f. The CEMP and associated sub-plans will be reviewed by TfNSW and/or an independent environmental representative (see Section 3.11) prior to any construction works commencing. Depending on the conditions of approval, the CEMP and certain sub-plans may also require the approval of the Department of Planning and Environment (DP&E), and other government agencies.
- g. Where a corresponding systems document exists within the Sydney Metro Integrated Management System, the Principal Contractor's procedures will be required to be consistent.

3.4 Construction Environmental Management Sub-Plans

- a. Subject to Section 3.3(c) and Section 3.2(c) the Principal Contractor will prepare issue-specific environmental sub-plans to the CEMP and SMP which address each of the relevant environmental impacts at a particular site or stage of the project. Issue specific sub-plans will include:
 - ◆ Spoil management.
 - ◆ Groundwater management.
 - ◆ Soil and water management.
 - ◆ Traffic and transport management.
 - ◆ Noise and vibration management.
 - ◆ Heritage management.
 - ◆ Flora and fauna management.
 - ◆ Visual amenity management.
 - ◆ Carbon and energy management.
 - ◆ Air quality management.
 - ◆ Waste management.
- b. Additional detail on the minimum requirements for these sub plans is provided in Sections 6-17 of this CEMP.

3.5 Environmental Procedures and Control Maps

- a. The Principal Contractor will prepare and implement activity specific environmental procedures. These procedures should supplement environmental management sub-plans, but may substitute for sub-plans in agreement with Sydney Metro if a reasonable risk based justification can be made and the sub plan is not a requirement of approval.
- b. The procedures will include:
 - ◆ A breakdown of the work tasks relevant to the specific activity and indicate responsibility for each task.
 - ◆ Potential impacts associated with each task.
 - ◆ A risk rating for each of the identified potential impacts.
 - ◆ Mitigation measures relevant to each of the work tasks.
 - ◆ Responsibility to ensure the implementation of the mitigation measures.

- c. The Principal Contractor will prepare and implement site based progressive Environmental Control Maps (ECM's) which as a minimum:
- ◆ Is a progressive document depicting a current representation of the site.
 - ◆ Indicates which environmental procedures, environmental approvals, or licences are applicable.
 - ◆ Illustrates the site showing significant structures, work areas and boundaries.
 - ◆ Illustrates environmental control measures and environmentally sensitive receivers.
 - ◆ Is endorsed by the Principal Contractors Environmental Manager or delegate.
 - ◆ Relevant workers will be trained in the requirements of and will sign off the procedures prior to commencing works on the specific site and / or activity.

3.6 Additional Environmental Assessments

- a. Where the requirement for an additional environmental assessment is identified, this will be undertaken prior to undertaking any physical works. The environmental assessment will include:
- ◆ A description of the existing surrounding environment.
 - ◆ Details of the ancillary works and construction activities required to be carried out including the hours of works.
 - ◆ An assessment of the environmental impacts of the works, including, but not necessarily limited to, traffic, noise and vibration, air quality, soil and water, ecology and heritage.
 - ◆ Details of mitigation measures and monitoring specific to the works that would be implemented to minimise environmental impacts.
 - ◆ Identification of the timing for completion of the construction works, and how the sites would be reinstated (including any necessary rehabilitation).

3.7 Condition Surveys

- a. Prior to the commencement of construction the Principal Contractors will offer Pre-construction Building Condition Surveys, in writing, to the owners of buildings where there is a potential for construction activities to cause cosmetic or structural damage. If accepted, the Principal Contractor will produce a comprehensive written and photographic condition report produced by an appropriate professional prior to relevant works commencing.
- b. Prior to the commencement of construction the Principal Contractor will prepare a Road Dilapidation Report for all local public roads proposed to be used by heavy vehicles.

3.8 Register of Hold Points

- a. Principal Contractors will identify hold points, beyond which approval is required to proceed with a certain activity. Example activities include vegetation removal and water discharge. Hold points will be documented in relevant CEMPs.
- b. Table 1.4 provides the structure for the register of hold points as well as a preliminary list of hold points which will be implemented.

Table 1.4 Preliminary Register of Hold Points

Hold Point	Release of Hold Point	By Who
Prior to Vegetation Clearing / Ground Disturbance	Pre-clearing inspection Erosion and sediment control plan	Qualified Ecologist Contractor's Environmental Manager or delegate
Discharge of water	Water tested to verify compliance and approval to discharge	Contractor's Environment Manager or delegate
Out of hours works	Noise Assessment	Contractor's Environment Manager
Use of local roads by heavy vehicles	Road Dilapidation Report	Appropriate Professional nominated by Principal Contractor
Construction identified as affecting buildings	Building Condition Survey	Appropriate Professional nominated by Principal Contractor

3.9 Training, Awareness and Competence

- a. Principal Contractors will be responsible for determining the training needs of their personnel. As a minimum this will include site induction, regular toolbox talks and topic specific environmental training as follows:
 - ◆ The site induction will be provided to all site personnel and will include, as a minimum:
 - Training purpose, objectives and key issues.
 - Contractor's environmental policy and key performance indicators.
 - Due diligence, duty of care and responsibilities.
 - Relevant conditions of any environmental licence and/or the relevant conditions of approval.
 - Site specific issues and controls including those described in the environmental procedures.
 - Reporting procedure for environmental hazards and incidents.
 - Communication protocols.
- b. Toolbox talks will be held on a regular basis in order to provide a project or site wide update, including any key or recurring environmental issues.
- c. Topic specific environmental training, eg erosion and sediment control training will be undertaken for relevant site personnel as determined by the Principal Contractor.

- d. Principal Contractors will conduct a Training Needs Analysis which:
- a. Identifies the competency requirements of staff that hold environmental roles and responsibilities documented within the Construction Environmental Management Plan and sub-plans.
 - b. Identifies appropriate training events and the frequency of training to achieve and/or maintain these competency requirements.
 - c. Implements a documented training schedule which plans attendance at training events, provides mechanisms to notify staff of their training requirements, and identifies staff that fail to attend scheduled training events or who have overdue training requirements.
 - d. Identifies that all staff are to receive an environmental induction and undertake environmental incident management training.

3.10 Emergency and Incident Response

- a. Principal Contractors will develop and implement a Pollution Incident Response Management Plan, in accordance with the requirements of the POEO Act. Contractors' emergency and incident response procedures will also be consistent with any relevant TfNSW procedures and will include:
- ◆ Categories for environmental emergencies and incidents.
 - ◆ Notification protocols for each category of environmental emergency or incident, including notification of TfNSW and notification to owners / occupiers in the vicinity of the incident. This is to include relevant contact details.
 - ◆ Identification of personnel who have the authority to take immediate action to shut down any activity, or to affect any environmental control measure (including as directed by an authorised officer of the EPA).
 - ◆ A process for undertaking appropriate levels of investigation for all incidents and the identification, implementation and assessment of corrective and preventative actions;
 - ◆ Depending on the nature of the incident the EPA, DP&E or OEHL will be notified by the Principal Contractor or TfNSW as appropriate.
- b. The Contractor will make all personnel aware of the plan and their responsibilities.

3.11 Independent Environmental Representatives

- a. TfNSW will engage Independent Environmental Representatives (ERs) to undertake the following, along with any additional roles as required:
- ◆ Review, provide comment on and endorse (where required) any relevant environmental documentation to verify it is prepared in accordance with relevant environmental legislation, planning approval conditions, relevant standards and this CEMF.
 - ◆ Monitor and report on the implementation and performance of the above mentioned documentation and other relevant documentation.
 - ◆ Provide independent guidance and advice to TfNSW and the Contractors in relation to environmental compliance issues and the interpretation of planning approval conditions.
 - ◆ Be the principal point of advice for the DP&E in relation to all questions and complaints concerning the environmental performance of the project.
 - ◆ Ensure that environmental auditing is undertaken in accordance with all relevant project requirements.
 - ◆ Recommend reasonable steps, including 'stop works', to be taken to avoid or minimise adverse environmental impacts.

3.12 Roles and Responsibilities

- a. In relation to Roles and Responsibilities the CEMP will:
- ◆ describe the relationship between the Principal Contractor, TfNSW, key regulatory stakeholders, the independent environmental representative and the independent certifier.
 - ◆ Describe the Principal Contractors environment, sustainability, and approvals team structure,
 - ◆ For each role that has environmental accountabilities or responsibilities provide a tabulated description of the role, accountabilities, responsibilities, lines of communication, minimum skill level requirements and their interface with the overall project organisation structure.
 - ◆ Provide details of each specialist environment, sustainability or planning consultant who is employed by the Principal Contractor including the scope of their work.
 - ◆ Provide an overview of the role and responsibilities of the Independent Environmental Representative, the Independent Certifier and other regulatory stakeholders.
- b. All sub-contractors engaged by the Principal Contractor will be required to operate within the EMS documentation of that Principal Contractor.

3.13 Environmental Monitoring, Inspections and Auditing

- a. Issue specific environmental monitoring will be undertaken as required or as additionally required by approval, permit or licence conditions.
- b. The results of any monitoring undertaken as a requirement of the EPL will be published on the Principal Contractor's, or a project specific, website within 14 days of obtaining the results.
- c. Environmental inspections will include:
 - ◆ Surveillance of environmental mitigation measures by the Site Foreman.
 - ◆ Periodic inspections by the Principal Contractor's Environmental Manager (or delegate) to verify the adequacy of all environmental mitigation measures. This will be documented in a formal inspection record.
- d. Regular site inspections by the ERs and TfNSW representatives at a frequency to be agreed with the Principal Contractor.
- e. Principal Contractors will be required to undertake internal environmental audits. Internal audits will include:
 - ◆ Compliance with approval, permit and licence conditions.
 - ◆ Compliance with the E&SMS, CEMP, SMP, sub-plans and procedures.
 - ◆ Community consultation and complaint response.
 - ◆ Environmental training records.
 - ◆ Environmental monitoring and inspection results.
- f. TfNSW (or an independent environmental auditor) will also undertake periodic audits of the Principal Contractor's E&SMS and compliance with the environmental aspects of contract documentation, including this Construction Environmental Management Framework.

3.14 Environmental Non-compliances

- a. Principal Contractors will document and detail any non-compliances arising out of the above monitoring, inspections and audits. TfNSW will be made aware of all non-compliances in a timely manner.
- b. Principal Contractors will develop and implement corrective actions to rectify the non-compliances and preventative actions in order to prevent the re-occurrence of the non-compliance. Contractors will also maintain a register non-compliances, corrective actions and preventative actions.
- c. TfNSW or the Environmental Representative may raise non-compliances against environmental requirements.

3.15 Environmental Records and Compliance Reporting

- a. Principal Contractors will maintain appropriate records of the following:
 - ◆ Site inspections, audits, monitoring, reviews or remedial actions.
 - ◆ Documentation as required by performance conditions, approvals, licences and legislation.
 - ◆ Modifications to site environmental documentation (eg CEMP, sub-plans and procedures).
 - ◆ Other records as required by this Construction Environmental Management Framework.
- b. Records will be retained onsite for the duration of works.
- c. Additionally records will be retained by the Principal Contractor for a period of no less than 7 years in total. Records will be made available in a timely manner to TfNSW (or their representative) upon request.
- d. Compliance reports detailing the outcome of any environmental surveillance activity including internal and external audits (refer to Section 3.13) will be produced by the Principal Contractors Environmental Manager or delegate. These reports will be submitted to TfNSW at an agreed frequency.

3.16 Review and Improvement of the E&SMS

- a. Principal Contractors will ensure the continual review and improvement of the E&SMS. This will generally occur in response to:
 - ◆ Issues raised during environmental monitoring, inspections and audits.
 - ◆ Significant environmental incidents.
 - ◆ Environmental non-conformances.
- b. A formal review of the E&SMS by the Principal Contractor's Senior Management Team will also occur on an annual basis, as a minimum. This review will generate actions for the continual improvement of the E&SMS and supporting management plans.

4. Stakeholder and Community Involvement

4.1 Overview

- a. Throughout construction, Sydney Metro and the Principal Contractors will work closely with stakeholders and the community to ensure they are well informed regarding the construction works.
- b. Stakeholders and the community will be informed of significant events or changes that affect or may affect individual properties, residences and businesses. These will include:
 - ◆ Significant milestones.
 - ◆ Design changes.
 - ◆ Changes to traffic conditions and access arrangements for road users and the affected public.
 - ◆ Construction operations which will have a direct impact on stakeholders and the community including noisy works, interruptions to utility services or construction work outside of normal work hours.

4.2 Communication and Consultation Strategy

- a. This communication and consultation strategy will form the basis of a Stakeholder and Community Involvement Plan which will be developed by the Sydney Metro Principal Contractors.
- b. Key elements of the communication and consultation strategy which will be implemented at appropriate times in the construction process will include:
 - ◆ Notification (including targeted letterbox drops, email and SMS) of any works that may disturb local residents and businesses (such as noisy activities and night works) at least seven days prior to those works commencing.
 - ◆ Notification (including targeted letterbox drops) of works that may affect transport (such as road closures, changes to pedestrian routes and changes to bus stops).
 - ◆ Traffic alerts (via email) to all key traffic and transport stakeholders advising of any changes to access and local traffic arrangements (at least seven days prior to significant events).
 - ◆ Print and radio advertisements regarding major traffic changes.
 - ◆ 24-hour toll-free community project information phone line.
 - ◆ Complaints management process.
 - ◆ Regular community information sessions.
 - ◆ Regular updates to the Sydney Metro website (sydneymetro.info), including uploading of all relevant documents, and contact details for the stakeholder and community involvement team.
 - ◆ Public displays, local events and open days.
 - ◆ Assistance to any Sydney Metro Community Information Centers in provision of regular community newsletters, information brochures and fact sheets and ongoing use of interactive web-based activities.
 - ◆ Clear signage at the construction sites and construction updates on the hoardings at construction sites.
 - ◆ Media releases and regular newspaper advertisements in local and metropolitan papers.
 - ◆ Regular inter-agency group meetings.
 - ◆ Community, business and stakeholder satisfaction surveys and feedback forms.
 - ◆ Translator and interpreter services.
 - ◆ The Principal Contractor's Community Relations Team will liaise with the TfNSW Place Managers as the point of contact for the community.

4.3 Complaint Handling

- a. Community liaison and complaints handling will be undertaken in accordance with the Construction Stakeholder and Community Involvement Plan and will include:
 - ◆ Principal Contractors will deal with complaints in a responsive manner so that stakeholders' concerns are managed effectively and promptly.
 - ◆ A verbal response will be provided to the complainant as soon as possible and within a maximum of two hours from the time of the complaint (unless the complainant requests otherwise). A detailed written response will then be provided, if required, to the complainant within one week.

4.4 Urban Design of Temporary Works

- a. Principal Contractors will develop and implement a Landscape and Temporary Works Management Plan for their scope of works. The Landscape and Temporary Works Management Plan will ensure as a minimum:
 - ◆ Temporary construction works including site hoardings and acoustic sheds consider urban design and visual impacts, including:
 - ◆ Artwork, graphics and images to enhance the visual appearance of temporary works in high visibility locations.
 - ◆ Project information to raise awareness on benefits, explain the proposed works at each site and provide updates on construction progress.
 - ◆ Community information, including contact numbers for enquiries / complaints.
 - ◆ Signage and information to mitigate impacts on local businesses which may be obscured by the construction site.
 - ◆ Sydney Metro advertising / public awareness campaigns.
 - ◆ Logos / branding, including Sydney Metro, NSW Government, and Contractor branding.
- b. The design of all temporary works will require TfNSW approval in relation to urban design and visual impacts.
- c. Construction hoardings, scaffolding and acoustic sheds will be regularly inspected and kept clean and free of dust build up. Graffiti on construction hoardings, scaffolding or acoustic sheds will be removed or painted over promptly.
- d. The principles of Crime Prevention Through Environmental Design will be applied to all works, including temporary works, that have a public interface.

4.5 Business and Property Impacts

- a. Principal Contractors will proactively work with potentially affected stakeholders to identify the likely impacts and put in place measures to minimise impacts.
- b. Construction works will be undertaken to meet the following objectives:
 - ◆ Minimise the potential impact of the project to businesses affected by construction works.
 - ◆ Ensure businesses are kept informed of the project and consulted in advance of major works or factors that are likely to have a direct impact.
 - ◆ Consult with all business directly affected by changes to access arrangements regarding specific requirements at least two weeks prior to those changes coming into effect.
 - ◆ Ensure that business stakeholder enquiries and complaints regarding the project are managed and resolved effectively.
- c. Principal Contractors will document in the Stakeholder and Community Involvement Plan (Section 4.2) key issues relating to business impacts by locality with a particular focus on proactive consultation with affected businesses. Including:
 - ◆ Identification of specific businesses which are sensitive to construction activity disturbances.
 - ◆ Summary of the commercial character of the locality, its general trading profile (daily and annually) and information gained from the business profiling such as:
 - Operating hours;
 - Main delivery times;
 - Reliance on foot traffic;
 - Any signage or advertising that may be impacted;
 - Customer origin; and
 - Other information specific to the business that will need to be considered in construction planning.
 - ◆ Define the roles and responsibilities in relation to the control and monitoring of business disturbances.
 - ◆ Identification of locality specific standard business mitigation measures which would be implemented.
 - ◆ Maps and diagrams to illustrate the information for easy identification of measures which would be implemented.
 - ◆ Description of the monitoring, auditing and reporting procedures.
 - ◆ Procedure for reviewing performance and implementing corrective actions.
 - ◆ Description of the complaints handling process.
 - ◆ Procedure of community consultation and liaison.

5. General Site Works



Figure 3 - Aerial View of the Sydney Metro Norwest Station Site

5.1 Working Hours

- a. Standard working hours are between 7am – 6pm on weekdays and 8am – 1pm on Saturdays.
- b. Works which can be undertaken outside of standard construction hours without any further approval include:
 - ◆ Those which have been described in respective environmental assessments as being required to take place 24/7. For example, tunneling and underground excavations and supporting activities will be required 24/7.
 - ◆ Works which are determined to comply with the relevant Noise Management Level at sensitive receivers.
 - ◆ The delivery of materials outside of approved hours as required by the Police or other authorities (including RMS) for safety reasons.
 - ◆ Where it is required to avoid the loss of lives, property and / or to prevent environmental harm in an emergency.
 - ◆ Where written agreement is reached with all affected receivers.
- c. Principal Contractors may apply for EPA approval to undertake works outside of normal working hours under their respective Environment Protection Licences.

5.2 Site Layout

- a. Principal Contractors will consider the following in the layout of construction sites:
- ◆ The location of noise intensive works and 24 hour activities in relation to noise sensitive receivers.
 - ◆ The location of site access and egress points in relation to noise and light sensitive receivers, especially for sites proposed to be utilised 24 hours per day.
 - ◆ The use of site buildings to shield noisy activities from receivers.
 - ◆ The use of noise barriers and / or acoustic sheds where feasible and reasonable for sites proposed to be regularly used outside of daytime hours.
 - ◆ Aim to minimise the requirement for reversing, especially of heavy vehicles.

5.3 Reinstatement

- a. Mitigation measures for reinstatement will be produced in consultation with TfNSW, the community and stakeholders.
- b. Mitigation measures required for reinstatement will be incorporated into the CEMP and will include as a minimum:
- ◆ Principal Contractors will clear and clean all working areas and accesses at project completion.
 - ◆ At the completion of construction all plant, temporary buildings or vehicles not required for the subsequent stage of construction will be removed from the site.
 - ◆ All land, including roadways, footpaths, loading facilities or other land having been occupied temporarily will be returned to their pre-existing condition or better.
 - ◆ Reinstatement of community spaces, infrastructure and services will occur as soon as possible after completion of construction.

6. Spoil Management



Figure 4 - Spoil and Excavation Works at the Showground Station Site

6.1 Spoil Management Objectives

a. The following spoil management objectives will apply to the construction of the project:

- ◆ Minimise spoil generation where possible
- ◆ The project will mandate 100% reuse or recycling (on or off-site) of usable spoil.
- ◆ Spoil will be managed with consideration to minimising adverse traffic and transport related issues.
- ◆ Spoil will be managed to avoid contamination of land or water.
- ◆ Spoil will be managed with consideration of the impacts on residents and other sensitive receivers.
- ◆ Site contamination will be effectively managed to limit the potential risk to human health and the environment.

6.2 Spoil Management Implementation

- a. Principal Contractors will develop and implement a Spoil Management Plan for their scope of works. The Spoil Management Plan will include as a minimum:
 - ◆ The spoil mitigation measures as detailed in the environmental approval documentation.
 - ◆ A link or reference to where traffic movements in relation to spoil are described.
 - ◆ A register of spoil receipt sites that includes the site or project name, location, capacity, site owner and which tier the site is classified as under the spoil reuse hierarchy.
 - ◆ The responsibilities of key project personnel with respect to the implementation of the plan.
 - ◆ How spoil generation is minimised through the design development process.
 - ◆ Procedures for the testing, classification, handling and reuse of spoil.
 - ◆ Spoil management monitoring requirements.
 - ◆ Compliance record generation and management.
- b. Spoil management measures will be included in regular inspections undertaken by the Contractor, and compliance records will be retained. These will include:
 - ◆ Records detailing the beneficial re-use of spoil either within the project or at off-site locations.
 - ◆ Waste dockets for any spoil disposed of to landfill sites.

6.3 Spoil Mitigation

- a. Examples of spoil mitigation measures include:
 - ◆ Implementing the spoil re-use hierarchy.
 - ◆ Handling spoil to minimise potential for air or water pollution.
 - ◆ Minimise traffic impacts associated with spoil removal.

7. Groundwater Management

7.1 Groundwater Management Objectives

- a. The following groundwater management objectives will apply to construction:
- ◆ Reduce the potential for drawdown of surrounding groundwater resources.
 - ◆ Prevent the pollution of groundwater through appropriate controls.
 - ◆ Reduce the potential impacts of groundwater dependent ecosystems.

7.2 Groundwater Management Implementation

- a. The following content may be provided within other sub-plans such as the Soil and Water Management Plan and Flora and Fauna Management Plan.
- b. Principal Contractors will develop and implement a Groundwater Management Plan for their scope of works. The Groundwater Management Plan will include as a minimum:
- ◆ The groundwater mitigation measures as detailed in the environmental approval documentation.
 - ◆ The requirements of any applicable licence conditions.
 - ◆ details of proposed extraction, use and disposal of groundwater, and measures to mitigate potential impacts to groundwater sources, incorporating monitoring, impact trigger definition and response actions for all groundwater sources potentially impacted by the SSI.
 - ◆ Evidence of consultation with the NSW Office of Water.
 - ◆ The responsibilities of key project personnel with respect to the implementation of the plan.
 - ◆ Procedures for the treatment, testing and discharge of groundwater from the site.
 - ◆ Compliance record generation and management.
 - ◆ Details of groundwater monitoring if required.

7.3 Groundwater Mitigation

- a. Examples of groundwater mitigation measures include:
- ◆ Implementing all feasible and reasonable measures to limit groundwater inflows to stations and crossovers.
 - ◆ Undertaking groundwater monitoring during construction (levels and quality) in areas identified as 'likely' and 'potential' groundwater dependent ecosystems.

8. Construction Traffic Management



Figure 5 - Castle Hill Station Site at the Intersection of Old Northern Rd and McMullen Ave

8.1 Construction Traffic Management Objectives

- a. The following traffic management objectives will apply to the construction of the project:
- ◆ Minimise disruption to traffic operation, road users, pedestrians, cyclists and access to adjoining properties (private and public)
 - ◆ Maximise the safety for the workers, by isolating work areas from traffic flows, applying low exposure work methods, education and the installation of appropriate traffic control
 - ◆ Limit obstructions and restrictions, and when required, provide alternatives to maintain access for local community, transport operators (buses) including over-dimension load movements and commercial developments
 - ◆ Encourage sustainable transport options by site workers.

8.2 Construction Traffic Management Implementation

- a. Principal Contractors will develop and implement a Construction Traffic Management Plan for their scope of works. The Construction Traffic Management Plan will as a minimum:
- ◆ Implement the traffic and transport mitigation measures as detailed in the environmental approval documentation.
 - ◆ be developed in consultation with the relevant road authority, Central Business District Co-ordination Group (CBDCG) and / or transport operator.
 - ◆ set out the overall traffic management resources, processes and procedures for the management of traffic and transport during construction of the Project Works and Temporary Works.
 - ◆ include Construction Traffic Control Plans setting out the specific traffic and transport management arrangements to be implemented at specific locations during the construction of the Project Works and Temporary Works.
 - ◆ includes a Traffic Route Management Plan that identifies:
 - traffic generation from other major infrastructure developments, impacts from construction traffic and haulage routes,
 - types and volumes of construction vehicles and associated route and time restrictions,
 - potential traffic disruptions and temporary and permanent detours, and
 - management, mitigation and restoration measures.
 - ◆ Includes a Parking Management Plan that identifies:
 - parking requirements and on and offsite parking arrangements and associated impacts,
 - remote parking arrangements and associated access between sites and public transport nodes,
 - alternate parking arrangements for displaced parking, and
 - communication and parking management measures.
 - ◆ Includes Site Specific Traffic Access and Management Plans which detail:
 - Site access and associated route and turning movements and the design and signalisation of intersections,
 - Potential activities that could result in the disruption to traffic and transport networks, including pedestrian, cyclist and public transport networks and during special events.
 - The timing to limit disruptions to the road and transport networks,
 - The maintenance of access to and safety of transport networks, parking and property.
 - Service facilities and station sites, and other locations identified by the relevant road authority or transport regulator.
 - details responses to the management of an event that directly involves or impacts on traffic and transport networks.

- b. TfNSW and its Contractors will undertake liaison with agencies and the community regarding traffic management. This may involve:
- ◆ Establishment of a Traffic and Transport Liaison Group which could consist of representatives from Sydney Metro Contractors, TfNSW, CBDCG, Westconnex, RMS, NSW Police, relevant councils, emergency services, and bus operators the group would review:
 - Road Occupancy Licence (ROL) applications to monitor potential cumulative impacts from multiple ROLs operating concurrently in one area.
 - be consulted on the preparation of the Construction Traffic Management Plan.
 - ◆ Consultation with the CBDCG in relation to the approval of Construction Traffic Management Plans, supporting plans, or related licences for works in the CBD..

8.3 Construction Traffic Mitigation

- a. Examples of traffic mitigation measures include:
- ◆ Minimising heavy vehicle movements during peak traffic times.
 - ◆ Avoidance of local road for heavy vehicle routes, where feasible.
 - ◆ Providing safe pedestrian and cyclist movements around the worksites.

9. Construction Noise and Vibration Management



Figure 6 - Hebel Wall Noise Barrier at the Cheltenham Services Facility Site

9.1 Construction Noise and Vibration Management Objectives

a. The following noise and vibration management objectives will apply to construction:

- ◆ Minimise unreasonable noise and vibration impacts on residents and businesses.
- ◆ Avoid structural damage to buildings or heritage items as a result of construction vibration.
- ◆ Undertake active community consultation.
- ◆ Maintain positive, cooperative relationships with schools, childcare centres, local residents and building owners.

9.2 Construction Noise and Vibration Management Implementation

- a. Principal Contractors will develop and implement a Construction Noise and Vibration Management Plan for their scope of works consistent with the Interim Construction Noise Guidelines (Department of Environment and Climate Change, 2009). The Construction Noise and Vibration Management Plan will include as a minimum:
 - ◆ Identification of work areas, site compounds and access points,
 - ◆ Identification of sensitive receivers and relevant construction noise and vibration goals,
 - ◆ Be consistent with and include the requirements of the noise and vibration mitigation measures as detailed in the environmental approval documentation and the Sydney Metro Construction Noise and Vibration Strategy (CNVS).
 - ◆ Details of construction activities and an indicative schedule for construction works, including the identification of key noise and/or vibration generating construction activities (based on representative construction scenarios) that have the potential to generate noise or vibration impacts on surrounding sensitive receivers, in particular residential areas.
 - ◆ Identification of feasible and reasonable procedures and mitigation measures to ensure relevant vibrations and blasting criteria are achieved, including a suitable blast program.
 - ◆ Community notification provisions specifically in relation to blasting.
 - ◆ The requirements of any applicable EPL conditions.
 - ◆ Additional requirements in relation to activities undertaken 24 hours of the day, 7 days per week.
 - ◆ Pre-construction compliance requirements and hold points.
 - ◆ The responsibilities of key project personnel with respect to the implementation of the plan.
 - ◆ Noise monitoring requirements.
 - ◆ Compliance record generation and management.
 - ◆ Community consultation requirements.
 - ◆ An Out of Hours Works Protocol applicable to all construction methods and sites.
- b. Detailed Construction Noise and Vibration Impact Statements will be prepared for noise-intensive construction sites and or activities, to ensure the adequacy of the noise and vibration mitigation measures. Specifically, Construction Noise and Vibration Impact Statements will be prepared for EPL variation applications and works proposed to be undertaken outside of standard construction hours.
- c. Noise and vibration monitoring would be undertaken for construction as specified in the CNVS and the EPL.
- d. The following compliance records would be kept by Principal Contractors:
 - ◆ Records of noise and vibration monitoring results against appropriate NMLs and vibration criteria.
 - ◆ Records of community enquiries and complaints, and the Contractor's response.

9.3 Construction Noise and Vibration Mitigation

- a. All feasible and reasonable mitigation measures would be implemented in accordance with the CNVS. Examples of noise and vibration mitigation measures include:
- ◆ Construction hours will be in accordance with the working hours specified in Section 5.1.
 - ◆ Hoarding and enclosures will be implemented where required to minimise airborne noise impacts.
 - ◆ The layout of construction sites will aim to minimise airborne noise impacts to surrounding receivers.

10. Heritage Management



Figure 7 -White Hart Inn Excavation Site

10.1 Heritage Management Objectives

- a. The following heritage management objectives will apply to construction:
- ◆ Embed significant heritage values through any architectural design, education or physical interpretation.
 - ◆ Minimise impacts on items or places of heritage value.
 - ◆ Avoid accidental impacts on heritage items.
 - ◆ Maximise worker's awareness of indigenous and non-indigenous heritage.

10.2 Heritage Management Implementation

- a. Principal Contractors will develop and implement a Heritage Management Plan which will include as a minimum:
 - ◆ Will be developed in consultation with Registered Aboriginal Parties (Indigenous Heritage only) and the NSW Heritage Council.
 - ◆ The heritage mitigation measures as detailed in the environmental approval documentation.
 - ◆ The responsibilities of key project personnel with respect to the implementation of the plan.
 - ◆ Procedures for interpretation of heritage values uncovered through salvage or excavation during detailed design.
 - ◆ Procedures for undertaking salvage or excavation of heritage relics or sites (where relevant) and any recordings of heritage relics prior to works commencing that would affect them.
 - ◆ Details of management measures to be implemented to prevent and minimise impacts on heritage items (including further heritage investigations, archival recordings and/ or measures to protect unaffected sites during construction works in the vicinity);
 - ◆ Procedures for unexpected heritage finds, including procedures for dealing with human remains.
 - ◆ Heritage monitoring requirements.
 - ◆ Compliance record generation and management.
- b. The Contractor's regular inspection will include checking of heritage mitigation measures.
- c. Compliance records will be retained by the Contractor. These will include:
 - ◆ Inspections undertaken in relation to heritage management measures.
 - ◆ Archival recordings undertaken of any heritage item.
 - ◆ Unexpected finds and stop work orders.
 - ◆ Records of any impacts avoided or minimised through design or construction methods.

10.3 Heritage Mitigation

- a. Examples of heritage mitigation measures include:
 - ◆ Any heritage item not affected by the works will be retained and protected throughout construction.
 - ◆ Prior to the commencement of construction undertake professional archaeological excavation, investigation and reporting of any historical Indigenous heritage sites of state significance which will be affected.
 - ◆ Undertake archival recordings of all non-Indigenous heritage items affected by the works prior to commencement of works.
 - ◆ Implement unexpected heritage find procedures for Indigenous and non-Indigenous heritage items.

11. Flora and Fauna Management



Figure 8 - Demarcation of Retained Flora

11.1 Flora and Fauna Management Objectives

a. The following flora and fauna management objectives will apply to construction:

- ◆ Minimise impacts on flora and fauna.
- ◆ Design waterway modifications and crossings to incorporate best practice principles.
- ◆ Retain and enhance existing flora and fauna habitat wherever possible.
- ◆ Appropriately manage the spread of weeds and plant pathogens.

11.2 Flora and Fauna Management Implementation

- a. Principal Contractors will develop and implement a Flora and Fauna Management Plan which will include as a minimum:
- ◆ The ecological mitigation measures as detailed in the environmental approval documentation.
 - ◆ The responsibilities of key project personnel with respect to the implementation of the plan.
 - ◆ Procedures for the clearing of vegetation and the relocation of flora and fauna.
 - ◆ Details on the locations, monitoring program and use of nest boxes by fauna;
 - ◆ Procedures for the demarcation and protection of retained vegetation, including all vegetation outside and adjacent to the construction footprint.
 - ◆ Plans for impacted and adjoining areas showing vegetation communities; important flora and fauna habitat areas; locations where threatened species, populations or ecological communities have been recorded.
 - ◆ Vegetation management plan(s) for sites where native vegetation is proposed to be retained.
 - ◆ Identification of measures to reduce disturbance to sensitive fauna.
 - ◆ Rehabilitation details, including identification of flora species and sources, and measures for the management and maintenance of rehabilitated areas (including duration of the implementation of such measures).
 - ◆ Weed management measures focusing on early identification of invasive weeds and effective management controls.
 - ◆ A procedure for dealing with unexpected EEC threatened species identified during construction, including cessation of work and notification of the Department, determination of appropriate mitigation measures in consultation with the OEH (including relevant re-location measures) and updating of ecological monitoring or off-set requirements.
 - ◆ Details on the methodology for vegetation mapping and survey.
 - ◆ Ecological monitoring requirements.
 - ◆ Compliance record generation and management.

- b. Principal Contractors would undertake the following ecological monitoring as a minimum:
- ◆ A pre-clearing inspection will be undertaken prior to any native vegetation clearing by a suitable qualified ecologist and the Contractor's Environmental Manager (or delegate). The pre-clearing inspection will include, as a minimum:
 - Identification of hollow bearing trees or other habitat features.
 - Identification of any threatened flora and fauna.
 - A check on the physical demarcation of the limit of clearing.
 - An approved erosion and sediment control plan for the worksite.
 - The completion of any other pre-clearing requirements required by any project approvals, permits or licences.
 - ◆ The completion of the pre-clearing inspection will form a HOLD POINT requiring sign-off from the Contractor's Environmental Manager (or delegate) and a qualified ecologist.
 - ◆ A post clearance report will be produced that validates the type and area of vegetation cleared including confirmation of the number of hollows impacted and the corresponding nest box requirements to offset these impacts.
- c. The Principal Contractor's regular inspections will include a check on the ecological mitigation measures and project boundary fencing.
- d. The following compliance records would be kept by the Principal Contractor:
- ◆ Records of pre-clearing inspections undertaken.
 - ◆ Records of the release of the pre-clearing hold point.
 - ◆ Records of ecological inspections undertaken.

11.3 Flora and Fauna Mitigation

- a. Examples of flora and fauna mitigation measures include:
- ◆ Areas to be retained and adjacent habitat areas will be fenced off prior to works to prevent damage or accidental over clearing.
 - ◆ Clearing will follow a two-stage process as follows:
 - Non-habitat trees will be cleared first after sign-off of the pre-clearing inspection.
 - Habitat trees will be cleared no sooner than 48 hours after non-habitat trees have been cleared. A suitably qualified ecologist will be present on site during the clearing of habitat trees. Felled habitat trees will be left on the ground for 24 hours or inspected by the ecologist prior to further processing.
 - ◆ Weed management is to be undertaken in areas affected by construction prior to any clearing works in accordance with the Noxious Weeds Act 1993.

12. Visual Amenity Management

12.1 Visual Amenity Management Objectives

- a. The following visual and landscape management objectives will apply to the construction of the project:
- ◆ Minimise impacts on existing landscape features as far as feasible and reasonable.
 - ◆ Ensure the successful implementation of the Landscape Design.
 - ◆ Reduce visual impact of construction to surrounding community.

12.2 Visual Amenity Management Implementation

- a. Principal Contractors will develop and implement a Visual Amenity Management Plan for temporary works which will include as a minimum:
- ◆ The visual mitigation measures as detailed in the environmental approval documentation for construction.
 - ◆ Input from an experienced Landscape or Urban Designer.
 - ◆ The maintenance of outward facing elements of site hoarding or noise barriers, including the removal of graffiti and weeds.
 - ◆ Apply the principles of Australian Standard 4282-1997 Control of the obtrusive effects of outdoor lighting and relevant safety design requirements and detail mitigation measures to minimise lighting impacts on sensitive receivers for all permanent, temporary and mobile light sources.
 - ◆ Apply the principals of the NSW Government Crime Prevention through Environmental Design guidelines.
 - ◆ Monitoring requirements.
 - ◆ Compliance record generation and management.
- b. Visual and landscape measures will be incorporated into the Principal Contractor's regular inspections including checking the health of retained vegetation around site boundaries, checking the condition of any site hoarding and acoustic sheds, and checking the position and direction of any sight lighting.
- c. The Contractor will retain compliance records of any inspections undertaken in relation to visual and landscape measures.

12.3 Visual Amenity Mitigation

- a. Examples of visual amenity mitigation measures include:
- ◆ Wherever feasible and reasonable, vegetation around the perimeter of the construction sites will be maintained.
 - ◆ Temporary construction works will be designed with consideration of urban design and visual amenity as per Section 4.4.
 - ◆ Temporary site lighting, for security purposes or night works will be installed and operated in accordance with AS4282:1997 Control of the Obtrusive Effect of Outdoor Lighting.

13. Carbon and Energy Management

13.1 Carbon and Energy Management Objectives

- a. The following carbon and energy management objectives will apply to construction:
- ◆ Reduce energy use and carbon emissions during construction.
 - ◆ Support innovative and cost effective approaches to energy efficiency, low carbon / renewable energy sources and energy procurement.
 - ◆ Design to reduce energy use and carbon emissions during operations.

13.2 Carbon and Energy Management Implementation

- a. Principal Contractors will develop and implement a Carbon and Energy Management Plan that will include, as a minimum:
- ◆ The carbon and energy mitigation measures as detailed in the environmental approval documentation.
 - ◆ The relevant requirements of the Sydney Metro Environment and Sustainability Policy and the Sydney Metro Sustainability Strategy.
 - ◆ The responsibilities of key project personnel with respect to the implementation of the plan.
 - ◆ The low carbon strategies and initiatives that will be implemented to minimise the carbon emissions associated with construction.
 - ◆ The energy efficiency strategies and initiatives that will be implemented to minimise energy use associated with construction.
 - ◆ Carbon emission estimates determined using a carbon footprint assessment undertaken in accordance with ISO 14064-1, ISO14064-2 and ISO14064-3 that incorporates direct and indirect emissions associated with construction.
 - ◆ Compliance record generation and management.
- b. Reporting of carbon and energy will be undertaken throughout the construction works in accordance with the National Greenhouse and Energy Reporting Act 2007.
- c. The Contractors would be required to retain appropriate records and prepare carbon footprint assessments (inclusive of Scope 1, 2 and 3 emissions) at various stages of construction.

13.3 Carbon and Energy Mitigation

- a. Examples of carbon and energy mitigation measures include:
- ◆ Equipment and material selection will have consideration of energy efficiencies.
 - ◆ Construction workers will be encouraged to use sustainable transport options and green travel plans will be developed.
 - ◆ Inclusion of renewable energy sources to power temporary facilities and equipment where feasible.
 - ◆ Designing and operating Site offices for energy efficiency.
 - ◆ Offsetting a portion of construction greenhouse gas emissions.
 - ◆ Efficient operation of vehicles and equipment.

14. Materials Management



Figure 9 - Sydney Monorail Beams being re-used at the Norwest Station Site

14.1 Materials Management Objectives

- a. The following materials management objectives would apply to the construction of the project:
- ◆ Reduce material use throughout the project life-cycle.
 - ◆ Consider embodied impacts in materials selection.
 - ◆ Use recycled materials.
 - ◆ Recycle and reuse materials onsite.
 - ◆ Influence subcontractors and materials suppliers to adopt sustainability objectives in their works and procurement.

14.2 Materials Management Implementation

- a. Principal Contractors will be required to develop and implement a Sustainable Procurement Policy that will include as a minimum:
 - ◆ The materials mitigation measures as detailed in the environmental approval documentation.
 - ◆ The relevant requirements of the City & Southwest Environment and Sustainability Policy and the City & Southwest Sustainability Strategy.
 - ◆ The responsibilities of key project personnel with respect to the implementation of the policy.
 - ◆ Compliance record generation and management.
 - ◆ Ethical sourcing of materials.
 - ◆ Local sourcing.
- b. The Contractors will be required to retain records detailing the consideration of sustainability in the procurement of all materials.

14.3 Materials Mitigation

- a. Examples of materials mitigation measures include:
 - ◆ Consideration of quality and durability in the procurement of materials.
 - ◆ Using recycled materials.
 - ◆ Using materials with a lower embodied impact.
 - ◆ Using recycled steel in concrete reinforcement.
 - ◆ Developing deconstruction plans to enable recycling and reuse at end-of-life.
 - ◆ Using low-VOC, low emission materials.
 - ◆ Using sustainably sourced timber and wood products.
 - ◆ Low-carbon concrete.
 - ◆ Consideration of whole-of-life costs during procurement.

15. Soil and Water Management



Figure 10 - Erosion and Sediment Controls at the Cudgegong Rd Site

15.1 Soil and Water Management Objectives

- a. The following soil and water management objectives will apply to construction:
- ◆ Minimise pollution of surface water through appropriate erosion and sediment control.
 - ◆ Maintain existing water quality of surrounding surface watercourses.
 - ◆ Source construction water from non-potable sources, where feasible and reasonable.

15.2 Soil and Water Implementation

- a. Principal Contractors will develop and implement a Soil and Water Management Plan for their scope of works. The Soil and Water Management Plan will include as a minimum:
- ◆ The surface water and flooding mitigation measures as detailed in the environmental approval documentation.
 - ◆ details of construction activities and their locations, which have the potential to impact on water courses, storage facilities, stormwater flows, and groundwater;
 - ◆ surface water and ground water impact assessment criteria consistent with the principles of the Australian and New Zealand Environment Conservation Council (ANZECC) guidelines;
 - ◆ management measures to be used to minimise surface and groundwater impacts, including identification of water treatment measures and discharge points, details of how spoil and fill material required by the SSI will be sourced, handled, stockpiled, reused and managed; erosion and sediment control measures; salinity control measures and the consideration of flood events;
 - ◆ a contingency plan, consistent with the Acid Sulfate Soils Manual (EPA 1998), to deal with the unexpected discovery of actual or potential acid sulfate soils, including procedures for the investigation, handling, treatment and management of such soils and water seepage;
 - ◆ management measures for contaminated material (soils, water and building materials) and a contingency plan to be implemented in the case of unanticipated discovery of contaminated material, including asbestos, during construction;
 - ◆ a description of how the effectiveness of these actions and measures would be monitored during the proposed works, clearly indicating how often this monitoring would be undertaken, the locations where monitoring would take place, how the results of the monitoring would be recorded and reported, and, if any exceedance of the criteria is detected how any non-compliance can be rectified;
 - ◆ The requirements of any applicable EPL conditions.
 - ◆ The responsibilities of key project personnel with respect to the implementation of the plan.
 - ◆ Procedures for the development and implementation of progressive erosion and sediment control plans.
 - ◆ Identification of locations where site specific Stormwater and Flooding Management Plans are required.
 - ◆ Compliance record generation and management.
- b. Principal Contractors will develop and implement progressive erosion and sediment control plans (ESCPs) for all active worksites in accordance with Managing Urban Stormwater: Soils & Construction Volume 1 (Landcom, 2004) (known as the “Blue Book”). The ESCPs will be approved by the Contractor’s Environmental Manager (or delegate) prior to any works commencing (including vegetation clearing) on a particular site. Copies of the approved ESCP will be held by the relevant Contractor personnel including the Engineer and the Site Foreman.
- c. ESCPs will detail all required erosion and sediment control measures for the particular site at the particular point in time and be progressively updated to reflect the current site conditions. Any amendments to the ESCP will be approved by the Contractor’s Environmental Manager (or delegate).

- d. Principal Contractors will develop and implement Stormwater and Flooding Management Plans for the relevant construction sites. These plans will identify the appropriate design standard for flood mitigation based on the duration of construction, proposed activities and flood risks. The plan will develop procedures to ensure that threats to human safety and damage to infrastructure are not exacerbated during the construction period.
- e. Principal Contractors will undertake the following soil and water monitoring as a minimum:
 - ◆ Weekly inspections of the erosion and sediment control measures. Issues identified would be rectified as soon as practicable.
 - ◆ Additional inspections will be undertaken following significant rainfall events (greater than 20 mm in 24 hours).
 - ◆ All water will be tested (and treated if required) prior to discharge from the site in order to determine compliance with the parameters of the EPL. No water will be discharged from the site without written approval of the Contractor's Environmental Manager (or delegate). This is to form a HOLD POINT.
- f. The following compliance records will be kept by the Principal Contractors:
 - ◆ Copies of current ESCPs for all active construction sites.
 - ◆ Records of soil and water inspections undertaken.
 - ◆ Records of testing of any water prior to discharge.
 - ◆ Records of the release of the hold point to discharge water from the construction site to the receiving environment.

15.3 Soil and Water Mitigation

- a. Examples of surface water and flooding mitigation measures include:
 - ◆ Clean water will be diverted around disturbed site areas, stockpiles and contaminated areas.
 - ◆ Control measures will be installed downstream of works, stockpiles and other disturbed areas.
 - ◆ Exposed surfaces will be minimised, and stabilised / revegetated as soon feasible and reasonable upon completion of construction.
 - ◆ Dangerous good and hazardous materials storage will be within bunded areas with a capacity of 110 per cent of the maximum single stored volume.
 - ◆ Spill kits will be provided at the batch plants, storage areas and main work sites.

15.4 Water Resources Management

- a. The following water resources management objectives will apply to the construction of the project:
- ◆ Minimise demand for, and use of potable water.
 - ◆ Maximise opportunities for water re-use from captured stormwater, wastewater and groundwater.
 - ◆ Examples of measures to minimise potable water consumption include:
 - ◆ Water efficient controls, fixtures and fittings in temporary facilities.
 - ◆ Collecting, treating and reusing water generated in tunnelling operations, concrete batching and casting facility processes.
 - ◆ Using recycled water or treated water from onsite sources in the formulation of concrete.
 - ◆ Harvesting and reusing rainwater from roofs of temporary facilities.
 - ◆ Using water from recycled water networks.
 - ◆ Collecting, treating and reusing groundwater and stormwater.
 - ◆ Using water efficient construction methods and equipment.
 - ◆ Providing designated sealed areas for equipment wash down.

16. Air Quality



Figure 11 - Dust Mitigation at Norwest Station Site

16.1 Air Quality Management Objectives

- a. The following air quality management objectives will apply to construction:
- ◆ Minimise gaseous and particulate pollutant emissions from construction activities as far as feasible and reasonable.
 - ◆ Identify and control potential dust and air pollutant sources.

16.2 Air Quality Management Implementation

- a. Principal Contractors will develop and implement an Air Quality Management Plan which will include, as a minimum:
- ◆ The air quality mitigation measures as detailed in the environmental approval documentation.
 - ◆ The requirements of any applicable EPL conditions.
 - ◆ Site plans or maps indicating locations of sensitive receivers and key air quality / dust controls.
 - ◆ The responsibilities of key project personnel with respect to the implementation of the plan.
 - ◆ Air quality and dust monitoring requirements.
 - ◆ Compliance record generation and management.

- b. Air quality and dust monitoring will involve the following as a minimum:
- ◆ Meteorological conditions will be monitored and appropriate responses will be organised and undertaken periodically by the Principal Contractor.
 - ◆ Regular visual monitoring of dust generation from work zones.
 - ◆ Monitoring emissions from plant and construction vehicles to ensure they have appropriate emission controls and are being maintained correctly.
- c. The following compliance records will be kept by the Principal Contractor:
- ◆ Records of any meteorological condition monitoring.
 - ◆ Records of any management measures implemented as a result of adverse, windy weather conditions.
 - ◆ Records of air quality and dust inspections undertaken.

16.3 Air Quality Mitigation

- a. Examples of air quality mitigation measures include:
- ◆ Plant and equipment will be serviced and maintained in good working order to reduce unnecessary emissions from exhaust fumes.
 - ◆ Water suppression will be used for active earthwork areas, stockpiles, unsurfaced haul roads and loads of soil being transported to reduce wind-blown dust emissions.
 - ◆ Wheel-wash facilities or rumble grids will be provided and used near the site exit points, as appropriate.
 - ◆ Dust extraction and filtration systems will be installed for tunnel excavation works and deep excavation with limited surface exposure.

17. Waste Management

17.1 Waste Objectives

- a. The following waste objectives will apply to construction:
 - ◆ Minimise waste throughout the project life-cycle.
 - ◆ Waste management strategies will be implemented in accordance with the *Waste Avoidance and Resource Recovery Act 2001* management hierarchy as follows:
 - ◆ Avoidance of unnecessary resource consumption.
 - ◆ Resource recovery (including reuse, reprocessing, recycling and energy recovery).
 - ◆ Disposal.
- b. Targets for the recovery, recycling or reuse of construction waste, and beneficial reuse of spoil will be provided by the Principal Contractor.

17.2 Waste Implementation

- a. Principal Contractors will develop and implement a Waste Management and Recycling Plan which will include as a minimum:
 - ◆ The waste management and recycling mitigation measures as detailed in the environmental approval documentation.
 - ◆ The responsibilities of key project personnel with respect to the implementation of the plan.
 - ◆ Waste management and recycling monitoring requirements.
 - ◆ A procedure for the assessment, classification, management and disposal of waste in accordance with the Waste Classification Guidelines (DECC, 2008).
 - ◆ Compliance record generation and management.
- b. Principal Contractors will undertake the following waste monitoring as a minimum:
 - ◆ Weekly inspections will include checking on the waste storage facilities on site.
 - ◆ All waste removed from the site will be appropriately tracked from 'cradle to grave' using waste tracking docketts.
- c. Principal Contractors will report all necessary waste and purchasing information to TfNSW as required for TfNSW to fulfil their WRAPP reporting requirements.
- d. Compliance records will be retained by the Principal Contractors in relation to waste management including records of inspections and waste docketts for all waste removed from the site.

17.3 Waste Mitigation

- a. Examples of waste management and recycling mitigation measures include:
 - ◆ All waste materials removed from the sites will be directed to an appropriately licensed waste management facility.
 - ◆ The use of raw materials (noise hoarding, site fencing, etc...) will be reused or shared, between sites and between construction contractors where feasible and reasonable.
 - ◆ Recyclable wastes, including paper at site offices, will be stored separately from other wastes.

18. Acronyms

Acronym	
CEMP	Construction Environmental Management Plan
CNVS	Construction Noise and Vibration Strategy
DP&E	Department of Planning and Environment (Formerly Department of Planning and Infrastructure)
EIS	Environmental Impact Statement
EMF	Environmental Management Framework
EMS	Environmental Management System
EPA	Environment Protection Authority
EP&A Act	Environmental Planning and Assessment Act 1979
EPL	Environment Protection Licence (issued by EPA under the POEO Act)
ER	Environmental Representative
ESCP	Erosion and Sediment Control Plan
NOHSC	National Occupational Health and Safety Commission
OEH	Office of Environment and Heritage (Formerly DECCW)
POEO Act	Protection of the Environment Operation Act 1997
RMS	Roads and Maritime Service (Formerly RTA)
TBM	Tunnel Boring Machine
TfNSW	Transport for NSW

Appendix A – Environment and Sustainability Policy



Transport
for NSW

Environment
& Sustainability
Policy



This Policy reflects a commitment in our delivery of the Sydney Metro program to:

- Align with, and support, Transport for NSW (TfNSW) Environment & Sustainability Policy.
- Optimise sustainability outcomes, transport service quality, and cost effectiveness.
- Develop effective and appropriate responses to the challenges of climate change, carbon management, resource and waste management, land use integration, customer and community expectation, and heritage and biodiversity conservation.
- Be environmentally responsible, by avoiding pollution, enhancing the natural environment and reducing the project ecological footprint, while complying with all applicable environmental laws, regulations and statutory obligations.
- Be socially responsible by delivering a workforce legacy which benefits individuals, communities, the project and industry, and is achieved through collaboration and partnerships.

To deliver on these commitments, the Sydney Metro team will:

Industry leadership

- Implement coordinated and transparent decision making, by engaging with stakeholders and suppliers, encouraging innovation and demonstrating sustainability leadership.
- Explore new benchmarks for the transport infrastructure sector by requiring high standards from our designers, contractors and suppliers, building on experience gained through development of Sydney Metro Northwest.

Community and customer

- Provide accessible, safe, pleasurable, and convenient access and transport service for all customers.
- Establish positive relationships with community and stakeholders to maximise opportunities to add value to local communities.

Land use integration and place making

- Create desirable places, promote liveability, cultural heritage, and optimise both community and economic benefit.
- Balance transit oriented development opportunities with stakeholder expectations.

Embedding environmental and social sustainability

- Establish robust sustainability objectives and targets.
- Maintain an environmental management system that is integrated into all our project activities.
- Ensure thorough and open environmental assessment processes are developed and maintained.
- Develop and maintain an environmental management framework to embed best practice pollution management and sustainable outcomes during construction.
- Apply effective assurance processes to monitor performance against the project environment and sustainability objectives and identify appropriate reward or corrective action, as required.
- Apply environment and sustainability specific processes to the procurement of delivery activities.

Accountability

- Undertake public sustainability reporting.
- Hold employees and contractors accountable for proactively meeting their environmental and social sustainability responsibilities.
- Provide appropriate training and resources necessary to meet our responsibilities.

Rodd Staples - Program Director, Sydney Metro



Integrated
Management
System

Sydney Metro City & Southwest Construction Noise and Vibration Strategy

Report No 610.14213-R3

Sydney Metro Integrated Management System (IMS)

Applicable to:	Sydney Metro City & Southwest
Author:	Mark Russell Associate Consultant SLR Consulting Australia Pty Ltd
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Appendix A - Construction Monitoring Methodology

Appendix B - Adjacent and Adjoining Receptor Information

1. FOREWORD

The Department of Environment, Climate Change and Water NSW (now the Environmental Protection Authority EPA) issued the Interim Construction Noise Guideline (ICNG) in July 2009.

The main objectives of the ICNG are stated in Section 1.3, a portion of which is presented below:

“The main objectives of the Guideline are to:

- promote a clear understanding of ways to identify and minimise noise from construction works*
- focus on applying all ‘feasible’ and ‘reasonable’ work practices to minimise construction noise impacts*
- encourage construction to be undertaken only during the recommended standard hours unless approval is given for works that cannot be undertaken during these hours*
- streamline the assessment and approval stages and reduce time spent dealing with complaints at the project implementation stage*
- provide flexibility in selecting site-specific feasible and reasonable work practices in order to minimise noise impacts.”*

The ICNG guideline (in Section 7.3) also encourages organisations involved with construction, maintenance or upgrading works (such as Sydney Metro) to develop their own best-practice techniques for managing construction noise.

In line with this recommendation the purpose of this ‘Construction Noise and Vibration Strategy’ is to document how Sydney Metro proposes to manage construction noise and vibration for the Sydney Metro and SouthWest project including any potential extensions.

2. PURPOSE AND SCOPE

2.1. Background

People are usually more tolerant to noise and vibration during the construction phase of proposals than during normal operation. This response results from recognition that the construction emissions are of a temporary nature – especially if the most noise-intensive construction impacts occur during the less sensitive daytime period. For these reasons, acceptable noise and vibration levels are normally higher during construction than during operations.

Construction often requires the use of heavy machinery which can generate high noise and vibration levels at nearby buildings and receivers. For some equipment, there is limited opportunity to mitigate the noise and vibration levels in a cost-effective manner and hence the potential impacts would be minimised by using feasible and reasonable management techniques.

At any particular location, the potential impacts can vary greatly depending on factors such as the relative proximity of sensitive receivers, the overall duration of the construction works, the intensity of the noise and vibration levels, the time at which the construction works are undertaken and the character of the noise or vibration emissions.

The construction noise and vibration emissions associated with a large infrastructure project such as Sydney Metro will cause disturbance to adjacent communities. This is of particular relevance in urban areas, such as in the Sydney CBD, where many sensitive receivers (not just residential) are present.

Due to the nature of this large infrastructure project a significant number of activities will be required outside normal construction hours as work during daytime periods would be highly disruptive to road traffic for commuters. In addition, noise and vibration impacts for this project are generally expected to have a duration of several years. It is therefore important that reasonable and feasible mitigation measures (as defined in the ICNG) are identified and implemented to ensure that construction noise and vibration impacts are reduced to a minimum.

2.2. Strategy Objectives

Generally the strategy is intended to provide a single interface for the large number of policies, guidelines, standards and regulations that apply to a large infrastructure project such as Sydney Metro. Where possible the strategy consolidates these information sources eg vibration criteria from numerous sources are collated into one section of this strategy for ease of reference. Further, the strategy aims to provide interpretation of the reference documents which are specific to the Metro project. Where the reference documents are found to have insufficient detail the strategy provides additional assessment criteria and methodologies.

The specific objectives of this Construction Noise and Vibration Strategy are as follows:

- Applying the strategy during the different construction phases of the project
- Environmental Protection Licence (EPL) conditions
- Construction noise and vibration guidelines to apply to the project (additional guidance to complement the ICNG)
- Construction noise and vibration assessment methodology
- Standard noise and vibration mitigation measures for the project
- Additional noise and vibration mitigation measures for the project
- Out of hours (OOH) Work
- Monitoring, auditing and reporting
- Construction noise and vibration documentation requirements

2.3. Distribution and Use

This document may be used in the development of, or referred to in:

- Environmental impact assessment documents
- Design and construction environmental management documents
- Contract documents
- Approvals and licences (subject to the agreement of the relevant regulatory authority)

2.4. Strategy Review

The strategy will be reviewed, as a minimum, annually to ensure that it meets the needs of the community, Sydney Metro and the contractors engaged on Sydney Metro projects. This document does not take precedence over approval or licence conditions and will be reviewed as required in response to the release of relevant approvals, licences, guidelines, standards and policies dealing with construction noise and vibration.

3. APPLYING THE STRATEGY

The planning procedure for all infrastructure projects requires that a detailed Environmental Assessment of the construction phases of the proposal be completed. As construction contractors are not typically appointed until much later in a project’s timeline, the exact construction methodology they will use for a particular project may not be known during the environmental assessment stage.

It is expected that conservative assumptions would be incorporated at early stages of the project approval process and these must not unduly restrict innovation (eg construction methods or mitigation) at later design stages. This reflects the refinement of construction methodologies with subsequent stages of the project.

This document therefore defines the strategies by which construction noise and vibration impacts are to be minimised on Sydney Metro projects throughout the construction of a project by recognising the changing assessment requirements for each construction phase.

Table 1 outlines the level of detail expected from the assessment process (refer to Section 7) at the following stages of the project:

- Environmental Impact Statement / Environmental Assessment
- In delivery / pre-construction impact statements

Table 1: Summary of Assessment Detail Required During the Various Stages of the Project

Assessment Input	Environmental Impact Statement / Environmental Assessment	In Delivery / Pre-construction Impact Statements
Construction Scenarios / Equipment List	Construction scenarios defined by project team, based on potential construction methodologies known at the time	Construction scenarios defined by construction team. These are expected to include finalised equipment lists, itemising the realistic worst-case plant proposed to be used at any one time, and in any one location
Modelled works location	Works location by scenario (or group of scenarios) ie different locations for different works	Works location by works scenario ie specific locations for each works
Background noise monitoring	Background noise monitoring required to determine RBL at locations representative of worst-affected receiver areas adjacent to the works areas	Supplementary noise monitoring required to determine RBL at locations representative of worst-affected receiver areas adjacent to the works areas where noise survey data is not current (ie more than 5 years old)
Study Area	The study area must, as a minimum, include receivers subjected to predicted $L_{Aeq}(15\text{minute}) \geq RBL + 5\text{dB}$ for the applicable time period. Vibration level predictions up to 100 m	Predict noise and vibration levels to the sensitive receivers within the area surrounding the works, to include all receivers where the $L_{Aeq}(15\text{minute}) \geq RBL + 5\text{dB}$ and the vibration screening criteria are exceeded during the applicable time periods.

Assessment Input	Environmental Impact Statement / Environmental Assessment	In Delivery / Pre-construction Impact Statements
Reporting	n/a	Predictions would be undertaken for the proposed time period of the works
Assessment of mitigation	Demonstration that assessment of this stage includes reasonable and feasible mitigation measures	<p>Based on these predictions the Construction Noise Management Plan (CNMP) shall identify all reasonable and feasible mitigation measures to minimise noise and vibration from construction. Sections 7 and 8 identify the standard and additional mitigation measures to be included where applicable in the CNMP.</p> <p>Eg. Detailed vibration assessments to include dilapidation surveys, continuous vibration monitoring and accurate vibration transfer measurements (site law measurements) for all buildings with the potential to exceed the screening criteria for vibration.</p>
Documentation	n/a	Implementation of the EPL conditions, or as modified by subsequent CNVIS (eg for OOHV)

4. ENVIRONMENTAL PROTECTION LICENCES (EPL)

Environmental Protection Licences are a fundamental noise control requirement for large infrastructure projects. These licences often provide detailed construction noise and vibration criteria and management measures that are tailored to the specifics of individual projects. To use this strategy effectively the time-line of assessments, approvals and licences would be understood and the necessary interaction of this strategy, the CNIS reports it generates and the EPL issued for the project.

4.1. Time-line of Assessments, Approvals and the EPL

The general time-line for this process with respect to noise and vibration from construction activities is outlined below:

1. Project concept. Preliminary high-level CNIS and CNMP reports.
2. Department of Planning Issues the Conditions of Approval for the project.
3. Environmental Impact Statement (EIS). Preliminary but more detailed CNIS and CNMP reports based on a complete concept design.
4. Project Approval from the Department of Planning.
5. Contactor Tender and Award.
6. Contractor Detailed Design. Mature CNIS and CNMP reports based on the detailed design.
7. Contractor application for Environmental Protection License for the project.
8. Licence award by the Environmental Protection Agency EPL.
9. Construction commences.
10. Ongoing of review of construction methodology and project noise and vibration issues.
11. Re-assess CNIS and CNMP based on new inputs (if necessary).
12. Consistency Assessment
13. Contractor application for amendments to the EPL.
14. Approval of the amendments to the EPL.

As can be seen from the above time-line this Strategy is used through the planning, approval and construction stages. Steps 10 through to 14 can be repeated to review and add to the EPL conditions, if necessary, during the construction stage.

5. NOISE AND VIBRATION GUIDELINES

5.1. Construction Noise Metrics

The three primary noise metrics used to describe construction noise emissions in the modelling and assessments are:

- | | |
|----------------|--|
| LA1(1minute) | The typical 'maximum noise level for an event', used in the assessment of potential sleep disturbance during night-time periods. Alternatively, assessment may be conducted using the LA _{max} or maximum noise level |
| LAeq(15minute) | The 'energy average noise level' evaluated over a 15-minute period. This parameter is used to assess the potential construction noise impacts. |

LA90 The 'background noise level' in the absence of construction activities. This parameter represents the average minimum noise level during the daytime, evening and night-time periods respectively. The $L_{Aeq(15\text{minute})}$ construction noise management levels are based on the LA90 background noise levels.

The subscript 'A' indicates that the noise levels are filtered to match normal hearing characteristics (A weighted).

5.2. Construction Hours

Where possible, works will be completed during the standard day time construction hours of Monday to Friday 7.00 am to 6.00 pm and Saturdays 8.00 am to 1.00 pm. However, the nature of the project means evening and night work are required throughout the construction program. Many of the construction scenarios for this project will require 24/7 operation. These scenarios include:

- Excavation of station shafts
- Excavation of the station caverns
- Operation of the tunnel boring machines
- Spoil removal and transport from site

Out of Hours Works (OOHWs) are to be included in the assessment for all proposed works at all locations in order to inform the scheduling of construction activity and management of noise during the detailed design phase. It is anticipated that the finalised requirements for OOHWs would be determined at a later design stage. It is understood that any OOHWs would be subject to a separate approval on a case-by-case basis and would likely require approval under the project's Environmental Protection Licence (EPL).

5.3. Construction Noise Management Levels (NML)

Construction Noise Management Levels (NML) for all Sydney Metro projects will be determined in accordance with the procedures nominated in the DECCW's "Interim Construction Noise Guideline" dated July 2009 (ICNG, 2009). The following information is intended to supplement the ICNG with respect to the unique requirements of the Metro project.

5.3.1. Residences and Other Sensitive Land Uses

Table 2 sets out the noise management levels and how they are to be applied. This approach intends to provide respite for residents exposed to excessive construction noise outside the recommended standard hours whilst allowing construction during the recommended standard hours without undue constraints.

Table 2 the rating background level (RBL) is used when determining the management level. The RBL is the overall single-figure background noise level measured in each relevant assessment period (as defined in the EPA "Industrial Noise Policy" dated January 2000).

Table 2: Noise at Residences Using Quantitative¹

Time of Day	Management Level LAeq(15minute) ²	How to Apply
<p>Recommended standard hours:</p> <p>Monday to Friday 7.00 am to 6.00 pm</p> <p>Saturday 8.00 am to 1.00 pm</p>	Noise affected RBL + 10 dB	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <p>Where the predicted or measured LAeq(15minute) is greater than the noise affected level, the proponent would apply all feasible and reasonable work practices to minimise noise.</p> <p>The proponent would also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.</p>
No work on Sundays or public holidays	Highly noise affected 75 dB	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <p>Where noise is above this level, the proponent would consider very carefully if there is any other feasible and reasonable way to reduce noise to below this level.</p> <p>If no quieter work method is feasible and reasonable, and the works proceed, the proponent would communicate with the impacted residents by clearly explaining the duration and noise level of the works, and by describing any respite periods that will be provided.</p>
Outside recommended standard hours	Noise affected RBL + 5 dB	<p>A strong justification would typically be required for works outside the recommended standard hours.</p> <p>The proponent would apply all feasible and reasonable work practices to meet the noise affected level.</p> <p>Where all feasible and reasonable practices have been applied and noise is more than 5 dBA above the noise affected level, the proponent would negotiate with the community.</p> <p>For guidance on negotiating agreements see Section 7.2.2 of the ICNG.</p>

Note 1: Adopted from the ICNG.

Note 2: Noise levels apply at the property boundary that is most exposed to construction noise. If the property boundary is more than 30 m from the residence, the location for measuring or predicting noise levels is at the most noise-affected point within 30 m of the residence.

Table 3 presents management levels for noise at other sensitive land uses based on the principle that the characteristic activities for each of these land uses would not be unduly disturbed. The noise management levels apply only to when the property is being used, for example classrooms during school hours. Internal noise levels are to be assessed at the centre of the occupied room. External noise levels are to be assessed at the most-affected point within 50 m of the area boundary.

Table 3: Noise at Other Sensitive Land Uses Using Quantitative Assessment¹

Land Use	Management Level, LAeq(15minute) (Applies When Land Use is being Utilised)
Classrooms at schools and other educational institutions	Internal noise level 45 dB
Hospital wards and operating theatres	Internal noise level 45 dB
Places of worship	Internal noise level 45 dB
Active recreation areas (such as parks and sports grounds or playgrounds)	External noise level 65 dB
Passive recreation areas (such as outdoor grounds used for teaching, outdoor cafes or restaurants)	External noise level 60 dB

Note 1: Adopted from the ICNG.

Other noise-sensitive businesses require separate specific noise goals and it is suggested in the ICNG that the internal construction noise levels at these premises are to be referenced to the 'maximum' internal levels presented in AS 2107. Recommended 'maximum' internal noise levels from AS 2107 are reproduced in **Table 4** for other sensitive receiver types.

However, the ICNG and AS 2107 do not provide specific criteria for childcare centres. Childcare centres generally have internal play areas and sleep areas. The Association of Australian Acoustical Consultants (AAAC) Technical Guideline on Child Care Centre Noise Assessments provides criteria for these land uses. Based on this guideline an LAeq (1hour) of 55 dBA for external play areas and LAeq (1hour) of 40 dBA for indoor play areas and sleeping areas would be adopted.

Table 4 AS 2107 Recommended Maximum Internal Noise Levels

Land Use	Time Period	AS 2107 Classification	Recommended "Maximum" Internal LAeq (dBA)
Hotel	Daytime & Evening	Bars and Lounges	50
	Night-time	Sleeping Areas: - Hotels near major roads	40
Café	When in use	Coffee bar	50
Bar/Restaurant	When in use	Bars and Lounges / Restaurant	50
Library	When in use	Reading Areas	45
Recording Studio	When in use	Music Recording Studios	25
Theatre / Auditorium	When in use	Drama Theatres	30

5.3.2. Commercial and Industrial Premises

Due to the broad range of sensitivities that commercial or industrial land can have to noise from construction, the process of defining management levels is separated into three categories. The external noise levels would be assessed at the most-affected occupied point of the premises:

- Industrial premises (external): 75 dB LAeq(15minute)
- Offices, retail outlets (external): 70 dB LAeq(15minute)
- Other businesses that may be very sensitive to noise, where the noise level is project specific as discussed below

Examples of other noise-sensitive businesses are theatres, studios and child care centres. The proponent would undertake a special investigation to determine suitable noise levels on a project-by-project basis; the recommended internal noise levels presented in Table 1 of AS 2107 “Acoustics - Recommended design sound levels and reverberation times for building interiors” (Standards Australia 2000) may assist in determining relevant noise levels; however, an acoustical consultant would be engaged in order to determine corresponding external noise levels based on the published internal noise levels. The proponent would assess construction noise levels for the project, and consult with occupants of commercial and industrial premises prior to lodging an application where required. During construction, the proponent would regularly update the occupants of the commercial and industrial premises regarding noise levels and hours of work.

5.4. Ground-Borne Vibration

The effects of vibration in buildings can be divided into three main categories; those in which the occupants or users of the building are inconvenienced or possibly disturbed, those where the building contents may be affected and those in which the integrity of the building or the structure itself may be prejudiced.

5.4.1. Human Comfort Vibration

The DECCW’s “Assessing Vibration: a technical guideline” dated February 2006 (DEC, 2006) recommends the use of BS 6472-1992 for the purpose of assessing vibration in relation to human comfort.

British Standard 6472-1992 “Guide to evaluation of human exposure to vibration in building” nominates guideline values for various categories of disturbance, the most stringent of which are the levels of building vibration associated with a “low probability of adverse comment” from occupants.

BS 6472-1992 provides guideline values for continuous, transient and intermittent events that are based on a Vibration Dose Value (VDV), rather than a continuous vibration level. The vibration dose value is dependant upon the level and duration of the short term vibration event, as well as the number of events occurring during the daytime or night-time period.

The vibration dose values recommended in BS 6472-1992 for which various levels of adverse comment from occupants may be expected are presented in **Table 5**.

Table 5: Vibration Dose Value Ranges which Might Result in Various Probabilities of Adverse Comment within Residential Buildings

Place and Time	Low Probability of Adverse Comment (m/s ^{1.75})	Adverse Comment Possible (m/s ^{1.75})	Adverse Comment Probable (m/s ^{1.75})
Residential buildings 16 hr day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 hr night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Note: For offices and workshops, multiplying factors of 2 and 4 respectively would be applied to the above vibration dose value ranges for a 16 hr day.

5.4.2. Structural Damage Vibration

Most commonly specified 'safe' structural vibration limits are designed to minimise the risk of threshold or cosmetic surface cracks, and are set well below the levels that have potential to cause damage to the main structure.

In terms of the most recent relevant vibration damage goals, Australian Standard AS 2187: Part 2-2006 'Explosives - Storage and Use - Part 2: Use of Explosives' recommends the frequency dependent guideline values and assessment methods given in BS 7385 Part 2-1993 'Evaluation and measurement for vibration in buildings Part 2' as they "are applicable to Australian conditions".

The Standard sets guide values for building vibration based on the lowest vibration levels above which damage has been credibly demonstrated. These levels are judged to give a minimum risk of vibration induced damage, where minimal risk for a named effect is usually taken as a 95% probability of no effect.

Sources of vibration that are considered in the standard include demolition, blasting (carried out during mineral extraction or construction excavation), piling, ground treatments (eg compaction), construction equipment, tunnelling, road and rail traffic and industrial machinery.

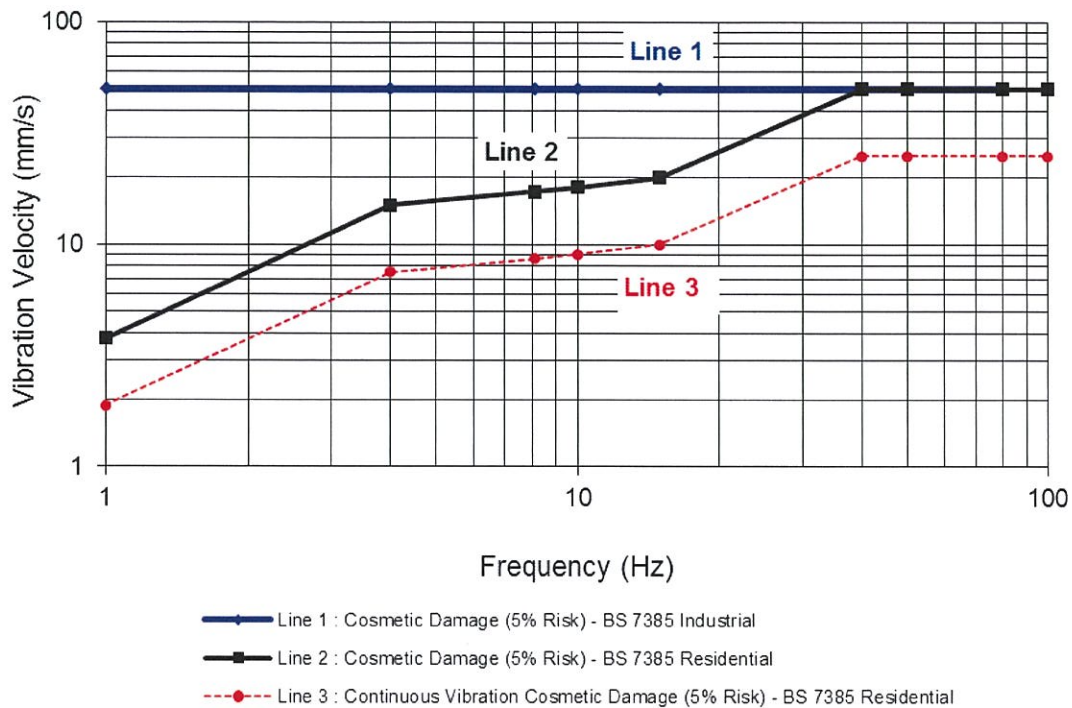
5.4.3. Cosmetic Damage Vibration

The recommended limits (guide values) for transient vibration to ensure minimal risk of cosmetic damage to residential and industrial buildings are presented numerically in **Table 6** and graphically in **Figure 1**.

Table 6: Transient Vibration Guide Values - Minimal Risk of Cosmetic Damage

Line	Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
		4 Hz to 15 Hz	15 Hz and Above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Figure 1: Graph of Transient Vibration Guide Values for Cosmetic Damage



The Standard goes on to state that minor damage is possible at vibration magnitudes which are greater than twice those given in **Table 6**, and major damage to a building structure may occur at values greater than four times the tabulated values.

Fatigue considerations are also addressed in the Standard and it is concluded that unless calculation indicates that the magnitude and number of load reversals is significant (in respect of the fatigue life of building materials) then the guide values in **Table 6** would not be reduced for fatigue considerations.

In order to assess the likelihood of cosmetic damage due to vibration, AS2187 specifies that vibration measured would be undertaken at the base of the building and the highest of the orthogonal vibration components (transverse, longitudinal and vertical directions) would be compared with the guidance curves presented in **Figure 1**.

It is noteworthy that extra to the guide values nominated in **Table 6**, the standard states that:

“Some data suggests that the probability of damage tends towards zero at 12.5 mm/s peak component particle velocity. This is not inconsistent with an extensive review of the case history information available in the UK.”

Also that:

“A building of historical value should not (unless it is structurally unsound) be assumed to be more sensitive.”

5.5. General Vibration Screening Criterion

The Standard states that the guide values in **Table 6** relate predominantly to transient vibration which does not give rise to resonant responses in structures and low-rise buildings.

Where the dynamic loading caused by continuous vibration may give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values in **Table 6** may need to be reduced by up to 50%.

Note: rockbreaking/hammering and sheet piling activities are considered to have the potential to cause dynamic loading in some structures (eg residences) and it may therefore be appropriate to reduce the transient values by 50%.

Therefore for most construction activities involving intermittent vibration sources such as rockbreakers, piling rigs, vibratory rollers, excavators and the like, the predominant vibration energy occurs at frequencies greater than 4 Hz (and usually in the 10 Hz to 100 Hz range). On this basis, a conservative vibration damage screening level per receiver type is given below:

- Reinforced or framed structures: 25.0 mm/s
- Unreinforced or light framed structures: 7.5 mm/s

At locations where the predicted and/or measured vibration levels are greater than shown above (peak component particle velocity), a more detailed analysis of the building structure, vibration source, dominant frequencies and dynamic characteristics of the structure would be required to determine the applicable safe vibration level.

5.6. Guidelines for Vibration Sensitive and Special Structures

5.6.1. Heritage

Heritage buildings and structures would be assessed as per the screening criteria in **Section 5.5** as they should not be assumed to be more sensitive to vibration unless they are found to be structurally unsound. If a heritage building or structure is found to be structurally unsound (following inspection) a more conservative cosmetic damage criteria of 2.5 mm/s peak component particle velocity (from DIN 4150) would be considered.

5.6.2. Sensitive Scientific and Medical Equipment

Some scientific equipment (eg electron microscopes and microelectronics manufacturing equipment) can require more stringent objectives than those applicable to human comfort.

Where it has been identified that vibration sensitive scientific and/or medical instruments are likely to be in use inside the premises of an identified vibration sensitive receiver, objectives for the satisfactory operation of the instrument would be sourced from manufacturer's data. Where manufacturer's data is not available, generic vibration criterion (VC) curves as published by the Society of Photo-Optical Instrumentation Engineers (Colin G. Gordon - 28 September 1999) may be adopted as vibration goals. These generic VC curves are presented below in **Table 7** and **Figure 2**.

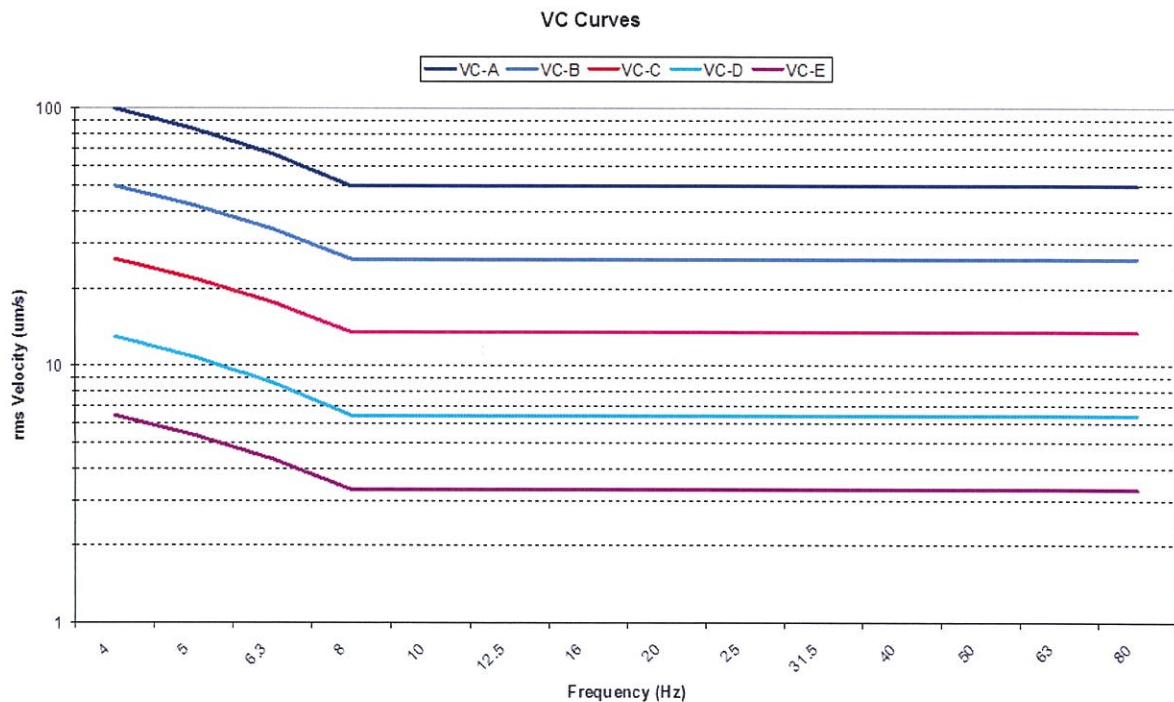
Table 7: Application and Interpretation of the Generic Vibration Criterion (VC) Curves (as shown in Figure 2)

Criterion Curve	Max Level (µm/sec, rms) ¹	Detail Size (microns) ²	Description of Use
VC-A	50	8	Adequate in most instances for optical microscopes to 400X, microbalances, optical balances, proximity and projection aligners, etc.
VC-B	25	3	An appropriate standard for optical microscopes to 1000X, inspection and lithography equipment (including steppers) to 3 micron line widths.
VC-C	12.5	1	A good standard for most lithography and inspection equipment to 1 micron detail size.
VC-D	6	0.3	Suitable in most instances for the most demanding equipment including electron microscopes (TEMs and SEMs) and E-Beam systems, operating to the limits of their capability.
VC-E	3	0.1	A difficult criterion to achieve in most instances. Assumed to be adequate for the most demanding of sensitive systems including long path, laser-based, small target systems and other systems requiring extraordinary dynamic stability.

Note 1: As measured in one-third octave bands of frequency over the frequency range 8 to 100 Hz.

Note 2: The detail size refers to the line widths for microelectronics fabrication, the particle (cell) size for medical and pharmaceutical research, etc. The values given take into account the observation requirements of many items depend upon the detail size of the process.

Figure 2: Vibration Criterion (VC) Curves



5.6.3. Other Vibration Sensitive Structures and Utilities

Where structures and utilities are encountered which may be considered to be particularly sensitive to vibration, a vibration goal which is more stringent than structural damage goals presented in Section 5.4 may need to be adopted. Examples of such structures and utilities include:

- Tunnels
- Gas pipelines
- Fibre optic cables

Specific vibration goals would be determined on a case-by-case basis. An acoustic consultant would be engaged by the construction contractor and would liaise with the structure or utility's owner in order to determine acceptable vibration levels.

5.7. Vibration and Overpressure from Blasting

The DECCW's ICNG recommends that vibration and overpressure from blasting be assessed against the levels presented in the Australian and New Zealand Environment Council's (ANZECC) Technical Basis for Guidelines to Minimise Annoyance Due to Blasting Overpressure and Ground Vibration (ANZECC, 1990).

The criteria set by this standard are targeted at operations that occur for long periods of time such as those at mining sites and hence are targeted at protecting human comfort vibration levels. As a result the vibration levels are conservative and can introduce unnecessary constraints when applied to construction projects which typically occur for much shorter time periods. Recent NSW infrastructure project approvals have recognised the restrictive nature of these blasting criteria when applied to construction projects and have therefore allowed the following vibration and overpressure limits:

- Vibration (PPV): 25 mm/s
- Overpressure: 125 dBL

These upper limits are deemed acceptable where the proponent has a written agreement with the relevant landowner to exceed the criteria and the Secretary has approved the terms of the written agreement. These upper limits to vibration and overpressure are intended to target the protection of building structures from cosmetic damage rather than human comfort criteria as construction works are considered short-term.

5.8. Ground-Borne (Regenerated) Noise

Ground-borne (regenerated) noise is noise generated by vibration transmitted through the ground into a structure. Ground-borne noise caused, for example by underground works such as tunnelling, can be more noticeable than airborne noise. The following ground-borne noise levels for residences are nominated in the ICNG and indicate when management actions would be implemented. These levels recognise the temporary nature of construction and are only applicable when ground-borne noise levels are higher than airborne noise levels.

The ground-borne noise management levels are given below:

- Day (7.00 am to 6.00pm)
Internal Residential: 45 dB LAeq(15minute)
Internal Commercial: 50 dB LAeq(15minute)

- Evening (6.00 pm to 10.00 pm)
Internal Residential: 40 dB LAeq(15minute)
- Night-time (10.00 pm to 7.00 am)
Internal Residential: 35 dB LAeq(15minute)

The daytime criteria are applicable to both residential and commercial receivers, whereas the evening and night-time criteria are only applicable to residential receivers.

The internal noise levels are to be assessed at the centre of the most-affected habitable room. For a limited number of discrete, ongoing ground-borne noise events, such as drilling or rock-hammering, The LA_{max} noise descriptor using a slow response on the sound level meter may be better than the LA_{eq} noise descriptor (15 min) in describing the noise impacts. The level of mitigation of ground-borne noise would depend on the extent of impacts and also on the scale and duration of works. Any restriction on the days when construction work is allowed would take into account whether the community:

- Has identified times of day when they are more sensitive to noise (for example Sundays or public holidays).
- Is prepared to accept a longer construction duration in exchange for days of respite.

5.9. Traffic Noise Assessment Goals

When trucks and other vehicles are operating within the boundaries of the various construction sites, road vehicle noise contributions are included in the overall predicted LA_{eq}(15minute) construction site noise emissions. When construction related traffic moves onto the public road network a different noise assessment methodology is appropriate, as vehicle movements would be regarded as 'additional road traffic' rather than as part of the construction site.

The ICNG does not provide specific guidance in relation to acceptable noise levels associated with construction traffic. For assessment purposes, guidance is taken from the RNP.

One of the objectives of the RNP is to apply relevant permissible noise increase criteria to protect sensitive receivers against excessive decreases in amenity as the result of a proposal. In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.

On this basis, construction traffic NMLs set at 2 dB above the existing road traffic noise levels during the daytime and night-time periods are considered appropriate to identify the onset of potential noise impacts. Where the road traffic noise levels are predicted to increase by more than 2 dB as a result of construction traffic, consideration would be given to applying feasible and reasonable noise mitigation measures to reduce the potential noise impacts and preserve acoustic amenity.

In considering feasible and reasonable mitigation measures where the relevant noise increase is greater than 2 dB, consideration would also be given to the actual noise levels associated with construction traffic and whether or not these levels comply with the following road traffic noise criteria in the RNP:

- 60 dB LA_{eq}(15hour) day and 55 dB LA_{eq}(9hour) night for existing freeway/ arterial/ sub-arterial roads.
- 55 dB LA_{eq}(1hour) day and 50 dB LA_{eq}(1hour) night for existing local roads.

5.9.1. Sleep Disturbance and Maximum Noise Events

In addition to the current legislative guidance on potential sleep disturbance outlined in Section 5.10 the RNP refers to Practice Note 3 of the ENMM for specific impacts from road traffic. The ENMM recommends an evaluation of the number and distribution of night-time passby events where the $L_{AFmax} - L_{Aeq(1hour)}$ difference is greater than 15 dB, and the maximum noise level of that event is greater than 65 dB L_{Amax} .

On the basis of the current guidance:

- External sleep disturbance screening criterion of $RBL + 15$ dB
- External sleep disturbance criterion of 65 dB L_{Amax} (assuming open windows).

5.10. Sleep Disturbance and Maximum Noise Level Events

The DECCW's ECRTN and the Road and Traffic Authority's (RTA's) 'Environmental Noise Management Manual' (ENMM) provide guidance as to the likelihood of sleep disturbance resulting from maximum noise level events (mainly associated with heavy vehicle movements). The ECRTN points out the following:

"There are no universally accepted criteria governing the likelihood of sleep disturbance. In other words, at the current level of understanding, it is not possible to establish absolute noise levels that correlate to levels of sleep disturbance (for all or even a majority of people)."

Notwithstanding the ECRTN/ENMM suggests that:

- Maximum internal noise levels below 50 dB to 55 dB L_{Amax} are unlikely to cause awakening reactions.
- One or two events per night, with maximum internal noise levels of 65 dB to 70 dB L_{Amax} , are not likely to affect health and wellbeing significantly.
- At locations where road traffic is continuous rather than intermittent, the $L_{Aeq(9hour)}$ target noise level should sufficiently account for sleep disturbance impacts.
- Where the emergence of L_{Amax} noise levels over the ambient L_{Aeq} noise level is greater than 15 dB, the L_{Aeq} criterion may not sufficiently account for sleep disturbance impacts.

A maximum noise event can be defined as any passby for which the difference in the L_{Amax} and $L_{Aeq(1Hour)}$ noise levels is greater than 15 dB. Furthermore, the ECRTN recommends that the assessment of sleep disturbance should include a consideration of the maximum noise level exceedances occurring during the night-time period and the emergence of these exceedances above the ambient noise level.

6. CONSTRUCTION NOISE & VIBRATION ASSESSMENT METHODOLOGY

6.1. Overview

Program and site constraints require that 24 hour working would most likely be required at all metro construction sites for a significant proportion of the total construction period. In particular, noisy activities such as:

- Excavation of tunnel and station caverns by Tunnel Boring Machines (TBMs) and roadheaders would be required over a 24 hour day, 6 days a week. Note that TBMs typically require routine maintenance of equipment on the 7th day.

- Bulk excavation of station entry and ventilation shafts by rockbreaker / blasting (or equivalent methodology), raise boring, line drilling and milling head would be required 24 hours a day for 7 days a week.
- Truck movements would be required 24 hours a day for 7 days a week.

6.2. Expected Construction Activities

Table 8 presents the construction activities which are likely to be undertaken during the construction of all Sydney Metro projects, together with typical plant and equipment required to execute each activity.

Table 8: Construction Activities and Typical Plant and Equipment

Activity	Significant Noise and Vibration Generating Plant and Equipment
Demolition	Excavator Dump Trucks Rockbreaker Jackhammer
General Earthworks and site establishment	Excavator Dumps Trucks Delivery Trucks
Spoil Removal	Excavator Dump Trucks
Shaft Excavation	Rockbreakers Penetrating Cone Fracture (PCF) Blasting Jackhammer
Station Cavern Excavation	Roadheaders
Tunnelling	Tunnel Boring Machine (TBM) Roadheaders
Cross passages	Rock breakers Roadheaders
Building/Facility Construction	Standard Construction Techniques Including: - Cranes - Delivery Trucks - Hand Tools/Hand Held Power Tools
Demolition	Excavator Dump Trucks Rockbreaker Jackhammer
General Earthworks and site establishment	Excavator Dumps Trucks Delivery Trucks
Spoil Removal	Excavator Dump Trucks
Shaft Excavation	Rockbreakers Penetrating Cone Fracture (PCF) Blasting Jackhammer

6.3. Noise and Vibration Sensitive Receivers

The sensitivity of occupants to noise and vibration varies according to the nature of the occupancy and the activities performed within the affected premises. For example, recording studios are more sensitive to vibration and ground borne noise than residential premises, which in turn are more sensitive than typical commercial premises.

Specific noise and vibration sensitive receivers (NSRs) relevant to individual construction sites would be identified and addressed in the Environmental Assessment of each Sydney Metro project. Each receiver would be identified as falling into one of the following categories:

- Commercial
- Educational
- Industrial
- Mixed residential/commercial
- Residential
- Residential occupied by shift workers
- Place of Worship
- Medical facilities
- Other sensitive receivers

6.4. General Assessment Procedure

All assessments must be quantitative as per the procedure given in the ICNG. If the assessment is being carried out for the environmental impact assessment documentation (eg EIS) it will be based on a concept design and construction scenarios for the project (usually prepared by a technical advisor and/or planning consultant). If the assessment is being undertaken prior to construction (eg CNIS) it will be based on a more detailed design and actual construction scenario (usually prepared by the design and/or construction contractors).

Constructions Noise Impact Statements (CNIS) are to be developed to assess the potential impact of noise at NSRs as a result of a Sydney Metro project's construction activities prior to the commencement of construction components.

In order to develop accurate and comprehensive CNIS reports for work components associated with the project, specific detail of the construction methodology, including the size and type of equipment is required. Detailed design, construction and engineering solutions are progressively developed and applied throughout the life-span of the project. Consequently, CNIS reports that cover the key construction activities/components are to be developed to reflect the progressive nature of design and construction of the project. There are to be two (2) different types of CNIS report to be developed throughout the project:

- General Construction Activity CNIS for construction scenarios that are consistently the same and progressively move along the project alignment eg tunnelling, retaining walls.
- Location Specific CNIS for construction scenarios that are specific to a location. Where works are required to be undertaken outside of standard construction hours, Out of Hours Work (OOHW) assessments will be included in CNIS or a new CNIS

developed in support of all applicable variations to the project Environment Protection Licence (EPL).

For all CNIS reports the noise impacts are to be assessed based on construction scenarios. A construction scenario relating to noise impact is essentially a construction activity with is made up of the required plant and equipment. A number of construction scenarios will make up any one CNIS report. In undertaking an assessment of the noise impact from a construction scenario(s) including the development of CNIS report, the following steps are to be taken:

- Identify all noise and/or vibration sensitive receivers (NSRs) which may be affected by the project.
- Conduct background noise monitoring at representative NSRs to determine the rating background noise levels (RBLs) in accordance with the procedures presented in the NSW Industrial Noise Policy, where RBLs have not been established in previous project stages.
- Determine the appropriate noise and vibration management levels of each NSR.
- Determine the source noise levels (Sound Power Levels) of each noise generating plant and equipment item required to undertake the construction scenario. Note: Sound Power Levels for each plant and equipment would be less than the maximum allowable levels found in Table 11 and Table 12.
- Clearly indicate which mitigation measures identified in Section 7 have been/are to be incorporated into the noise assessment. Noise mitigation measures to be implemented will vary for reasons such as safety and space constraints, these are to be identified and the calculations adjusted accordingly.
- For Location Specific construction scenarios and where applicable for Generic scenarios, include the effects of noise shielding provided by site offices, residential fences, noise barriers or natural topographic features.
- Where applicable include the effects of noise reflections and ground attenuation.
- On the basis of the duration of each activity (over a typical “worst case” 15-minute period), determine whether any correction between the L_{Amax} and the L_{Aeq} is required.
- Calculate the L_{Aeq} noise or range of levels from construction scenarios at sensitive receiver groups, with the use of noise contour maps where appropriate and/or at 10 m, 25 m, 50 m, 75 m, 100 m and 200 m for more general construction activities.
- Compare these against the goals identified for each NSR and identify predicted exceedances.
- For night-time activities, calculate the $L_{A1(60second)}$ noise levels and compare with the DECCW’s RBL + 15 dB sleep disturbance screening criterion. On the basis of the ambient noise environment during the night-time period, the predicted L_{A1} noise levels and the number of expected L_{A1} noise events would be assessed. From this assessment determine the likelihood of potential sleep disturbance. Note: the L_{Amax} noise level can be used to estimate the L_{A1} noise level.
- On completion of all CNIS reports for the subjective classification of the noise impact is to be evaluated and documented as:
 - Lower Impact
 - Moderate Impact

- High Impact

The classifications are to be determined on a case-by-case basis with consideration of the following points. These are guidelines for classifications only and subjective due to the number of variances within any construction scenario. An objective evaluation is to be applied to all construction scenarios.

- The location of the works in relation to NSRs with consideration of noise attenuation features such as noise barriers including topographical features (earth-mounds), buildings, dividing fences etc (distance of works from sensitive receiver(s)).
- The type and sensitivity of the NSRs:
 - Lower Impact: eg Commercial buildings/ Scattered Residential (low density)
 - Moderate Impact: eg Standard residential (typical density)
 - High Impact: eg Residential home for the elderly/high density unit blocks/persistent complainers/residents deemed to have “construction noise fatigue”.
- The extent of noise exceedance above Noise Management Level.
- The likelihood for potential sleep disturbance RBL + 15 dB.
- The type of and intensity of noise emitted from works (ie tonal or impulsive):
 - Lower Impact: No high noise and/or vibration intensive activities
 - Moderate Impact: Short/intermittent high noise and/or vibration intensive activities
 - High Impact: Prolonged high noise and/or vibration intensive activities.
- The duration of any OOHW required.
- The time frames for any OOHW:
 - Lower Impact: 6.00 pm till 10.00 pm weekdays 1.00 pm till 10.00pm Saturdays
8.00 am till 6.00 pm Sundays or Public Holidays
 - Moderate Impact: 10.00 pm to 7.00 am Weekday Nights 10.00 pm to 8.00 am Saturdays
 - High Impact: 6.00 pm to 7.00 am Sundays and Public Holidays.
- As a result of noise classification and/or the noise level exceedances at sensitive receivers provided by the CNIS reports, appropriate reasonable and feasible noise mitigation is to be adopted and implemented. For sites where works are predicted to significantly exceed noise goals and impact on receivers for a significant period of time, additional reasonable and feasible noise mitigation measures such as those outlined in Section 7 would be considered if practical to reduce the noise levels and impact on sensitive receivers.

6.5. Ground-Borne (Regenerated) Noise

Ground-borne noise as a result of construction activities is usually associated with tunnelling projects where equipment such as tunnel boring machines, road headers, rock hammers and drilling rigs are operated underground. It is therefore anticipated that ground-borne noise may be an issue during the construction of Sydney Metro projects.

If ground-borne noise is anticipated as a result of construction activities, a CNIS report, specifically in relation to the assessment of ground-borne construction noise would be undertaken.

In undertaking a CNIS report for ground-borne construction noise the following steps are to be taken:

- Determine the location of each plant and equipment item in relation to each receiver.
- On the basis of ground-borne noise versus distance prediction algorithms for each plant item, determine the level of ground-borne noise at each building location. For highly sensitive building occupancies, such as recording studios, the assessment may need to incorporate the acoustic properties of the building space and the structural response of the building. This is to be determined by a qualified acoustic consultant, should ground-borne noise be a potential issue.
- Include the effect of all relevant standard mitigation measures as part of the construction scenario.
- Calculate the $L_{Aeq(15\text{minute})}$ noise levels from the proposed construction activities at each receiver and compare these to the ground-borne noise management levels.

6.6. Ground-Borne Vibration

Vibration as a result of construction activities is usually associated with tunnelling projects where equipment such as tunnel boring machines, road headers, rock hammers and drilling rigs are operated underground. It is therefore anticipated that ground-borne vibration may be an issue during the construction of Sydney Metro projects.

If vibration impacts are anticipated as a result of construction activities, a CNIS report, specifically in relation to the assessment of construction vibration would be undertaken.

In undertaking a CNIS report for ground-borne construction vibration the following steps are to be taken:

- Determine the location of each plant and equipment item in relation to each receiver.
- On the basis of ground-borne vibration versus distance prediction algorithms for each plant item, determine the level of ground-borne vibration at each building location. For highly sensitive building occupancies, such as recording studios, the assessment may need to incorporate the vibration properties of the building space and the structural response of the building. This is to be determined by a qualified acoustic consultant, should ground-borne vibration be a potential issue.
- Include the effect of all relevant standard mitigation measures as part of the construction scenario.

Calculate the vibration levels from the proposed construction activities at each receiver and compare these to the ground-borne vibration criteria.

6.7. Vibration and Overpressure from Blasting

Vibration and overpressure as a result of construction activities is usually associated with tunnelling projects where blasting is required. If this construction is implemented then vibration and overpressure may be an issue during the construction of Sydney Metro projects.

If vibration and overpressure impacts are anticipated as a result of construction blasting, a CNIS report, specifically in relation to the assessment of construction blasting would be undertaken.

In undertaking a CNIS report for blasting vibration and overpressure the following steps are to be taken:

- Determine the location of blast charge in relation to each receiver.
- On the basis of vibration / overpressure versus distance prediction algorithms for blasting determine the level of vibration / overpressure at each receiver (building) location.
- Include the effect of all relevant standard mitigation measures as part of the construction scenario.

Calculate the vibration and overpressure levels from the proposed blasting activities at each receiver and compare these to the blasting criteria.

7. STANDARD NOISE AND VIBRATION MITIGATION MEASURES

7.1. Minimum Requirements

This section sets out the standard construction noise and vibration mitigation measures to be implemented on all Sydney Metro projects and delivered via relevant procedures, systems, environmental assessment, construction environmental management and all relevant contract documentation.

For all Sydney Metro construction projects, the standard mitigation measures in **Table 9** shall be applied by default in order to minimise the potential noise and vibration impacts at the surrounding Noise Sensitive Receivers. Additional information in relation to specific mitigation measures, the assessment process and relevant objectives are provided in **Section 8**.

During the preparation of the environmental assessment documentation, a construction noise and vibration assessment would be undertaken. This includes monitoring requirements in order to validate the modelling assumptions and confirm that noise levels from individual plant and equipment items are not excessive. This section provides guidance in relation to standard monitoring and survey requirements that are expected for Sydney Metro construction projects.

7.1.1. Management Strategies during Construction

- Construction hours would be in accordance with the ICNG, project approvals and the EPL, except where otherwise specified in an approved noise management plan.
- When working adjacent to schools, medical facilities and childcare centres, particularly noisy activities would be scheduled outside normal working hours, where feasible and reasonable.
- When working adjacent to churches and places of worship particularly noisy activities would be scheduled outside services, where feasible and reasonable.
- Avoiding the coincidence of noisy plant working simultaneously close together and adjacent to sensitive receivers will result in reduced noise emissions.

- Where feasible and reasonable, the offset distance between noisy plant items and nearby noise sensitive receivers would be as great as possible.
- Regular compliance checks on the noise emissions of all plant and machinery used for the project would indicate whether noise emissions from plant items were higher than predicted. This also identifies defective silencing equipment on the items of plant.
- Ongoing noise monitoring during construction at sensitive receivers during critical periods (ie times when noise emissions are expected to be at their highest - eg piling and hammering) to identify and assist in managing high risk noise events.
- Where feasible and reasonable heavy vehicle movements would be limited to daytime hours.
- The implementation of procedures to maximise the night-time onsite spoil storage capacity where spoil is produced between the hours of 10.00 pm and 7.00 am.

7.1.2. Site Induction for all Employees, Contractors and Subcontractors

The site induction would include the following as a minimum:

- All relevant project specific and standard noise and vibration mitigation measures
- Relevant licence and approval conditions
- Permissible hours of work
- Any limitations on high noise generating activities
- Location of nearest sensitive receivers
- Construction employee parking areas
- Designated loading/unloading areas and procedures
- Site opening/closing times (including deliveries)
- Environmental incident reporting and management procedures

7.1.3. Source Noise Control Strategies

- Engines and exhausts are typically the dominant noise sources on mobile plant such as cranes, graders, excavators, heavy vehicles, etc. In order to minimise noise emissions, residential grade mufflers would be fitted on all mobile plant utilised on Sydney Metro construction projects.
- The use of damped hammers is recommended such as the 'City' model Rammer hammers. These reduce the 'ringing' of the rockpick, cylinder and excavator arm that is commonly associated with rockbreaking works. Approximately 10 dB attenuation can be achieved compared to undamped hammers of the same size.
- Regular maintenance of all plant and machinery used for the project will assist in minimising noise emissions, including the reporting of the results.
- Acoustic enclosure of plant items, if required, as identified during compliance monitoring.
- Air brake silencers would be correctly installed and fully operational for any heavy vehicle that approaches and uses any Sydney Metro construction site.
- Non-tonal reversing alarms would be used for all permanent mobile plant operating on Sydney Metro construction projects. Whilst the use of non-tonal reversing

alarms is suggested to ensure noise impacts are minimised, it is noted that OH&S requirements must also be fully satisfied.

7.1.4. Noise Barrier Control Strategies

Temporary noise barriers are recommended between the noise sources and nearby potentially affected noise sensitive receivers, wherever feasible. Typically, 5 dB to 15 dB attenuation can be achieved with a well-constructed barrier.

7.1.5. Acoustic Enclosures

Where significant noise impacts are predicted and/or long periods of construction works are planned, acoustic enclosures can be used as an effective mitigation method. Acoustic enclosures act to contain the sources of noise, whilst also providing the benefit of screening the construction site from view. An enclosure with no openings would be expected to provide attenuation the order of 20 dB.

7.1.6. Vibration Control Strategies

Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the calculated safe-working distances.

7.1.7. Community Consultation

Active community consultation and the maintenance of positive, cooperative relationships with schools, local residents and building owners and occupiers assists in managing impacts from noisier operations and in alleviating concerns and thereby minimising disturbance and complaint. This includes, for example:

- Periodic notification of work activities and progress (eg regular letterbox drops, e-consult)
- Specific notification (letter-box drop) prior to especially noisy activities
- Comprehensive website information
- Project information and construction response telephone line
- Email distribution list

7.2. Summary of the Standard Mitigation Measures

The actions set out in **Table 9** must be implemented on all Sydney Metro construction projects.

Table 9: Standard Mitigation Measures to Reduce Construction Noise and Vibration

Action required	Applies to	Details
Management Measures		
Implementation of any project specific mitigation measures required	Airborne noise Ground-borne noise and vibration	In addition to the measures set out in this table, any <i>project specific</i> mitigation measures identified in the environmental assessment documentation (eg EA, REF, submissions or representations report) or approval or licence conditions must be implemented.
Implement community consultation measures	Airborne noise Ground-borne noise and vibration	Periodic Notification (monthly letterbox drop) ¹ Website Project information and construction response telephone line Email distribution list Place Managers
Register of Noise Sensitive Receivers	Airborne noise Ground-borne noise and vibration	A register of all noise and vibration sensitive receivers (NSRs) would be kept on site. The register would include the following details for each NSR: <ul style="list-style-type: none"> • Address of receiver • Category of receiver (eg Residential, Commercial etc.) • Contact name and phone number
Site inductions	Airborne noise Ground-borne noise and vibration	All employees, contractors and subcontractors are to receive an environmental induction. The induction must at least include: <ul style="list-style-type: none"> • All relevant project specific and standard noise and vibration mitigation measures • Relevant licence and approval conditions • Permissible hours of work • Any limitations on high noise generating activities • Location of nearest sensitive receivers • Construction employee parking areas • Designated loading/unloading areas and procedures • Site opening/closing times (including deliveries) • Environmental incident procedures
Behavioural practices	Airborne noise	No swearing or unnecessary shouting or loud stereos/radios; on site. No dropping of materials from height; throwing of metal items; and slamming of doors. No excessive revving of plant and vehicle engines Controlled release of compressed air.
Monitoring	Airborne noise Ground-borne noise and vibration	A noise monitoring program is to be carried out for the duration of the works in accordance with the Construction Noise and Vibration Management Plan and any approval and licence conditions.

¹ Detailing all upcoming construction activities at least 14 days prior to commencement of relevant works

Action required	Applies to	Details
Attended vibration measurements	Ground-borne vibration	Attended vibration measurements are required at the commencement of vibration generating activities to confirm that vibration levels satisfy the criteria for that vibration generating activity. Where there is potential for exceedances of the criteria further vibration site law investigations would be undertaken to determine the site-specific safe working distances for that vibration generating activity. Continuous vibration monitoring with audible and visible alarms would be conducted at the nearest sensitive receivers whenever vibration generating activities need to take place inside the applicable safe-working distances.
Source Controls		
Construction hours and scheduling	Airborne noise Ground-borne noise and vibration	Where feasible and reasonable, construction would be carried out during the standard daytime working hours. Work generating high noise and/or vibration levels would be scheduled during less sensitive time periods.
Construction respite period	Ground-borne noise and vibration Airborne noise	High noise and vibration generating activities ² may only be carried out in continuous blocks, not exceeding 3 hours each, with a minimum respite period of one hour between each block ³ .
Equipment selection	Airborne noise Ground-borne noise and vibration	Use quieter and less vibration emitting construction methods where feasible and reasonable. For example, when piling is required, bored piles rather than impact-driven piles will minimise noise and vibration impacts. Similarly, diaphragm wall construction techniques, in lieu of sheet piling, will have significant noise and vibration benefits.
Maximum noise levels	Airborne-noise	The noise levels of plant and equipment must have operating Sound Power Levels compliant with the criteria in Table 11 .
Rental plant and equipment	Airborne-noise	The noise levels of plant and equipment items are to be considered in rental decisions and in any case cannot be used on site unless compliant with the criteria in Table 11 .
Plan worksites and activities to minimise noise and vibration	Airborne noise Ground-borne vibration	Plan traffic flow, parking and loading/unloading areas to minimise reversing movements within the site.
Non-tonal reversing alarms	Airborne noise	Non-tonal reversing beepers (or an equivalent mechanism) must be fitted and used on all construction vehicles and mobile plant regularly used on site and for any out of hours work.

² Includes jack and rock hammering, sheet and pile driving, rock breaking and vibratory rolling.

³ "Continuous" includes any period during which there is less than a 60 minutes respite between ceasing and recommencing any of the work.

Action required	Applies to	Details
Minimise disturbance arising from delivery of goods to construction sites	Airborne noise	<p>Loading and unloading of materials/deliveries is to occur as far as possible from NSRs</p> <p>Select site access points and roads as far as possible away from NSRs</p> <p>Dedicated loading/unloading areas to be shielded if close to NSRs</p> <p>Delivery vehicles to be fitted with straps rather than chains for unloading, wherever feasible and reasonable</p>
Path Controls		
Shield stationary noise sources such as pumps, compressors, fans etc	Airborne noise	<p>Stationary noise sources would be enclosed or shielded whilst ensuring that the occupational health and safety of workers is maintained.</p> <p>Appendix F of AS 2436: 1981 lists materials suitable for shielding.</p>
Shield sensitive receivers from noisy activities	Airborne noise	<p>Use structures to shield residential receivers from noise such as site shed placement; earth bunds; fencing; erection of operational stage noise barriers (where practicable) and consideration of site topography when siting plant.</p>

Table 10: Minimum Requirements for Construction Methods

Method	Minimum Requirements
Excavator	Ensure that the Sound Power Levels given in Table 11 have been met.
Truck	Ensure that the Sound Power Levels given in Table 11 have been met.
Rockbreakers and jackhammers	<p>Ensure that the Sound Power Levels given in Error! Reference source not found. have been met.</p> <p>Noise and vibration monitoring would be conducted at the nearest identified NSR where exceedances of the criteria have been predicted.</p>
PCF	<p>Where it has been predicted that vibration / regenerated noise is likely to be in excess of the nominated goals, specific notification would be given to all NSRs a minimum of 2 weeks prior to a shot being fired.</p> <p>Vibration and overpressure monitoring would be conducted at the nearest identified NSR.</p>
Blasting	<p>Where it has been predicted that vibration / overpressure is likely to be in excess of the nominated goals, specific notification would be given to all NSRs a minimum of 2 weeks prior to a shot being fired.</p> <p>Vibration and overpressure monitoring would be conducted at the nearest identified NSR.</p>
TBM	Noise and vibration monitoring would be conducted at the nearest identified NSR where levels are expected to exceed the relevant noise and vibration goals.
Roadheaders	Noise and vibration monitoring would be conducted at the nearest identified NSR where levels are expected to exceed the relevant noise and vibration goals.

7.3. Maximum Allowable Plant Sound Power Levels

Plant or equipment operating on Sydney Metro project construction sites shall have an operating sound power level (SWL) which is no higher than the corresponding SWL presented in **Table 11**. The SWLs presented in **Table 11** have been compiled from a selection of field measurements conducted between 2004 and 2008 of plant and equipment operating on large construction projects throughout NSW and are therefore considered to be representative of plant and equipment SWLs which are readily achieved by current plant and equipment normally used in the construction industry.

Plant and equipment with SWLs higher than those presented in **Table 11** would be deemed to be emitting an excessive level of noise and would not be permitted to operate Sydney Metro project construction sites.

Table 11: Maximum Allowable Sound Power Levels for Construction Equipment

Equipment	Maximum Allowable Sound Power Level (dB) LAmax	Maximum Allowable Sound Pressure Level (dB) LAmax at 7 m
Excavator Hammer	118	93
Excavator (approx. 3 tonne)	90	65
Excavator (approx. 6 tonne)	95	70
Excavator (approx. 10 tonne)	100	75
Excavator (approx. 20 tonne)	105	80
Excavator (approx. 30 tonne)	110	85
Excavator (approx. 40 tonne)	115	90
Skidsteer Loaders (approx. 1/2 tonne)	107	82
Skidsteer Loaders (approx. 1 tonne)	110	85
Dozer (tracking) - equiv. CAT D8	118	93
Dozer (tracking) - equiv. CAT D9	120	95
Dozer (tracking) - equiv. CAT D10	121	96
Backhoe/FE Loader	111	86
Dump Truck (approx. 15 tonne)	108	83
Concrete Truck	112	87
Concrete Pump	109	84
Concrete Vibrator	105	80
Bored Piling Rig	110	85
Scraper	110	85
Grader	110	85
Vibratory Roller (approx. 10 tonne)	114	89
Vibratory Pile Driver	121	96
Impact Piling Rig	134	109
Compressor (approx. 600 CFM)	100	75
Compressor (approx. 1500 CFM)	105	80
Concrete Saw	118	93
Jackhammer	113	88

Equipment	Maximum Allowable Sound Power Level (dB) LAmax	Maximum Allowable Sound Pressure Level (dB) LAmax at 7 m
Generator	104	79
Lighting Tower	80	55
Flood Lights	90	65
Cherry Picker	102	77
Mobile Crane	110	85

Where an item of construction equipment is not listed in **Table 11**, generic sound power levels presented in **Table 12** may be adopted.

Table 12: Generic Equipment or System Sound Power Level Limit¹

Equipment	Maximum Allowable Sound Power Level (dB) LAmax	Maximum Allowable Sound Pressure Level (dB) LAmax at 7 m
Motorised (<25kW)	90	65
Motorised (<50kW)	95	70
Motorised (<100kW)	100	75
Motorised (<200kW)	105	80
Motorised (>200kW)	110	85
All other Auxiliary Equipment or Systems	90	65

Note 1: Sound Power Levels in dBA relative to 10 pW.

7.4. Auditing and Monitoring

All items of plant would have noise audits conducted in accordance with the procedures outlined in **Section 9** of this strategy upon arrival at a Sydney Metro construction site and at 6 month intervals thereafter.

Where it has been identified within this strategy that noise and/or vibration monitoring is required at the nearest sensitive receiver; however, the nearest sensitive receiver has refused monitoring at their property, monitoring would be undertaken at the near point to that receiver within the site boundary or at another suitable location determined by an acoustic consultant.

8. ADDITIONAL NOISE AND VIBRATION MITIGATION MEASURES

8.1. Overview

The implementation of the standard management measures, compliance with maximum sound power levels for plant and equipment, construction hour management and standard community consultation measures in this Strategy should significantly reduce the noise and vibration impacts on nearby sensitive receivers.

Nevertheless, due to the highly variable nature of construction activities and the likelihood of work outside the standard construction hours on Sydney Metro projects, exceedances of the construction noise and vibration management levels are likely to occur.

Where there is a potential exceedance of the construction noise and vibration management levels a number of additional measures to mitigate such exceedances – primarily aimed at pro-active engagement with affected sensitive receivers – would be explored and have been included in this Strategy. The additional mitigation measures to be applied are outlined in **Table 13**.

Table 13: Additional Management Measures

Measure	Description	Abbreviation
Alternative accommodation	Alternative accommodation options may be provided for residents living in close proximity to construction works that are likely to incur unreasonably high impacts over an extended period of time. Alternative accommodation will be determined on a case-by-case basis.	AA
Monitoring	Where it has been identified that specific construction activities are likely to exceed the relevant noise or vibration goals, noise or vibration monitoring may be conducted at the affected receiver(s) or a nominated representative location (typically the nearest receiver where more than one receiver have been identified). Monitoring can be in the form of either unattended logging or operator attended surveys. The purpose of monitoring is to inform the relevant personnel when the noise or vibration goal has been exceeded so that additional management measures may be implemented.	M
Individual briefings	Individual briefings are used to inform stakeholders about the impacts of high noise activities and mitigation measures that will be implemented. Communications representatives from the contractor would visit identified stakeholders at least 48 hours ahead of potentially disturbing construction activities. Individual briefings provide affected stakeholders with personalised contact and tailored advice, with the opportunity to comment on the project.	IB
Letter box drops	For each Sydney Metro project, a newsletter is produced and distributed to the local community via letterbox drop and the project mailing list. These newsletters provide an overview of current and upcoming works across the project and other topics of interest. The objective is to engage and inform and provide project-specific messages. Advanced warning of potential disruptions (eg traffic changes or noisy works) can assist in reducing the impact on the community. Content and newsletter length is determined on a project-by-project basis. Most projects distribute notifications on a monthly basis. Each newsletter is graphically designed within a branded template.	LB
Project specific respite offer	The purpose of a project specific respite offer is to provide residents subjected to lengthy periods of noise or vibration respite from an ongoing impact.	RO
Phone calls and emails	Phone calls and/or emails detailing relevant information would be made to identified/affected stakeholders within 7 days of proposed work. Phone calls and/or emails provide affected stakeholders with personalised contact and tailored advice, with the opportunity to provide comments on the proposed work and specific needs etc.	PC
Specific notifications	Specific notifications would be letterbox dropped or hand distributed to identified stakeholders no later than 7 days ahead of construction activities that are likely to exceed the noise objectives. This form of communication is used to support periodic notifications, or to advertise unscheduled works.	SN

8.2. Applying Additional Mitigation Measures

In circumstances where - after application of the standard mitigation measures - the LAeq(15minute) construction noise and vibration levels are still predicted to exceed the noise or vibration objectives, the relevant Additional Mitigation Measures Matrix (AMMM) (see **Table 14** to **Table 16**) is to be used to determine the additional measures to be implemented. This requirement is supplemental to the basic requirements in the ICNG.

Using the relevant AMMM, the following steps need to be carried out to determine the additional mitigation measures to be implemented:

- Determine the duration (time period) when the work is to be undertaken.
- Determine the level of exceedance.
- From the relevant AMMM table, identify the additional mitigation measures to be implemented (using the abbreviation codes - expanded in **Table 13**).

Table 14: Additional Mitigation Measures Matrix (AMMM) - Airborne Construction Noise

Time Period		Mitigation Measures			
		Predicted LAeq(15minute) Noise Level Above Background (RBL)			
		0 to 10 dB	10 to 20 dB	20 to 30 dB	> 30 dB
Standard	Mon-Fri (7.00 am - 6.00 pm)	-	-	M, LB,	M, LB
	Sat (8.00 am - 1.00 pm)				
	Sun/Pub Hol (Nil)				
OOHW	Mon-Fri (6.00 pm - 10.00 pm)	-	LB	M, LB	M, IB, LB, PC, RO,SN
	Sat (1.00 pm - 10.00 pm)				
	Sun/Pub Hol (8.00 am - 6.00 pm)				
OOHW	Mon-Fri (10.00 pm - 7.00 am)	-	M, LB,	M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN
	Sat (10.00 pm - 8.00 am)				
	Sun/Pub Hol (6.00 pm - 7.00 am)				

Table 15: AMMM - Ground-borne Construction Noise

Time Period		Mitigation Measures		
		Predicted LAeq(15minute) Noise Level Exceedance		
		0 to 10 dB	10 to 20 dB	> 20 dB
Standard	Mon-Fri (7.00 am - 6.00 pm)	LB	LB	M, LB, SN,
	Sat (8.00 am - 1.00 pm)			
	Sun/Pub Hol (Nil)			
OOHW	Mon-Fri (6.00 pm - 10.00 pm)	LB	M, LB, SN,	M, IB, LB, PC, RO, SN
	Sat (1.00 pm - 10.00 pm)			
	Sun/Pub Hol (8.00 am - 6.00 pm)			
OOHW	Mon-Fri (10.00 pm - 7.00 am)	M, LB, SN,	AA, M, IB, LB, PC, RO, SN	AA, M, IB, LB, PC, RO, SN
	Sat (10.00 pm - 8.00 am)			
	Sun/Pub Hol (6.00 pm - 7.00 am)			

Table 16: AMMM - Ground-borne Vibration

Time Period		Mitigation Measures
		Predicted Vibration Levels Exceed Maximum Levels
Standard	Mon-Fri (7.00 am - 6.00 pm)	M, LB, RP
	Sat (8.00 am - 1.00 pm)	
	Sun/Pub Hol (Nil)	
OOHW	Mon-Fri (6.00 pm - 10.00 pm)	M, IB, LB, PC, RO, SN
	Sat (1.00 pm - 10.00 pm)	
	Sun/Pub Hol (8.00 am - 6.00 pm)	
OOHW	Mon-Fri (10.00 pm - 7.00 am)	AA, M, IB, LB, PC, RO, SN
	Sat (10.00 pm - 8.00 am)	
	Sun/Pub Hol (6.00 pm - 7.00 am)	

9. MONITORING, AUDITING AND REPORTING

A construction noise and vibration monitoring guideline is included in **Appendix A** and outlines the minimum requirements for contractors undertaking monitoring on the Sydney Metro Project.

9.1. Plant Noise Auditing, Compliance Evaluation and Reporting

In order to compare the noise levels of plant and equipment with the values in Section 7, the following guidelines are recommended:

- Measurements of Sound Pressure Level (SPL) at 7 m (with plant or equipment stationary) shall be undertaken using procedures that are consistent with the requirements of Australian Standard AS2012–1990 Acoustics – Measurement of Airborne Noise Emitted by Earthmoving Machinery and Agricultural Tractors – Stationary Test Condition Part 1: Determination of Compliance with Limits for Exterior Noise.
- Measurements of Sound Power Level (SWL) shall be determined using procedures that are consistent with the requirements of International Standard ISO9614-2 1996 Acoustics – Determination of sound power levels of noise sources using sound intensity - Part 2: Measurement by scanning.
- If measuring the SPL at 7 m of moving plant, compliance measurements would be guided by the requirements of Australian Standard AS2012–1977 Method for Measurement of Airborne Noise From Agricultural Tractors and Earthmoving Machinery.

For all measurements, the plant or equipment under test would be measured while operating under typical operating conditions. If this is not practical, it may be appropriate to conduct a stationary test at high idle.

In the case of an exceedance in sound power levels the item of plant would either be replaced, or the advice of an acoustic consultant would be sought to provide suitable mitigation measures, which may include:

- ensuring all bolts are tightened and no parts are loose
- cleaning and/or lubricating moving parts
- replacing old or worn parts
- implementing additional or upgrading existing muffling devices
- building enclosures around items of stationary plant (eg pumps or generators).

A register of measured sound power levels for each item of plant would be kept for reference where future noise audits are conducted. The register would be reviewed annually in conjunction with this strategy and corresponding revisions made to the Sound Power Levels presented in Section 7 to represent contemporary plant noise emission levels.

9.2. Noise Monitoring

Where a CNIS report has been prepared for a Sydney Metro construction site and it has been predicted that noise levels may be in excess of the nominated construction noise goals at a noise sensitive receiver, noise monitoring would be conducted at:

- the affected receiver; or
- if more than one affected receiver has been identified, at the nearest affected receiver; or
- where the nearest affected receiver refuses noise monitoring on their property, at the near point to that receiver within the site boundary.
- If it can be demonstrated that direct measurement of noise from the construction site is impractical, alternative means of determining construction noise levels may be adopted in accordance with Chapter 11 of the NSW Industrial Noise Policy.

All noise monitoring results would be assessed against the nominated noise goals and compiled into a report to be forwarded to the construction contractor and project manager. Reporting would be submitted to the construction contractor and project manager within one week of being undertaken or at weekly intervals for continuous monitoring. All noise monitoring reports would also be made available to the public through a publically accessible website.

9.3. Vibration Monitoring

Where it is anticipated that an item of plant will exceed the cosmetic damage criteria given in Section 5.4.3, vibration monitoring would be required at the nearest affected receiver. Where it is anticipated that an item of plant will exceed the human response / ground borne noise criteria and concerns have been raised regarding vibration, vibration monitoring would also be required at the receiver(s) under question.

All vibration monitoring results would be assessed against the nominated vibration goals and compiled into a report to be forwarded to the construction contractor and project manager. Reporting would be submitted to the construction contractor and project manager within one week of being undertaken or at weekly intervals for continuous monitoring. All vibration monitoring reports would also be made available to the public through the publically accessible website.

9.4. Blast Monitoring

- As specified in the minimum requirements presented in Section 5.7, vibration and overpressure monitoring would be conducted for all PCF and blasting activities which take place on Sydney Metro construction sites.
- Monitoring would be conducted as a minimum at the sensitive receiver(s) likely to receive the maximum vibration and/or overpressure emissions from the blast as identified by an acoustic consultant.

All blast monitoring results would be assessed against the nominated goals and compiled into a report to be forwarded to the construction contractor and project manager. All blast monitoring reports would also be made available to the public through the Sydney Metro website.

As the effect of vibration and overpressure from blasting have the potential to cause structural damage to buildings and services, accurate records of all blasts are required to be maintained. Such records would describe the location of the blast and all the blastholes, the design of the blast in terms of type of explosives, mass of explosives, initiating system used, ground vibration and overpressure measurement data.

Records of every blast would be kept for a minimum of seven years. A longer period of retention of the records may be warranted if a construction project is blasted over an extended or disrupted period.

For any section of tunnel construction where blasting is proposed, a series of initial trials at reduced scale shall be conducted prior to production blasting to determine site-specific blast response characteristics and to define allowable blast sizes to meet the airblast overpressure and ground vibration limits.

9.5. Dilapidation Surveys

If construction activities have the potential to cause damage through vibration to nearby public utilities, structures, buildings and their contents, an Existing Condition Inspection of these items is required to be undertaken in accordance with AS 4349.1 *“Inspection of Buildings”*.

Prior to conducting the Existing Condition Inspections, the property owners will be advised of the inspection scope and methodology and the process for making a property damage claim. At the same time, maintain a register of all properties inspected and of any properties where owners refused the inspection offer.

The findings of all dilapidation surveys conducted for each Sydney Metro construction site would be compiled into a report to be forwarded to the construction contractor and project manager. Follow-up Condition Inspections would be required at the completion of certain major works (eg completion of shaft bulk excavation works).

10. COMPLAINT HANDLING

All complaints handling would be in accordance with the Sydney Metro Construction Complaints Management System.

11. COMMUNITY CONSULTATION AND LIAISON

All community consultation would be in accordance with Sydney Metro Overarching Stakeholder and Community Involvement Plan.

12. DOCUMENTATION REQUIREMENTS

Any acoustic assessment, CNIS or CNVMP undertaken for the Sydney Metro project must document the following as a minimum (where applicable):

- Acoustic Terminology / Glossary
- Overview of the Project / Works
- Secretary's Environmental Assessment Requirements
- EPL conditions (if applicable)
- Site Plan and Sensitive Receivers
- Ambient Noise Monitoring: methodology, locations, analysis and results
- Construction Noise and Vibration Criteria
 - Construction Airborne Noise Criteria
 - Construction Tunnelling Ground-borne Noise Criteria (if applicable)
 - Construction Ground-borne Noise Criteria
 - Construction Vibration Criteria
- Construction Noise and Vibration Assessment
 - Construction Airborne Noise Methodology / Predictions
 - Construction Tunnelling Ground-borne Noise Methodology / Predictions (if applicable)
 - Construction Ground-borne Noise Methodology / Predictions
 - Construction Vibration Methodology / Predictions
- Summary of Noise and Vibration Impacts
- Summary of all Standard and Additional Mitigation Measures
- References

All noise and vibration predictions are to be presented (as a minimum) as facade noise maps for a distance of at least 300 m in all directions from each work site / project area under assessment.

13. REFERENCES

Related Documents and References
<ul style="list-style-type: none"> ANZECC, 1990, Technical basis for guidelines to minimise annoyance due to blasting overpressure and ground vibration. Australian and New Zealand Environment Council.
<ul style="list-style-type: none"> APTA, 1981, Guidelines for Design of Rapid Transit Systems. American Public Transit Association.
<ul style="list-style-type: none"> AS 2107, 2000, Acoustics - Recommended design sound levels and reverberation times for building interiors. Standards Australia.
<ul style="list-style-type: none"> AS 2012 Part 1, 1990, Acoustics - Measurement of airborne noise emitted by earth-moving machinery and agricultural tractors - Stationary test condition - Determination of compliance with limits for exterior noise. Standards Australia.
<ul style="list-style-type: none"> AS 2187, Part 2, 2006, Explosives - Storage and Use - Part 2: Use of Explosives. Standards Australia.
<ul style="list-style-type: none"> AS 2436, 1981, Guide to Noise Control on Construction, Maintenance and Demolition Sites. Standards Australia.
<ul style="list-style-type: none"> AS 4349, 2007, Inspection of buildings - General requirements. Standards Australia.
<ul style="list-style-type: none"> BS 6472, 2008, Evaluation of Human Exposure Vibration in Buildings. The British Standards Institution.
<ul style="list-style-type: none"> BS 7385 Part 2, 1993, Evaluation and Measurement for Vibration in Buildings Part 2. The British Standards Institution.
<ul style="list-style-type: none"> Colin G. Gordon, 1999, Generic Vibration Criteria for Vibration-Sensitive Equipment. International Society for Optical Engineering.
<ul style="list-style-type: none"> The Association of Australian Acoustical Consultants (AAAC) Technical Guideline on Child Care Centre Noise Assessments
<ul style="list-style-type: none"> DECC, 1999, Environmental Criteria for Road Traffic Noise. NSW Department of Environment and Climate Change.
<ul style="list-style-type: none"> DECC, 2009, Interim Construction Noise Guideline. NSW Department of Environment and Climate Change NSW.
<ul style="list-style-type: none"> EN ISO 9641, Part 2, 1996, Acoustics - Determination of sound power levels of noise sources using sound intensity – Part 2: Measurement by scanning. International Organization for Standardization.
<ul style="list-style-type: none"> EPA, 2000, NSW industrial noise policy. NSW Environment Protection Authority.
<ul style="list-style-type: none"> RTA, 2001, Environmental noise management manual, NSW Roads and Traffic Authority.
<ul style="list-style-type: none"> RTA, 2001, Environmental noise management manual, NSW Roads and Traffic Authority.
<ul style="list-style-type: none"> TIDC, 2007, Construction noise strategy. Transport Infrastructure Development Corporation (NSW).

APPENDIX A - Construction Noise and Vibration Monitoring Guideline

This document is intended to provide guidance and outline the minimum requirements for contractors undertaking construction noise and vibration monitoring on the Sydney Metro Project. It should be read in conjunction with the requirements of the Construction Noise and Vibration Strategy (CNIS), the EPA's Interim Construction Noise Guideline (ICNG) and the conditions of approval.

Construction Noise and Vibration Impact Statements (CNIS) are to be developed prior to the commencement of demolition and construction to assess the potential impact of noise and vibration at surrounding noise sensitive receivers and, where necessary, to develop detailed noise and vibration mitigation and management plans. The plans shall identify suitable monitoring locations; the types of instruments to be used; the timing duration and frequency of monitoring; and whether the monitoring is to be operator-attended or unattended.

To aid in the development of the site CNIS, an adjacent and adjoining receptor list along with the minimum number of monitoring locations is included as Appendix B.

The objectives of monitoring are as follows:

Attended

- confirm source noise and vibration levels used for predictions
- confirm noise and vibration levels at receivers are consistent with predictions
- confirm suitability of mitigation measures and provide evidence to support corrective action
- investigate alerts and alarms from unattended monitoring (see below)
- verify measured unattended noise and vibration levels
- provide a record of construction noise and vibration levels for complaints management

Unattended

- confirm noise and vibration levels near receivers are consistent with predictions,
- confirm suitability of mitigation measures and provide evidence to support corrective action
- providing a continuous record of noise and vibration levels, for use in incident or complaint investigations
- providing notification (alerts and alarms) to project staff if levels exceed pre-determined thresholds
- providing a record of construction noise and vibration levels

Monitoring for the Project will be required at the commencement of works and at regular intervals throughout the project (i.e. when new construction activities commence) to quantify the airborne noise, ground-borne noise and vibration levels associated with construction activities.

Monitoring would also be required in the event of a complaint being received and would be conducted at:

- the affected receiver; or
- if more than one affected receiver has been identified, at the nearest affected receiver; or
- where the nearest affected receiver refuses monitoring on their property, at the nearest point to that receiver within the site boundary.
- If it can be demonstrated that direct measurement of the construction site is impractical, alternative means of determining construction noise levels may be adopted in accordance with Chapter 11 of the NSW Industrial Noise Policy.

The contractor would need to determine the suitability of either attended or unattended monitoring for each monitoring event.

1. Construction Noise Monitoring

The noise measurement procedures employed throughout the monitoring program will be in accordance with the requirements of Australian Standard (AS) 1055:1997 Acoustics - Description and Measurement of Environmental Noise and the NSW Department of predicted levels.

Measurements are expected to consist of operator-attended and unattended measurements. All noise measurements will be performed and analysed by a suitably qualified acoustical consultant.

1.1. Noise Monitoring

Noise monitoring for the Project will be required at the commencement of works and at regular intervals throughout the project to quantify the airborne and ground-borne noise levels associated with the construction activities for comparison against the noise management levels and to confirm that noise levels at the nearest receivers are consistent with the predictions in the CNISs.

All noise monitoring results will be assessed against the nominated noise criteria, compared to the conditions on the consent / licence, or the relevant noise management objectives and summarised in a report. Reporting would be submitted to the construction contractor and project manager within one week of being undertaken or at weekly intervals for continuous monitoring. Where monitoring has been conducted in response to complaints, these reports will be submitted within 3 days to TfNSW and should be suitable for public distribution.

1.2. Airborne Noise

1.2.1. Operator-Attended Monitoring

The objective of operator attended monitoring is to accurately quantify the airborne noise levels associated with the construction activities for comparison against the noise management levels and to confirm that noise levels at the nearest receivers are consistent with the predictions in the CNVSSs.

Operator-attended noise measurements are to be undertaken at the commencement of any new construction activities or location.

The operator-attended noise measurements must be undertaken at a location representative of the potentially most exposed receivers, or alternatively at other specifically identified sensitive receivers (i.e. in complaint locations).

1.2.2. Continuous Noise Monitoring

Continuous noise monitors may be installed (as determined appropriate by the Project team in areas identified as high risk level or repeated complaints) and positioned at the closest sensitive receiver, where practicable (dependent upon the location of construction works).

These units will enable review of the noise levels at the nearest sensitive receivers and, if necessary, provide triggers to modify construction activities where noise levels are higher than predicted.

Consideration should be given to the implementation of real-time or near real-time remote monitoring systems. Such systems may be beneficial in identifying the source of the noise management level exceedance, identifying the occurrence of false-positive trigger events, and provide real-time feedback to the project team on the potential impact of works in relation to the management levels. Real-time remote monitoring systems may be acceptable for the monitoring of airborne noise, ground-borne noise, and vibration.

1.3. Methodology

Monitoring will be conducted in accordance with Australian Standard (AS) 1055:1997 Acoustics – Description and Measurement of Environmental Noise and the INP (DECC, 2000).

Operator-attended noise measurements are to be conducted during normal Project operations to quantify the noise emissions and potential impacts from the Project.

Timing

Operator-attended noise monitoring will be conducted for a minimum of 15 minutes at each location during the subject construction activities. Where a longer monitoring duration is required, measurements must be made in consecutive 15 minute periods.

Measurement

All acoustic instrumentation used in the monitoring programme will be designed to comply with the requirements of AS IEC 61672.1:2004 Electroacoustics – Sound level meters – Specifications and carry current National Association of Testing Authorities (NATA) or manufacturer calibration certificates.

The operator will quantify and characterise the maximum (L_{Amax}) noise level and the energy average ($L_{Aeq(15minute)}$) noise level from construction activities over a 15 minute measurement period.

In addition, the operator will quantify and characterise the ambient level of noise (i.e. L_{Amax} , $LA1$, $LA10$ and $LA90$) over the measurement period, where possible.

Instrument calibration will be checked before and after each measurement survey, with the variation in calibrated levels to not exceed ± 0.5 dBA.

Assessment of Results

The assessment of the results will be undertaken in comparison to the predicted noise levels in the appropriate CNVIS. In the event of the measured noise levels being higher than predicted, an assessment will be conducted to determine:

- Timing, location and the equipment in use during the exceedance.
- Exclusion of non-Project related noise (e.g. can the exceedance be attributed entirely to the Project). This will include consideration of:
 - the methods and type of equipment being used by the project at the time of the exceedance and proximity to the locations at which the exceedance was recorded
 - the location of non-project related activities and proximity to the locations at which the exceedance was recorded.

If the above assessment determines that the noise levels are due to Project noise then noise mitigation measures detailed in Section 7 of the CNIS will be required to be considered.

Measurement Reporting

The following should be included in as a minimum in noise monitoring report:

- The type of monitoring conducted (for example, at a particular project stage or following complaints) and a brief statement of the measurement method.
- The noise/vibration/blasting conditions on the consent / licence, or the relevant noise management objectives.
- Descriptions of the nearest affected residences and other sensitive land uses or, in the case of complaints, description of the complainant location and complaint.
- Description of the instrumentation used (the instrumentation specifications required for compliance noise monitoring are the same as those required for background noise monitoring set out in Appendix B of the NSW Industrial Noise Policy (EPA 2000))
- The results of monitoring at each monitoring location, including a comparison with the consent conditions or relevant noise management objectives
- The location of the construction works in relation to the monitoring position. (sketch plan & sections, photos)
- Details of the various construction equipment in use during the measurement period.
- Indicative noise levels at the measurement location from the operation of the various plant items, together with the observed duration of individual items.
- Details as to the likely dominant noise sources.
- Meteorological conditions (i.e. temperature, humidity, cloud cover, and wind speed and direction)
- A clear statement outlining the project's compliance or non-compliance with the conditions or objectives where the monitored level is higher than the conditions or objectives,
- The reasons for non-compliance should be stated, strategies for minimising noise identified and stated, and the appropriate actions to implement the mitigation and or management strategies.

2. Cosmetic Damage Vibration Monitoring

2.1. General

Where it is anticipated that an item of plant will exceed the cosmetic damage criteria, vibration monitoring is required at the nearest affected receiver. Where concerns have been raised regarding vibration, vibration monitoring would be required at the receiver(s) in question.

All vibration monitoring results will be assessed against the nominated vibration goals and compiled into a report to be forwarded to the construction contractor and project manager and TfNSW. Reporting would be submitted within one week of being undertaken or at weekly intervals for continuous monitoring. Where monitoring has been conducted in response to complaints, these reports will be submitted within 3 days to TfNSW and should be suitable for public distribution if deemed necessary by TfNSW.

2.2. Vibration Compliance

All monitoring results will be assessed against the nominated criteria, compared to the conditions on the consent / licence, or the relevant management objectives.

Table 17 Nominated Site Control Vibration Criteria (ie Operator Warning and Halt Levels) - To be Measured at the Base

Structure	Site Control Criteria (PPV in any Orthogonal Direction)	
	Operator Warning Level	Operator Halt Level
Reinforced or framed structures	20 mm/s	25 mm/s
Unreinforced or light framed structures	5 mm/s	7.5 mm/s
Heritage	1.5 mm/s	2.5 mm/s

Exceedance of the “Operator Warning Level” would not require excavation activity to cease, but rather alerts the Construction Manager to proceed with caution at reduced force or load.

An exceedance of the “Operator Halt Level” would require the Construction Manager to implement an alternative excavation technique pending further analysis of the vibration frequency content in order to determine any potential exceedance of the criteria presented in the CNVS or the site specific CNVIS.

Vibration monitoring equipment must be set so that as a minimum visual and audible alarms are triggered when the levels of vibration exceed the control criteria presented in **Table 17**.

If the “Operator Warning Level” is reached, the contractor will immediately, either:

- Reduce the number of vibration-generating plant/equipment items; or
- Cease operation, pending further analysis of the potential for building damage. A suitably qualified specialist acceptable to the construction contractor must endorse the conclusions of such an investigation.

2.3. Other Vibration Sensitive Structures and Utilities

Where structures and utilities are encountered which may be considered to be particularly sensitive to vibration, a vibration goal which is more stringent than structural damage goals presented in Section 5.4 of the CNVS may need to be adopted. Examples of such structures and utilities include:

- Tunnels
- Gas pipelines
- Fibre optic cables
- Medical or vibration sensitive equipment.

Specific vibration goals would be determined on a case-by-case basis. An acoustic consultant would be engaged by the construction contractor and would liaise with the structure or utility's owner in order to determine acceptable vibration levels.

2.4. Vibration Monitor Specification

Construction vibration monitoring instrumentation used for the identification of structural and cosmetic damage will be employed that meets the following primary specifications presented in **Table 18**. The instrumentation must be installed, operated and maintained by suitably qualified or trained personnel. The instruments must be externally calibrated at regular intervals.

Table 18 vibration Monitor Specifications

Specification	Seismic
Resolution	0.016 mm/s
Range	0.1 mm/s to 254 mm/s
Accuracy	3% at 15 Hz
Sample Rate	Minimum 1024 samples per second per channel
Frequency Response	2 Hz to 250 Hz (3 dB points)
Communications Link	Keyboard and Modem
Recording Mode	Waveform Recording and archiving

It should be noted that equipment specifications detailed in **Table 18** may not be suitable for the measurement of all vibration impacts such as human comfort and or the measurement of vibration impacts to sensitive equipment. Prior to any measurement being conducted the contractor must ensure that the monitoring equipment being proposed is suitable for the type of measurement being conducted.

2.5. Vibration Monitoring

Structural vibration monitoring must be carried out as required during the construction period.

Transducer mounting plates would be installed at the base of the building or structure, at the location closest to the construction works. The monitoring locations would be on a stiff part of the building or structure (at the foundations) on the side of the structure adjacent to the subject construction works.

The vibration monitoring system must be configured to record the peak vibration levels and to trigger an audible/visual alarm when the predetermined vibration thresholds nominated in **Table 17** are exceeded. The thresholds correspond to an “Operator Warning Level” and an “Operator Halt Level”, where the Warning Level is between 66% and 80% of the Halt Level.

The vibration threshold must be set to the respective “Operator Warning Level” (ppv) and the “Operator Halt Level” (ppv) depending on the type of building or structure, the exceedance of which will be indicated by the audible/visual alarm in the construction site.

Should the alarm signalling “Operator Halt Level” be activated then all nearby construction works must stop immediately. Construction personnel engaged on the site must have been briefed on the procedures including the location and nature of audio and visual alarms. The audio and visual alarms must be arranged to directly alert the equipment operations to any alarm event.

Exceedances of the “Operator Halt Level” are only permissible when the recommended vibration limits in the Standard are achieved (based on the frequency content of the vibration signal) and the vibration criteria are approved by a suitably qualified specialist.

An exceedance of the “Operator Warning Level” will not require the excavation activities to cease, but rather alert the Construction Manager to proceed with caution at a reduced force or load.

Attended vibration monitoring will, if considered necessary, be carried out by a suitably qualified specialist. Attended structural damage vibration monitoring must be carried out in response to structural damage criterion exceedances. This monitoring would provide direct feedback to the operators and appropriate modification of construction techniques.

Supplementary Vibration Monitoring

Supplementary structural damage vibration monitoring must also be carried out in response to exceedances of the criteria or for the purpose of refining construction techniques in order to minimise vibration emissions. Monitoring would be attended under these circumstances, in order to provide immediate feedback to the operators.

Reporting

If vibration monitoring has been conducted, reports must be submitted to the Project Manager at weekly intervals. These reports will cover the preceding weeks’ activities and will include the following:

- The type of monitoring conducted (for example, at a particular project stage or following complaints) and a brief statement of the measurement method.
- The vibration/blasting conditions on the consent / licence, or the relevant management objectives.
- Descriptions of the nearest affected residences and other sensitive land uses or, in the case of complaints, description of the complainant location and complaint.
- Vibration monitoring results summary together with notes describing any vibration-intensive activities (if applicable).
- Summary of measurements exceeding the vibration criteria levels and descriptions of the plant or operations causing these exceedances (if available).
- Details of corrective action applicable to vibration criteria exceedances and confirmation of its successful implementation. Where corrective action has not yet been implemented, it may be shown as pending and the status of its implementation will be carried forward to following reports.

2.6. Ground-borne Noise and Vibration

Operator-attended and unattended noise and vibration monitoring will be conducted where the ground-borne noise and vibration levels are higher than predicted, or in response to complaints. People tend to hear vibration before they feel vibration; that means that if the ground-borne noise criteria are exceeded then the human comfort criteria for vibration could also be exceeded.

Where attended ground-borne noise monitoring is not possible, indirect unattended remote monitoring⁴ of ground-borne noise from measured vibration velocity should be considered to obtain an indication of ground-borne noise impacts and assist in management of impacts.

⁴ "Monitoring ground borne and structure borne noise for management of construction impacts" D.Anderson,D.Sburlati, Proceedings of ACOUSTICS 2016 , 9-11 November 2016, Brisbane, Australia.

APPENDIX B - Adjoining and Adjacent Receptor Information for Inclusion in the Demolition Contract

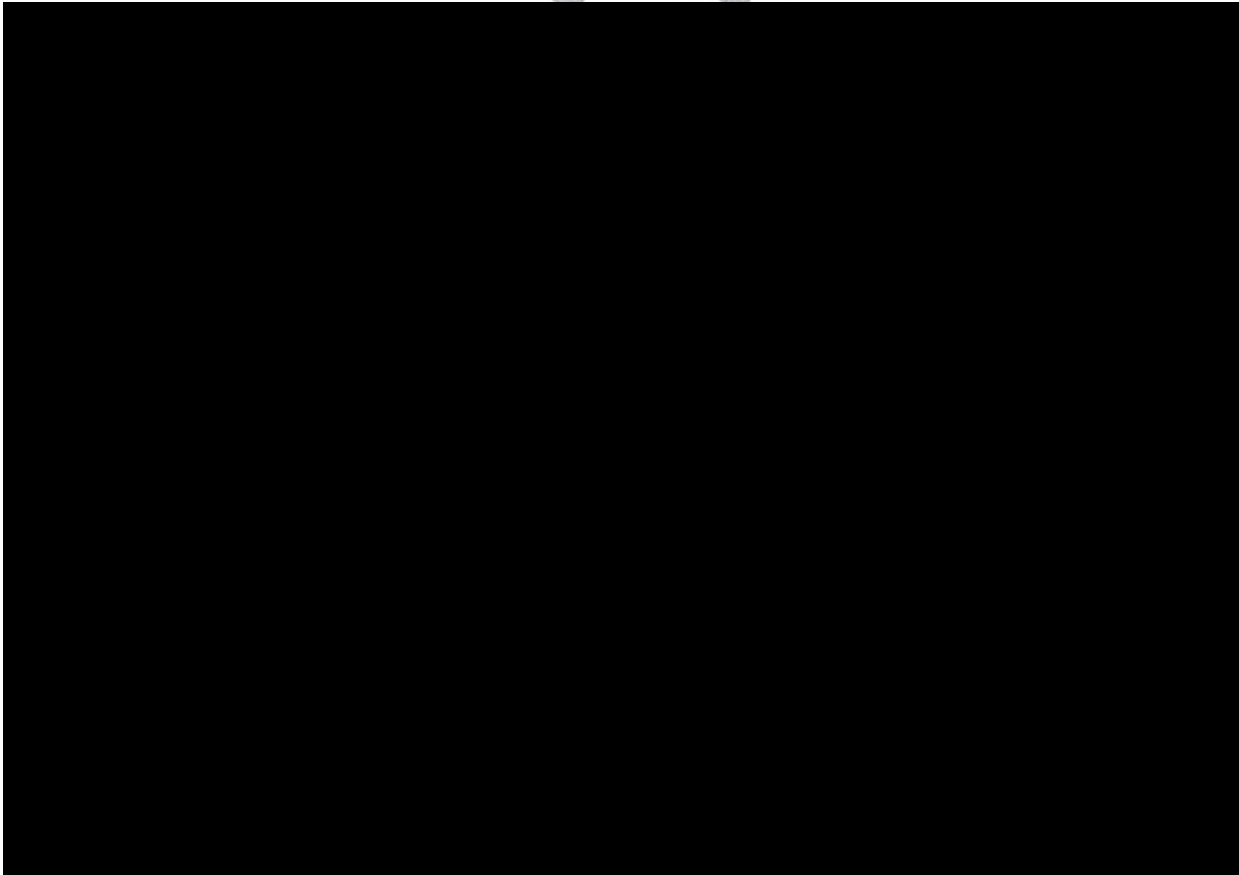
1. Chatswood
2. Crows Nest
3. Victoria Cross
4. Martin Place
5. Pitt Street
6. Waterloo
7. Sydenham

Chatswood

The areas at which noise and/or vibration monitoring is to be undertaken are shown on the attached plan. The minimum number of monitoring locations necessary in this precinct is [REDACTED] for the duration of the works. Additional monitoring may be identified by the Contractor's CNISs or as required by TfNSW.

The Contractor in preparation of the CNISs, should incorporate information from the table below. The Contractor should note the following:

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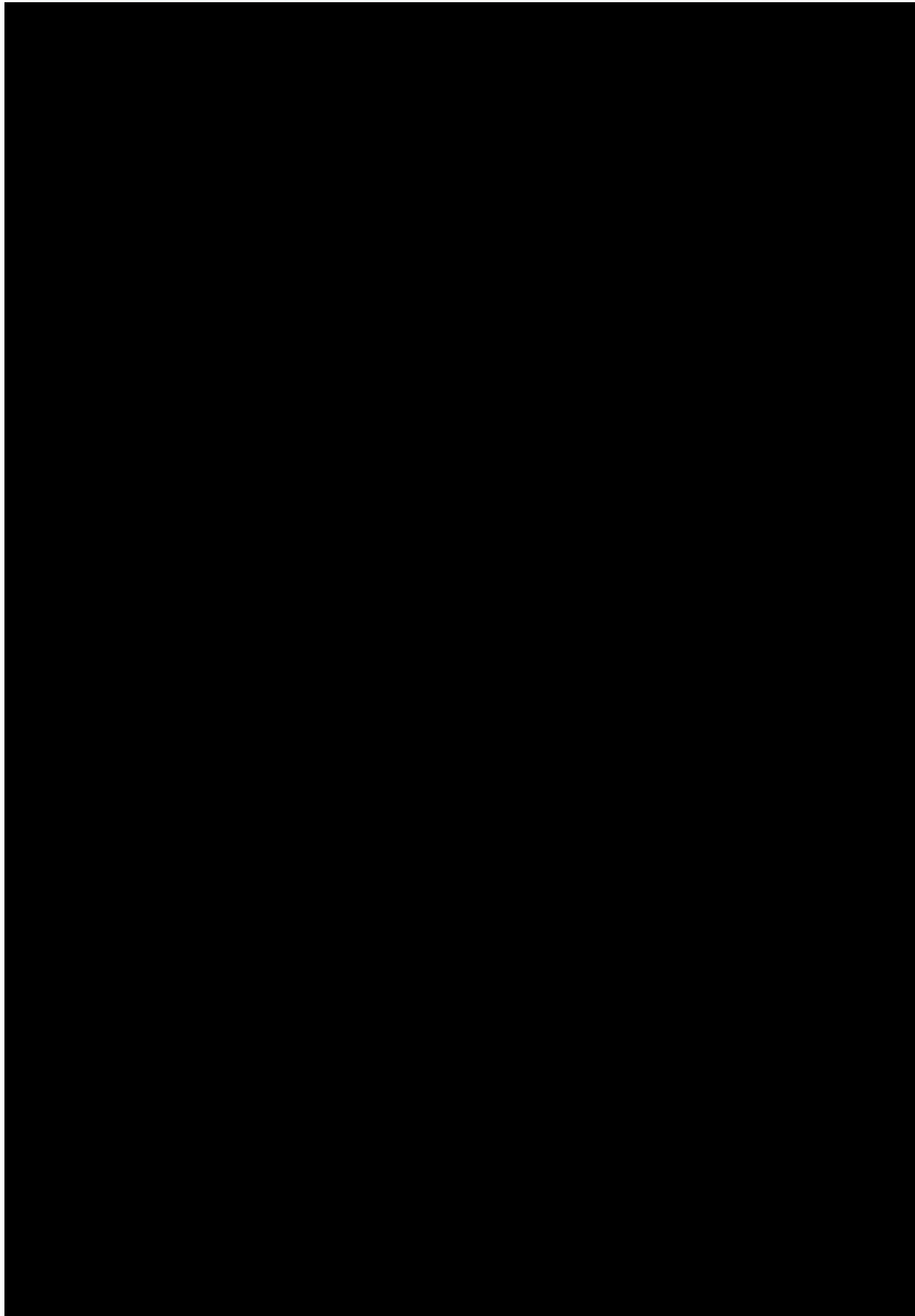
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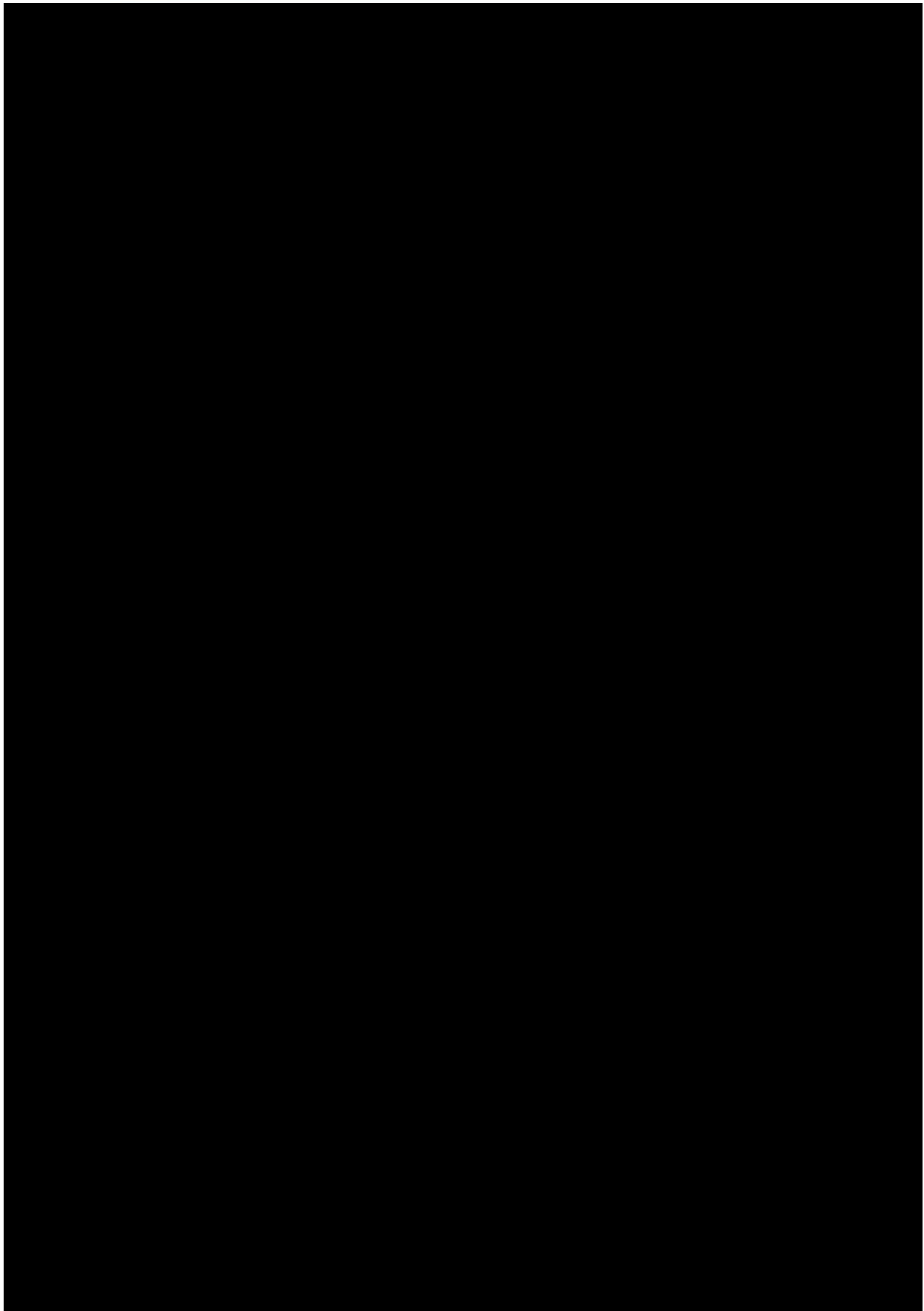
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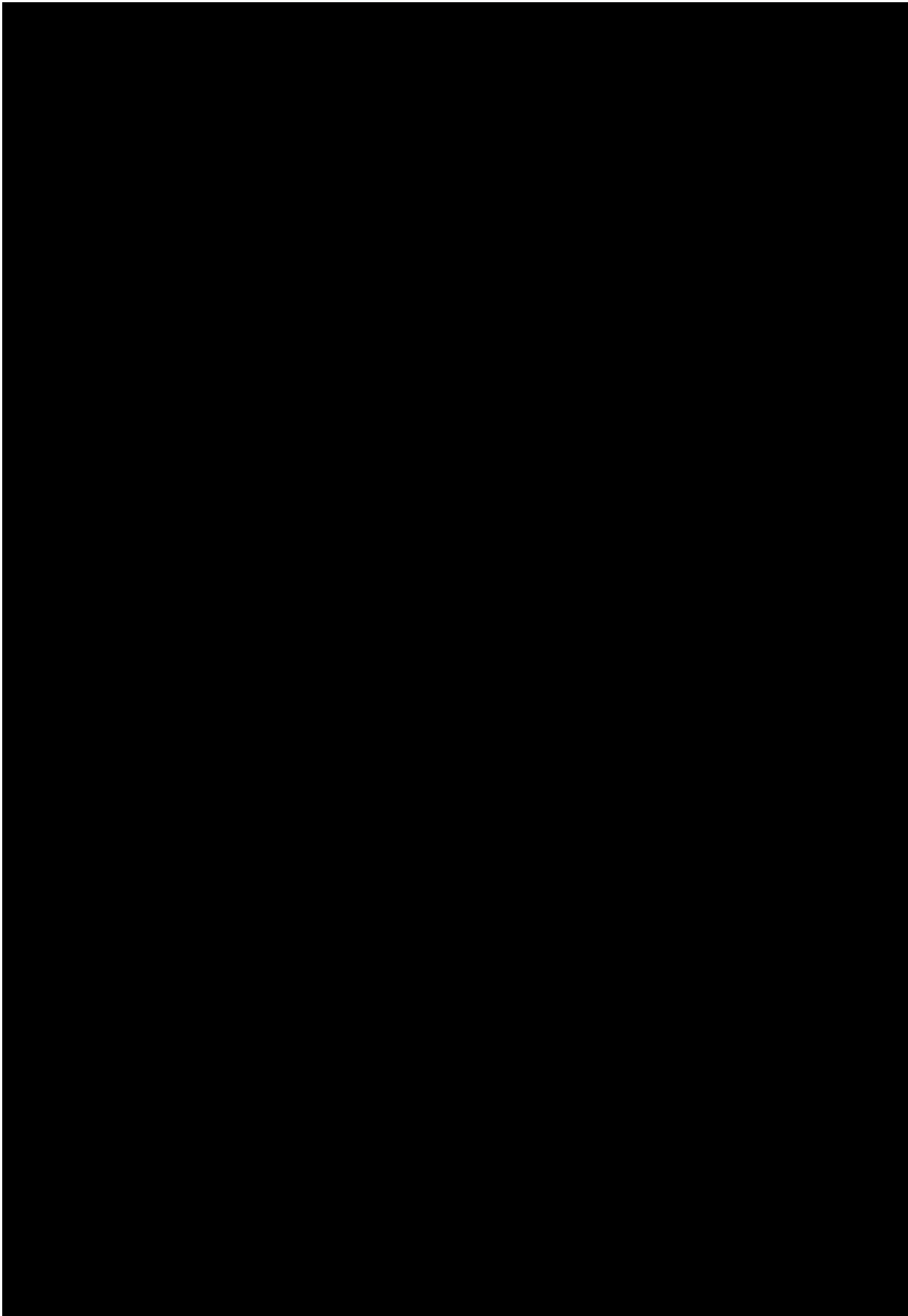
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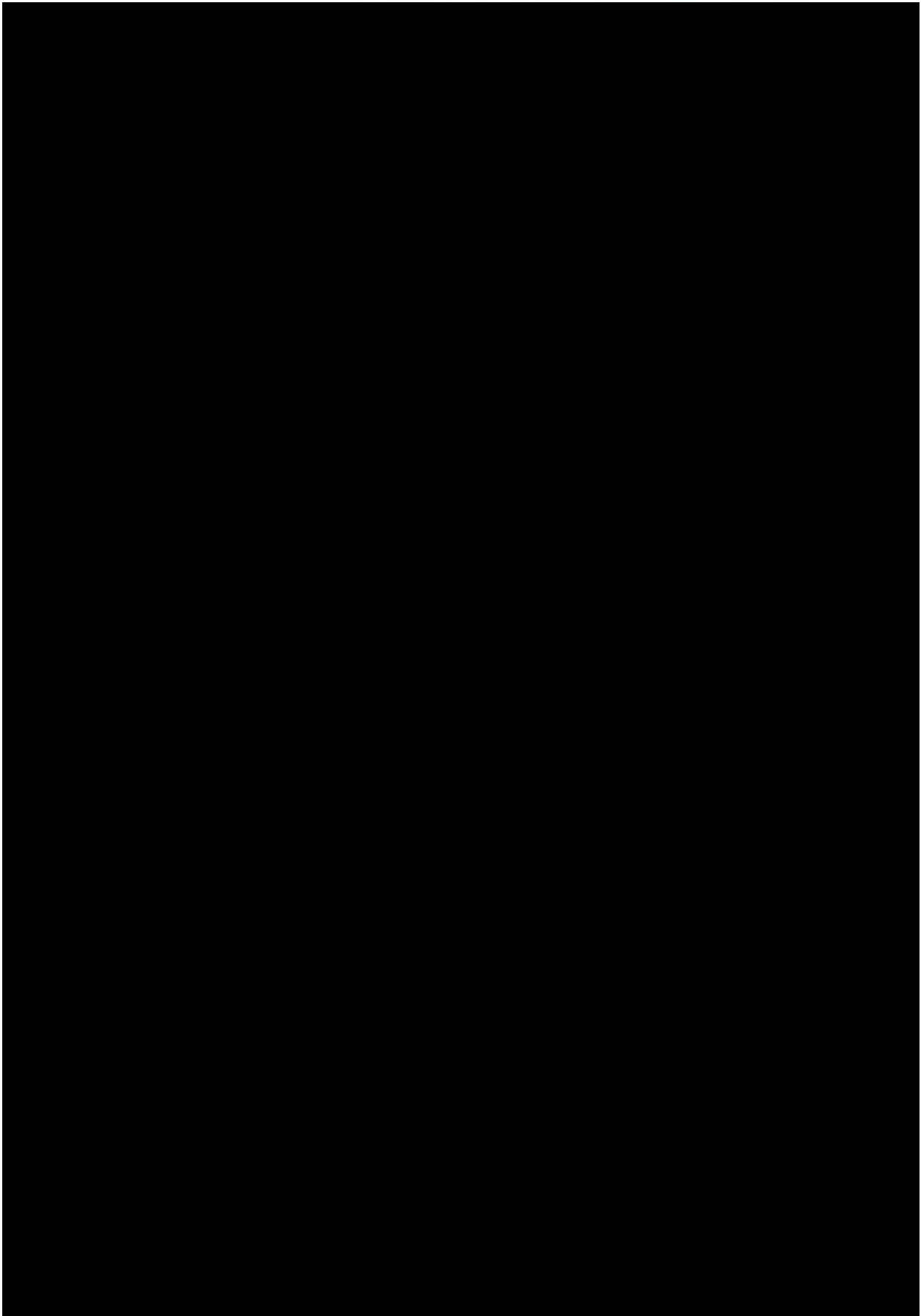
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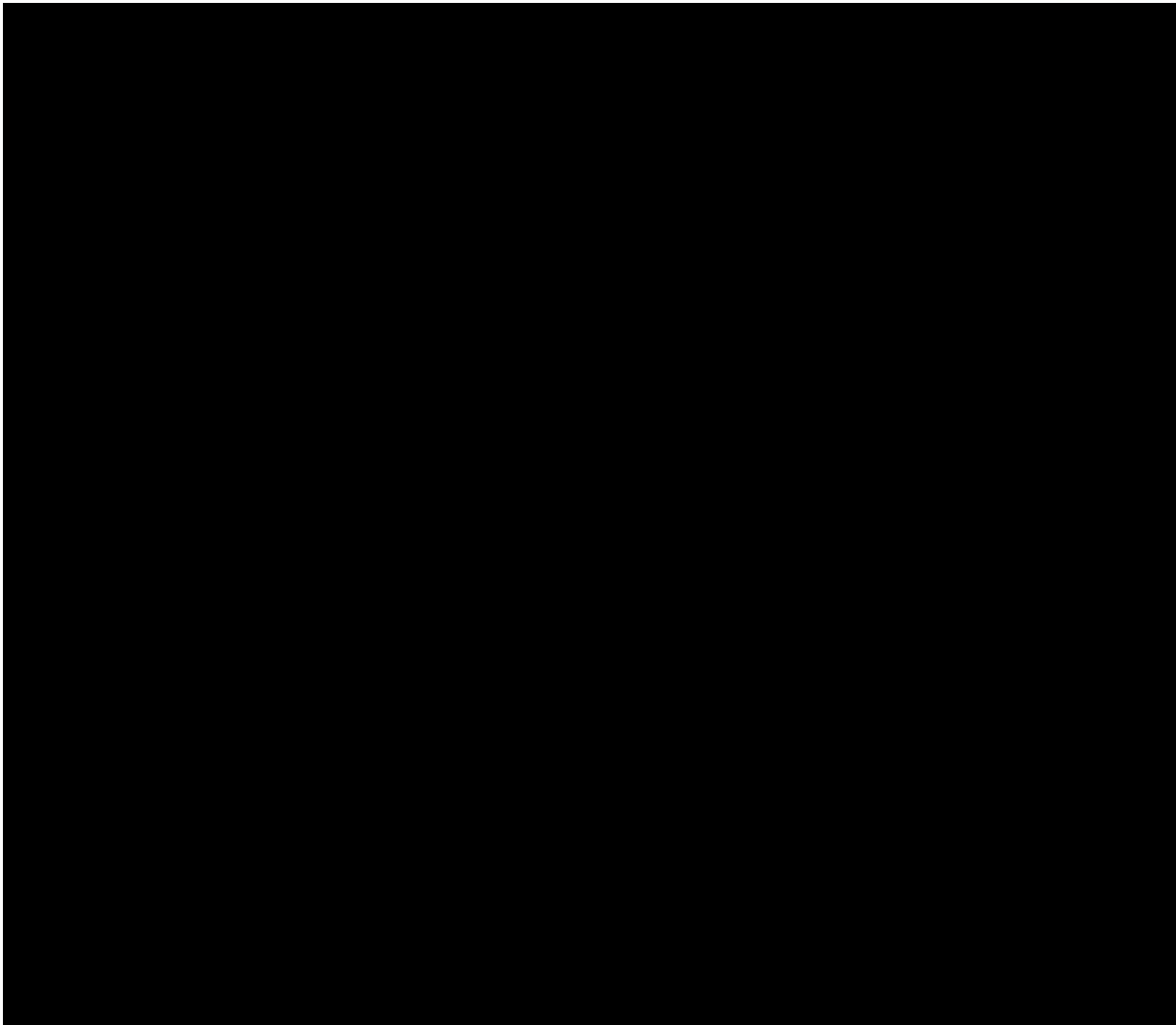
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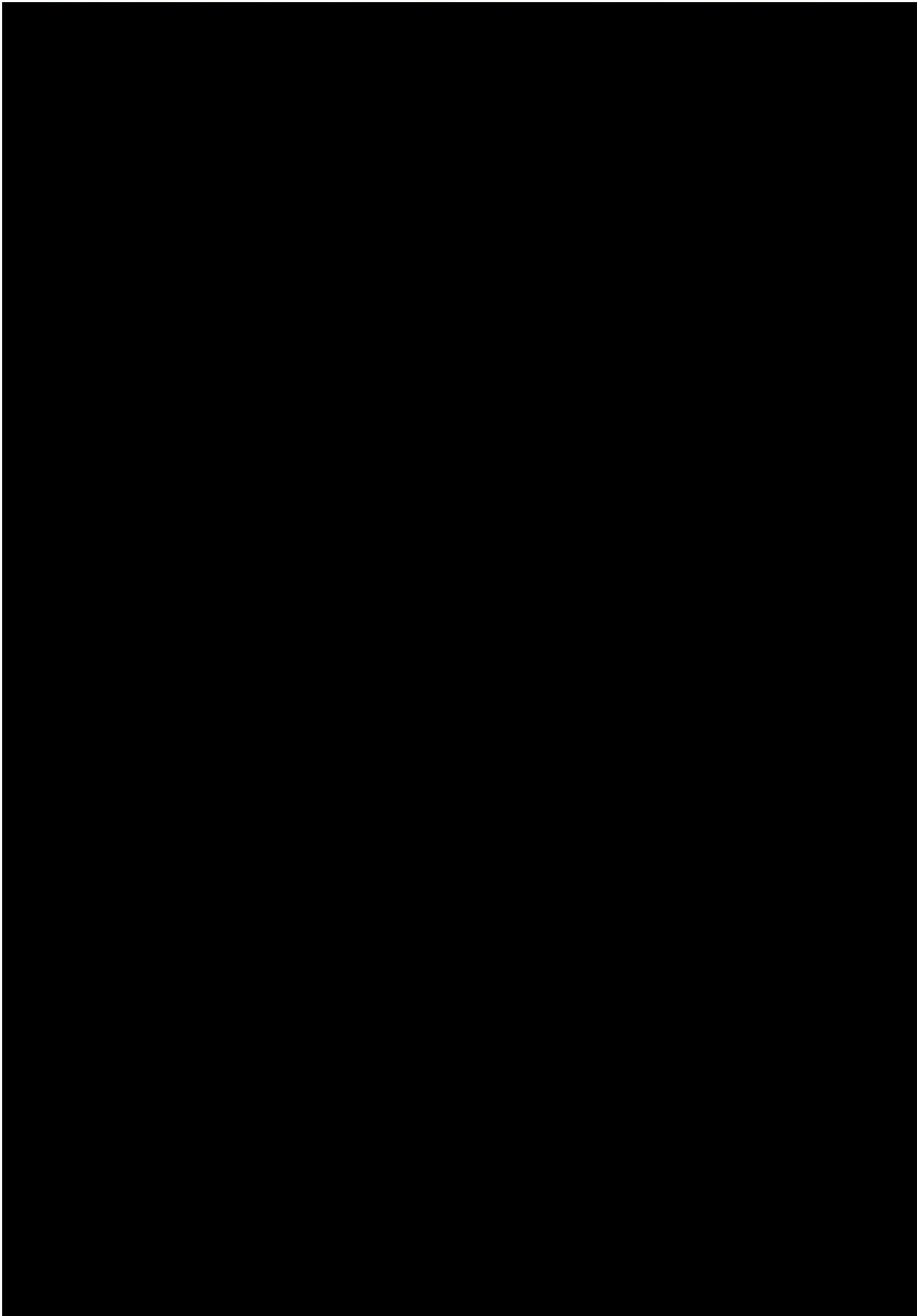
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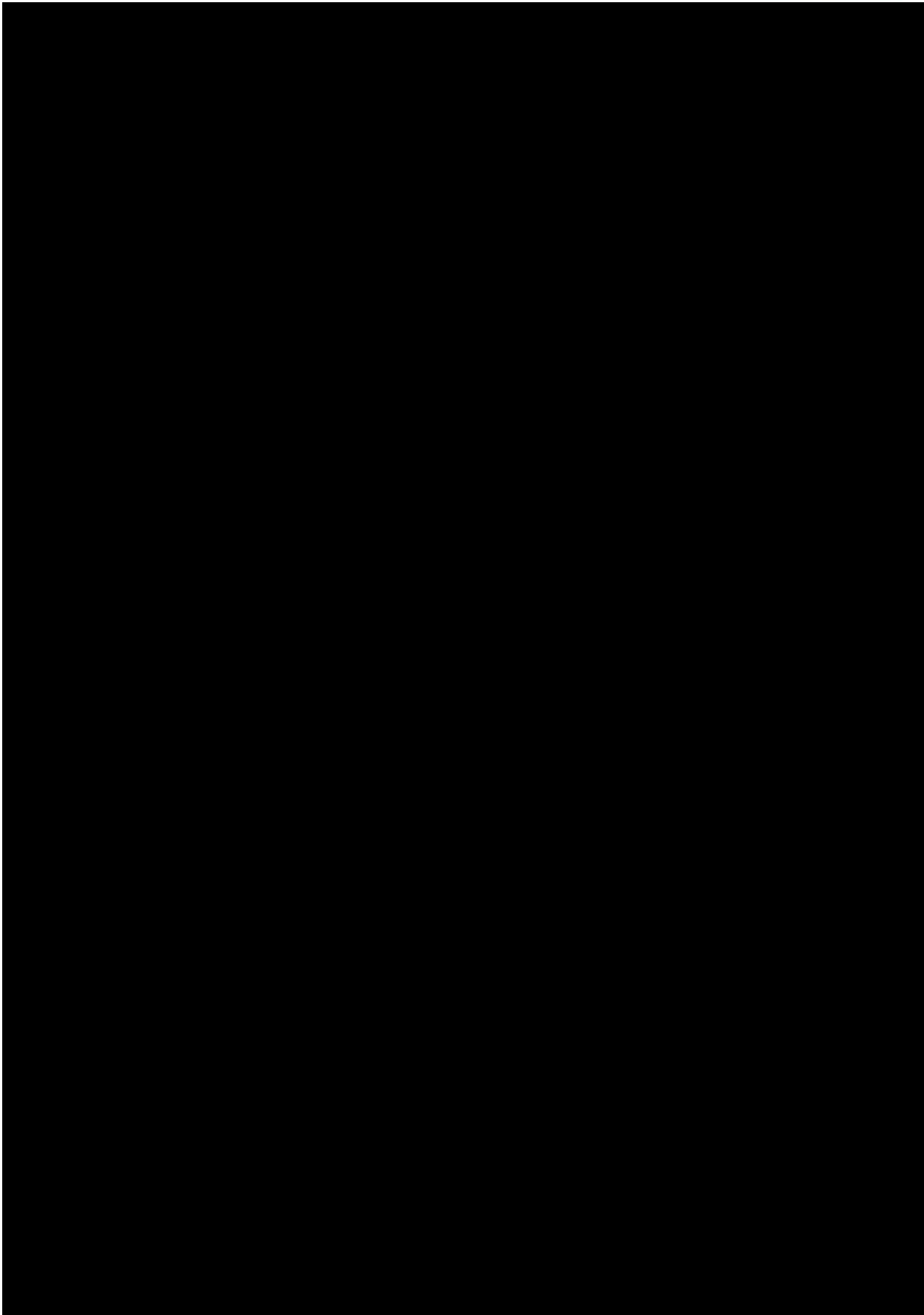
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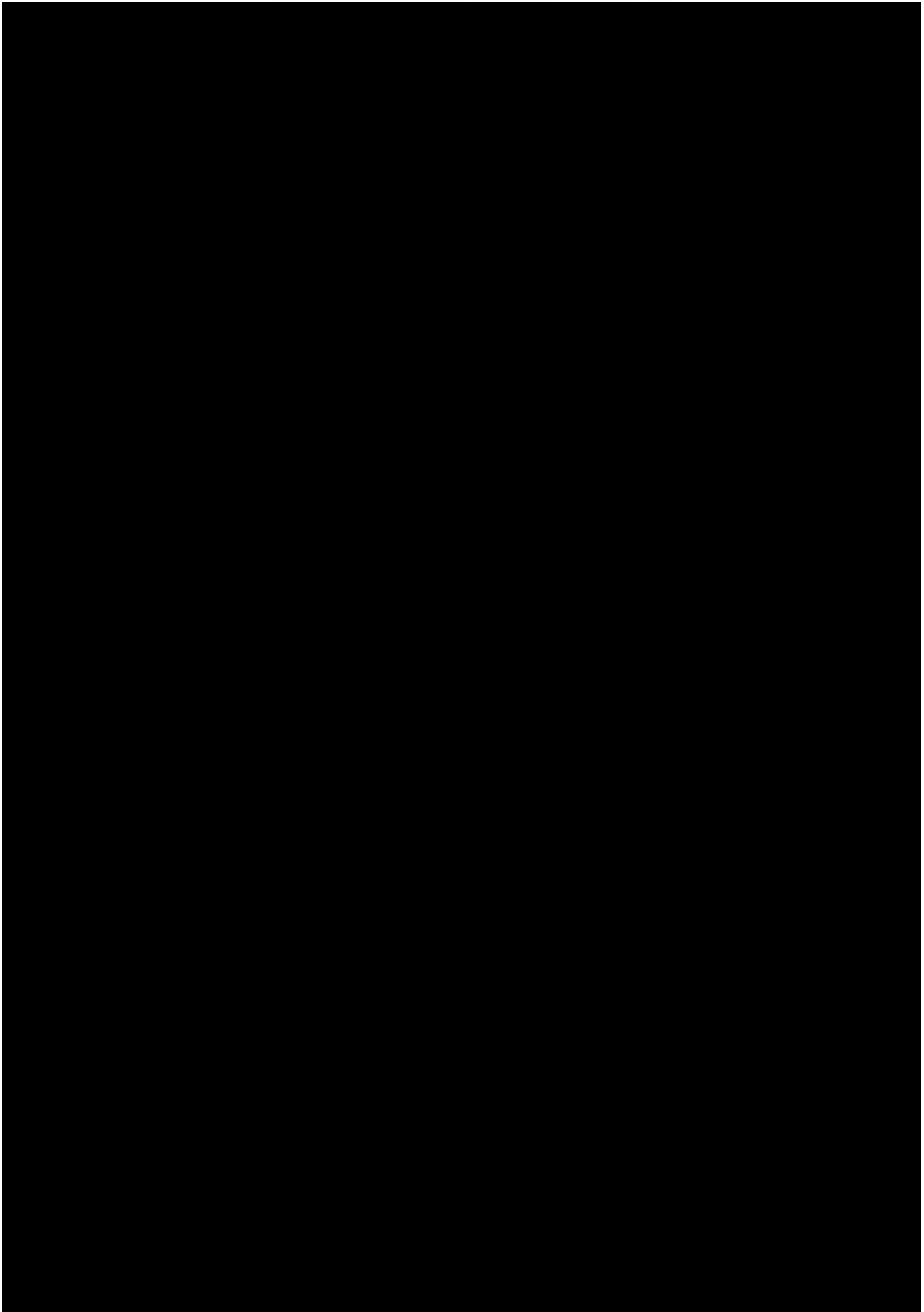
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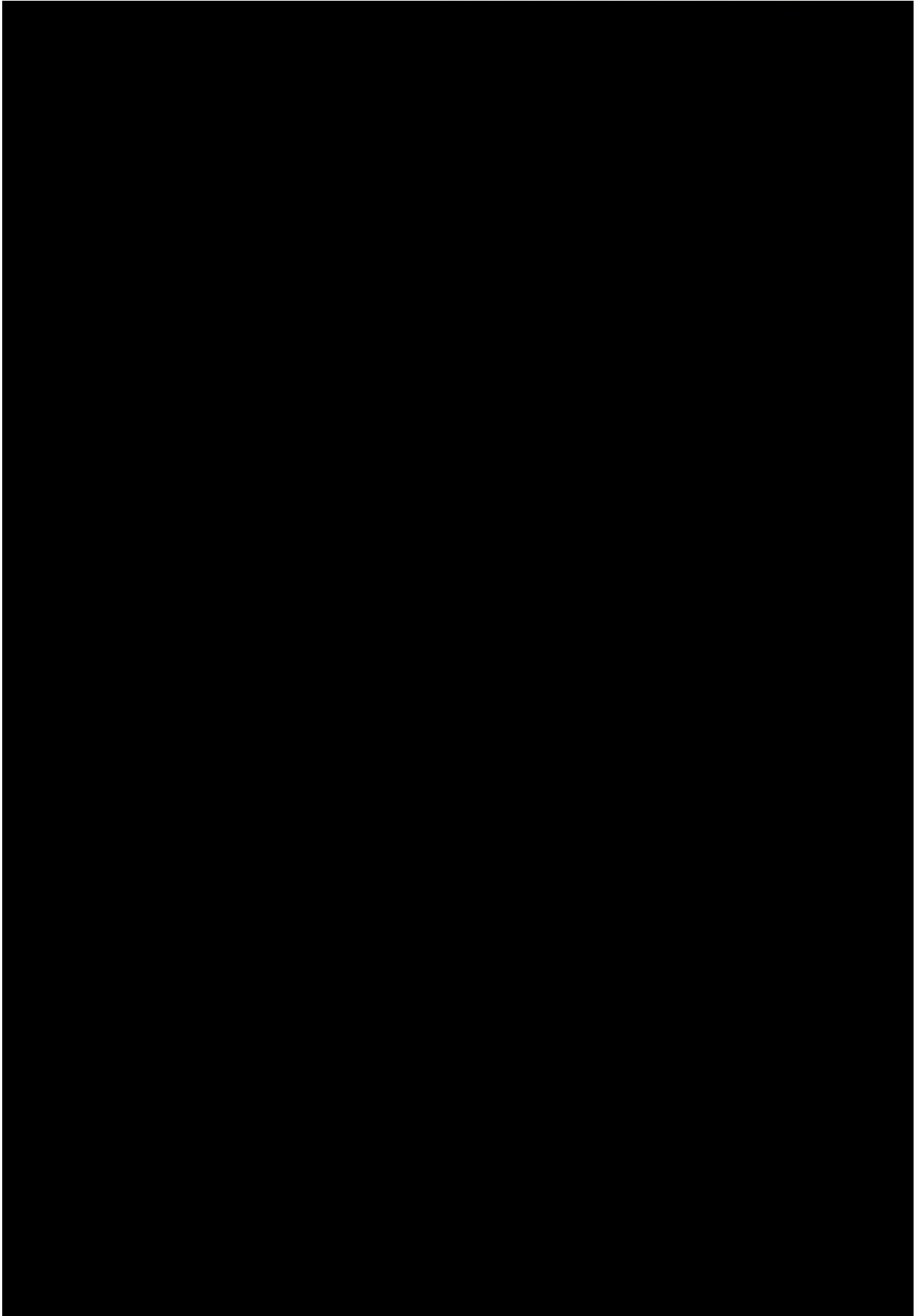
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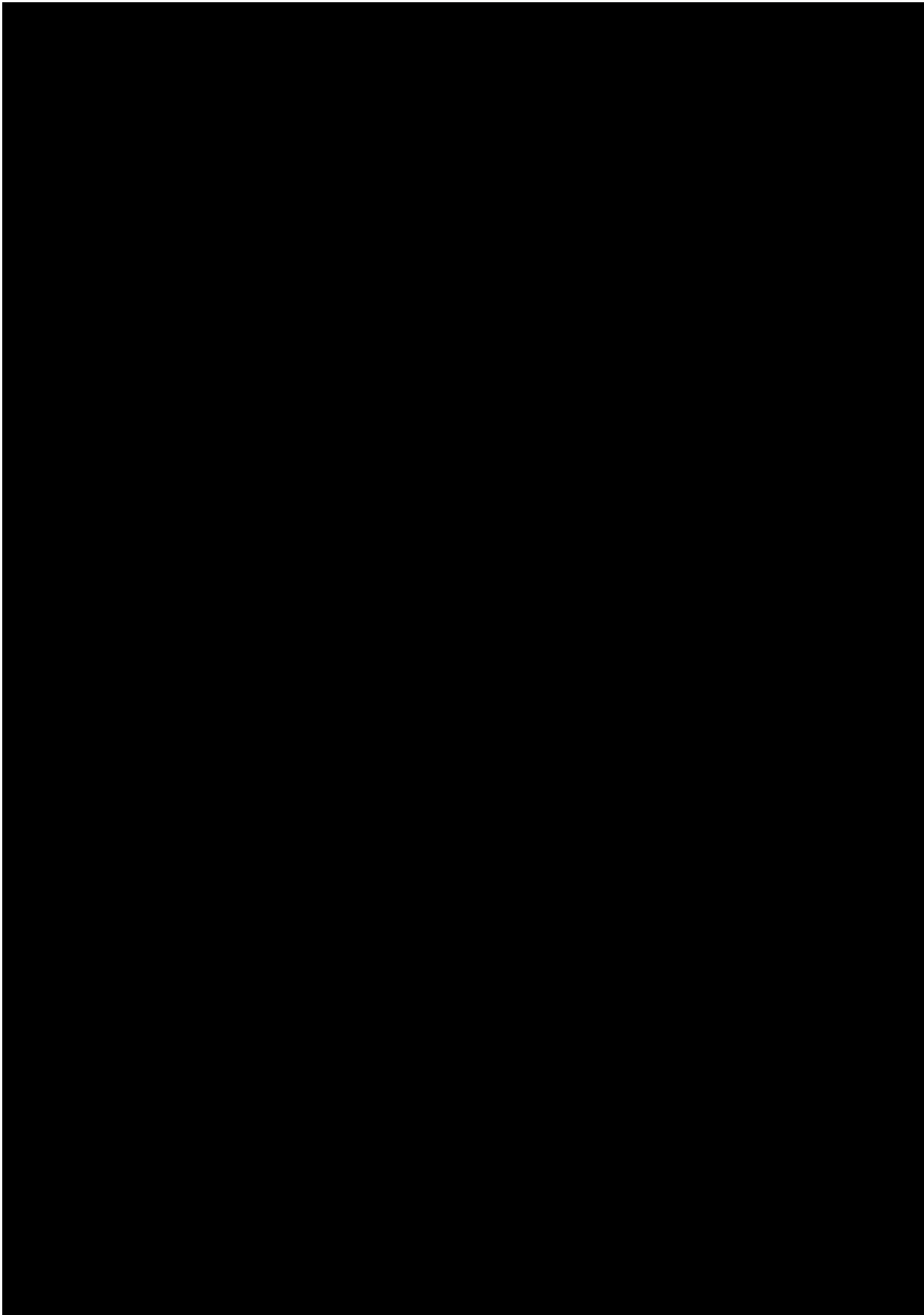
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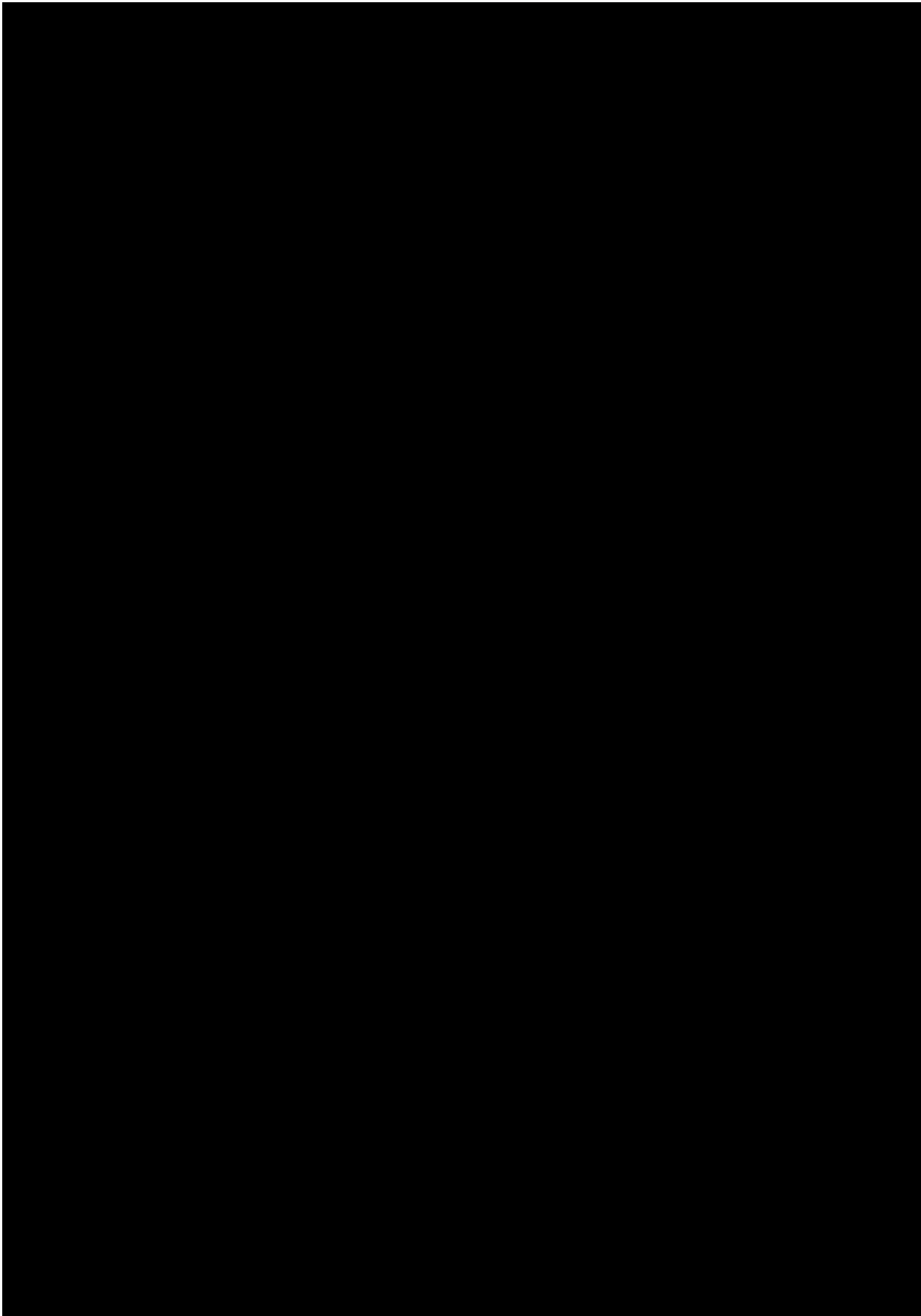


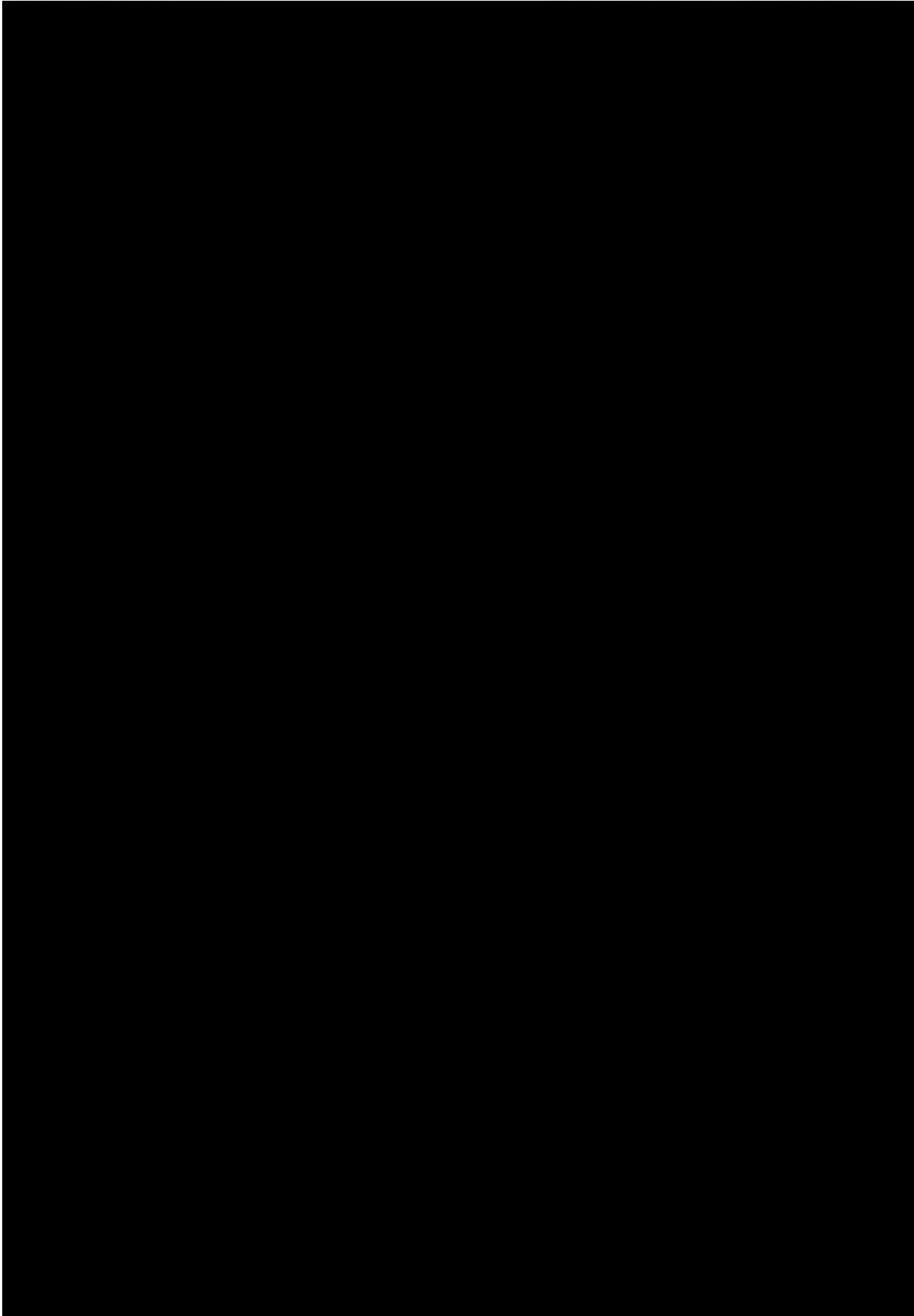


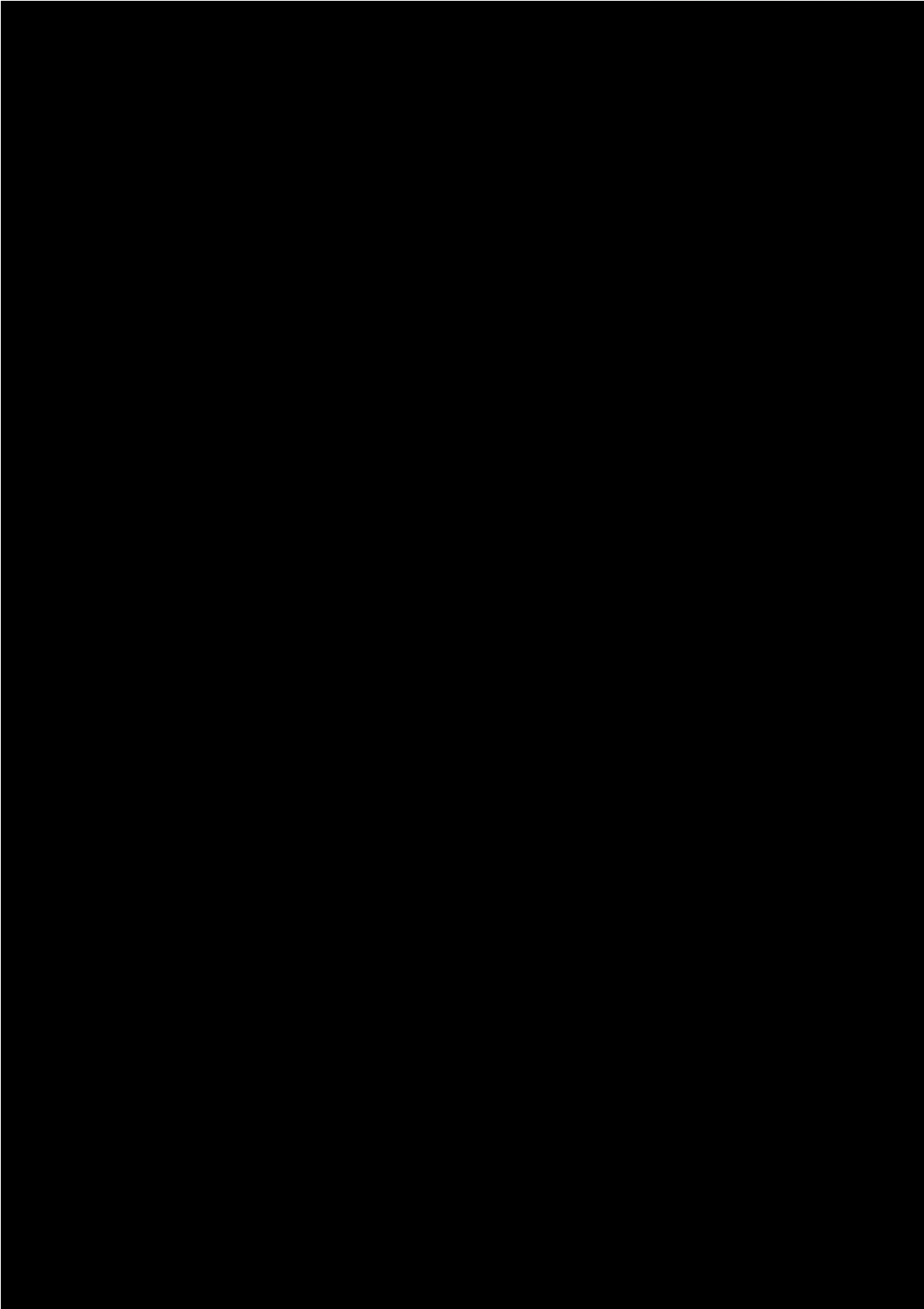


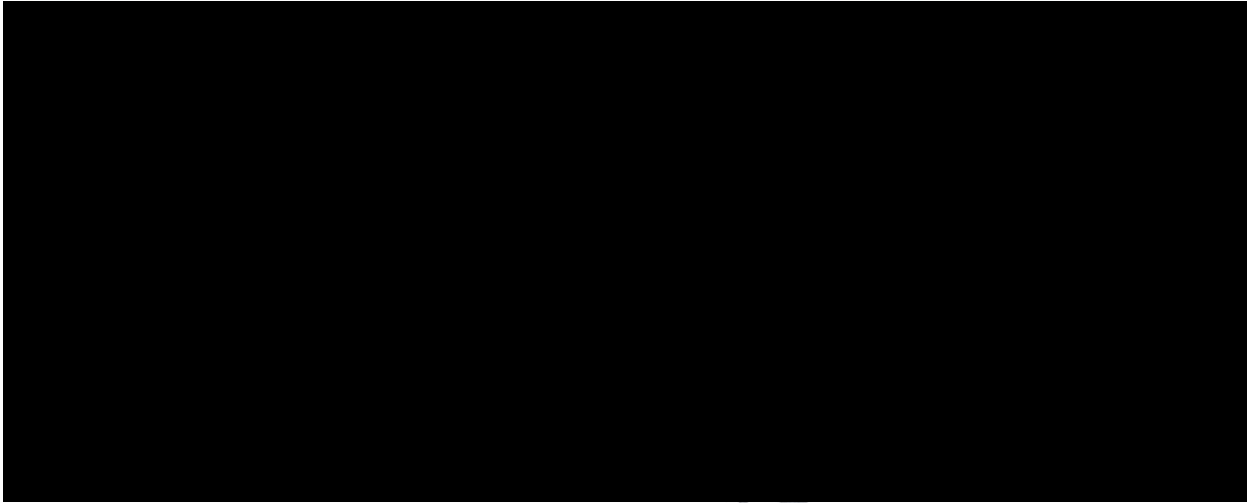












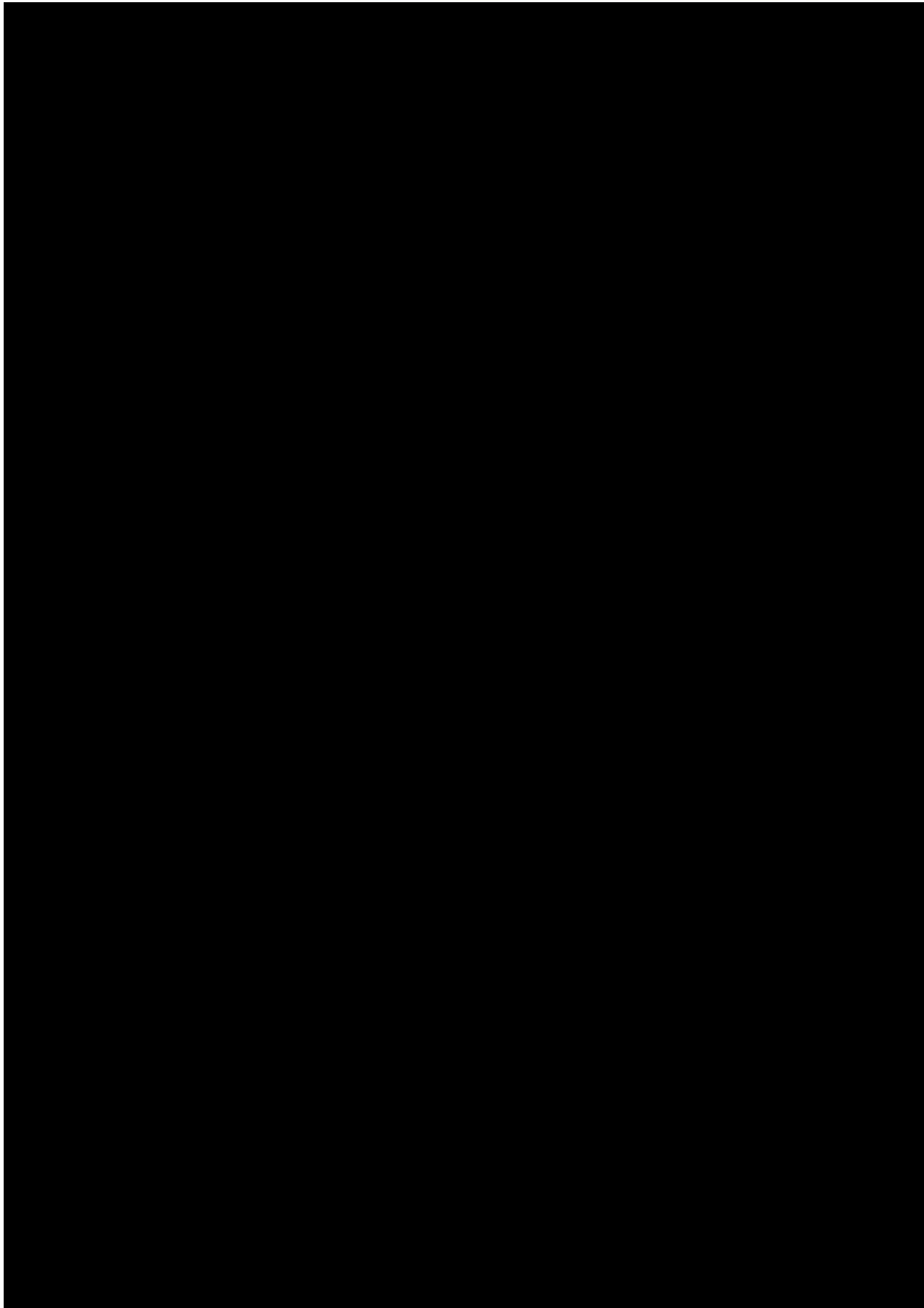
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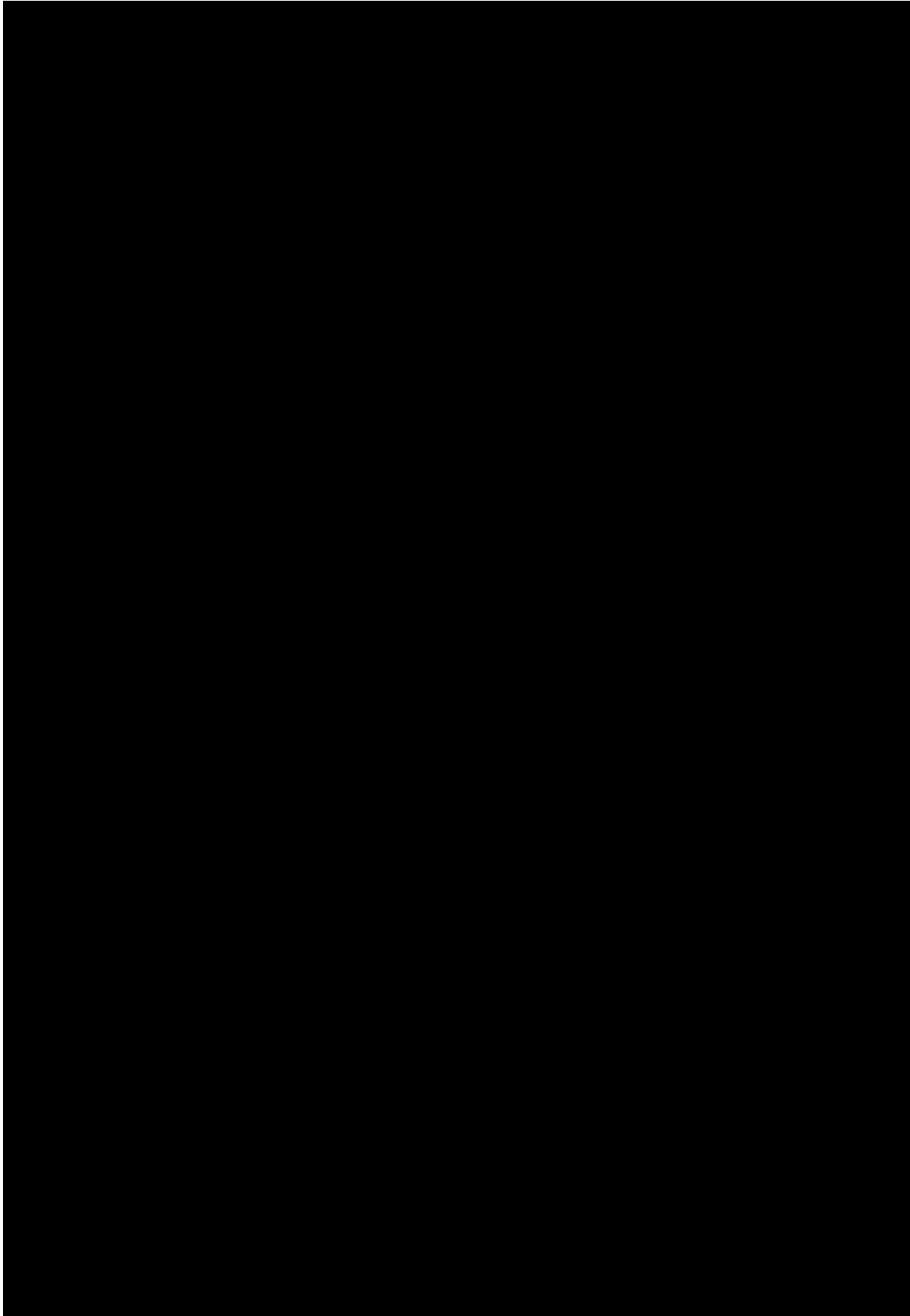
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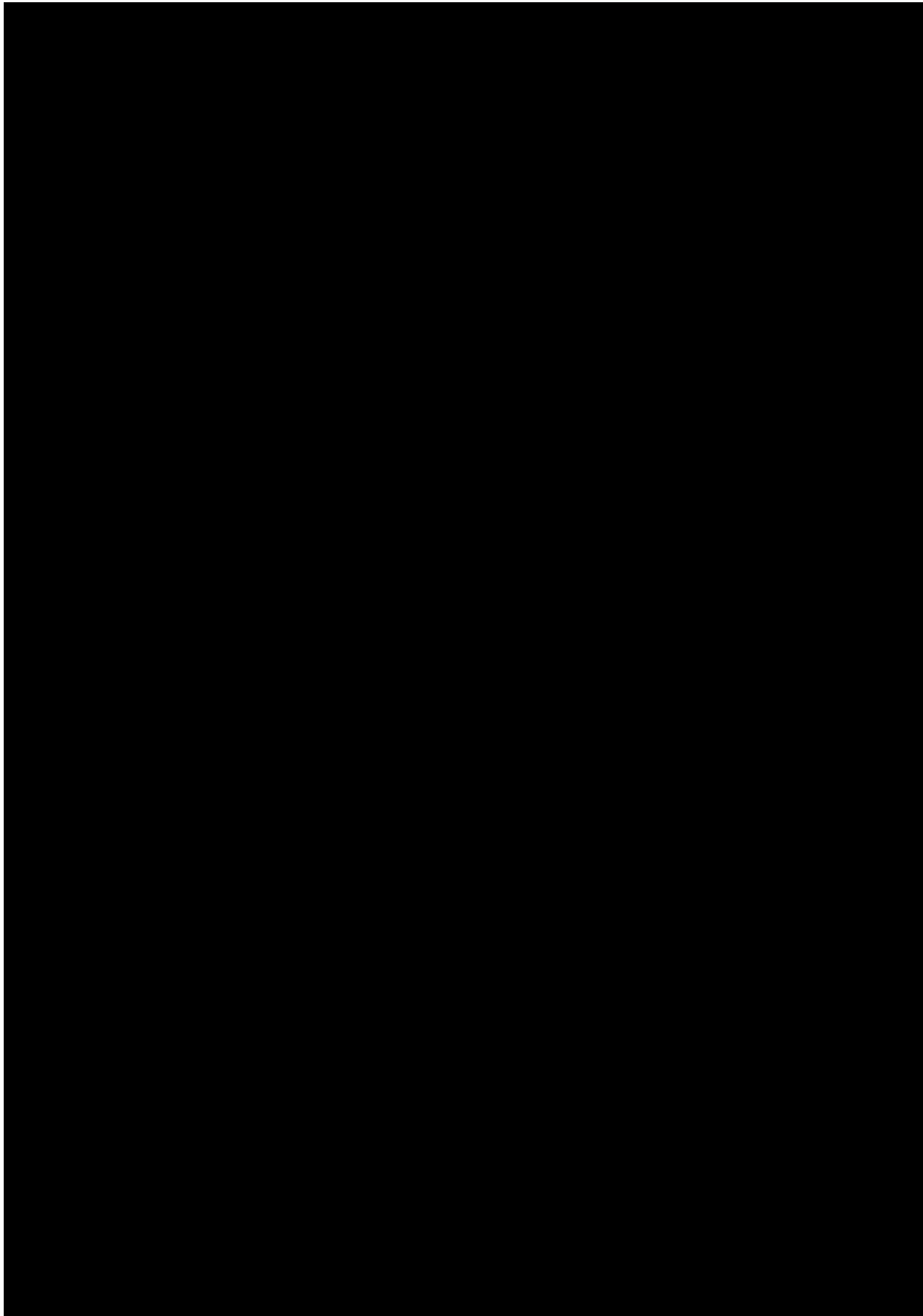
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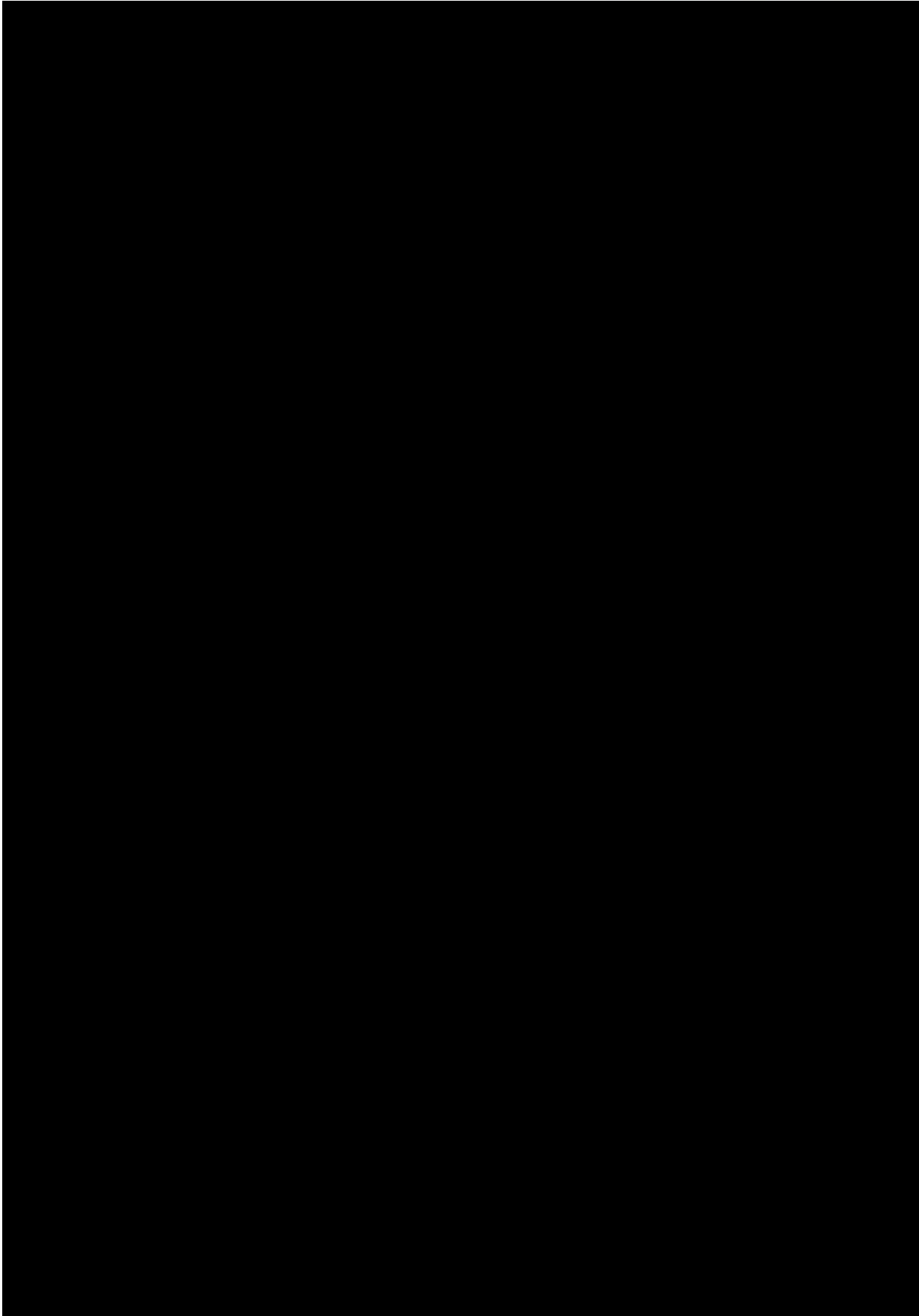
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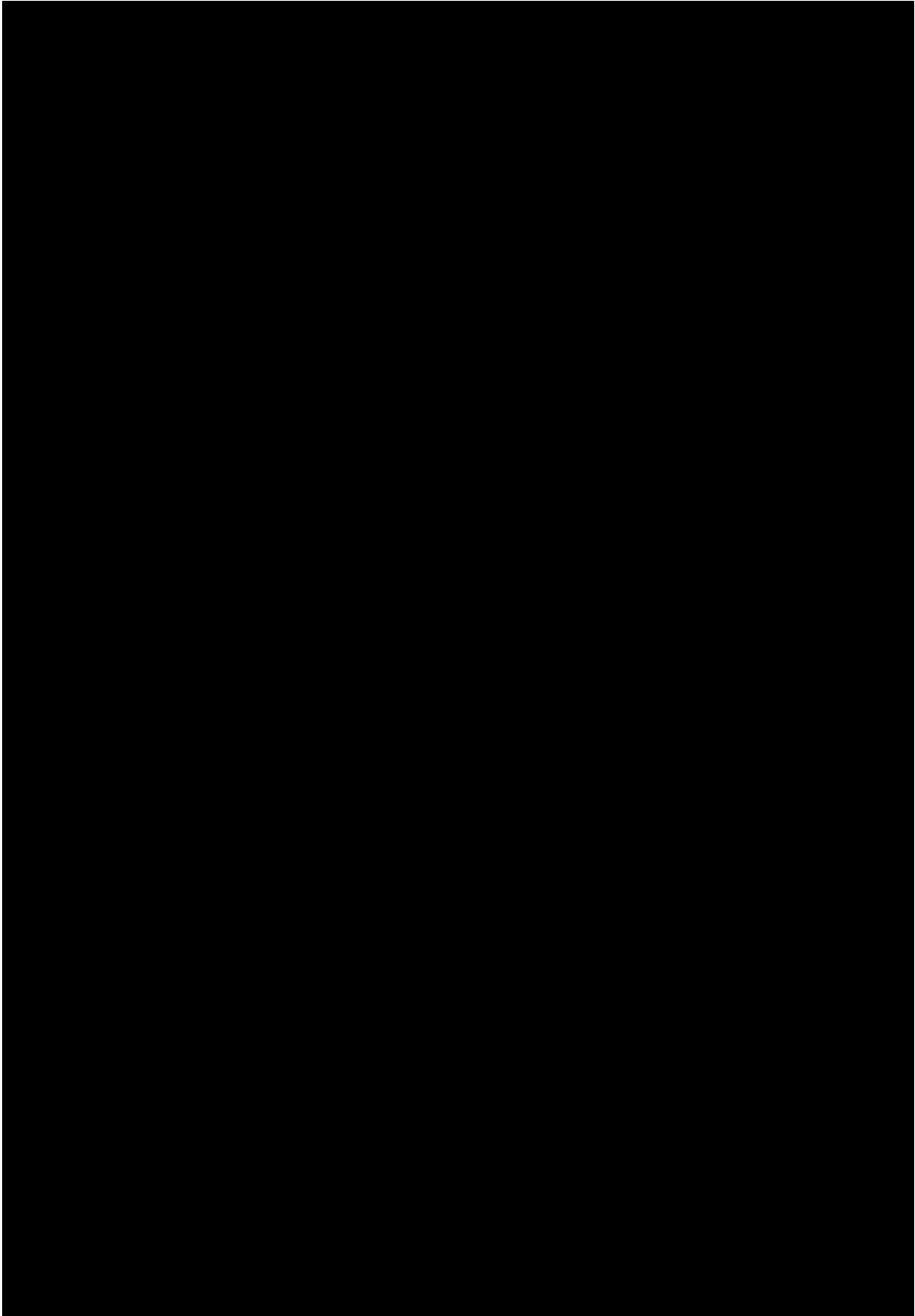
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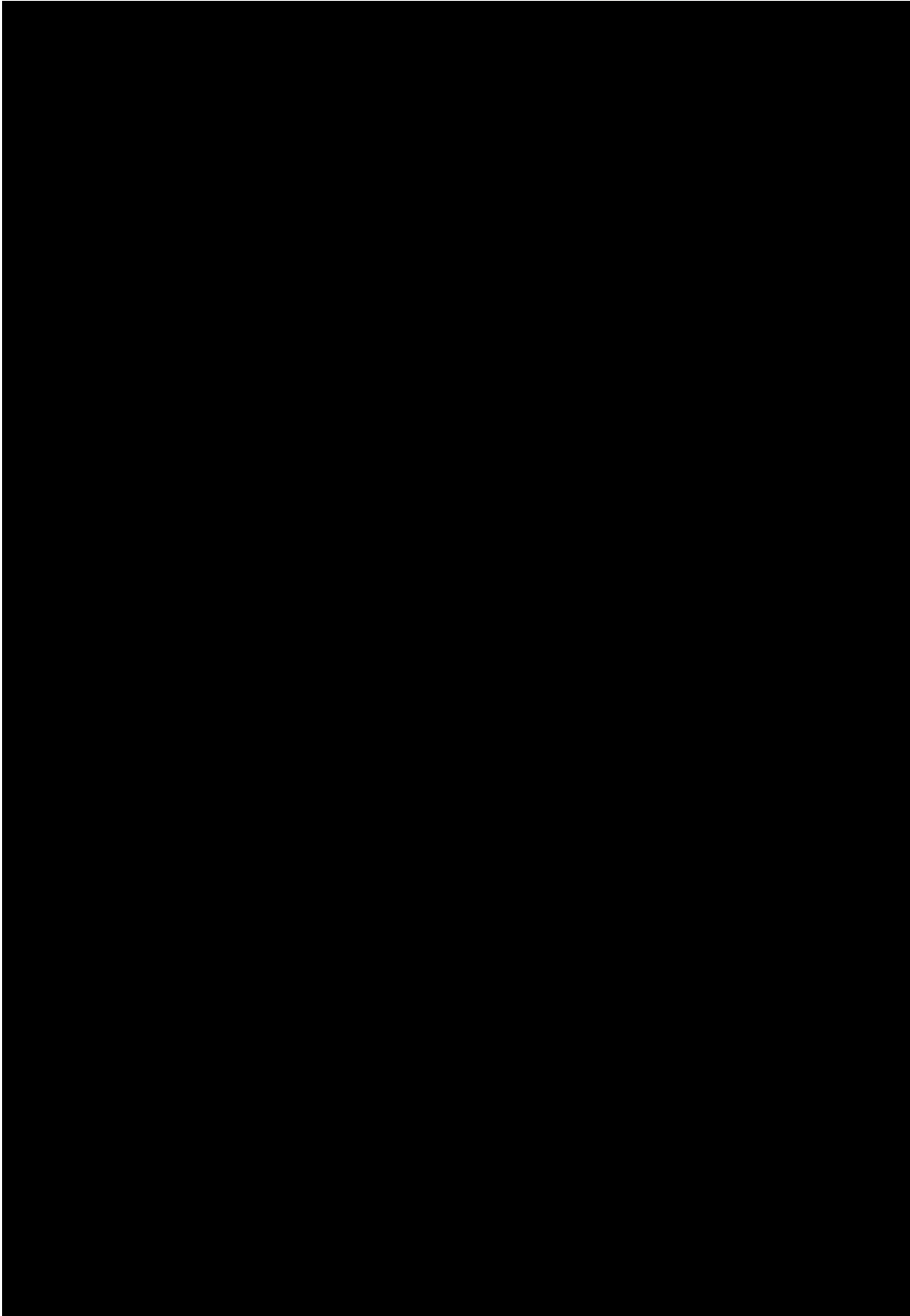


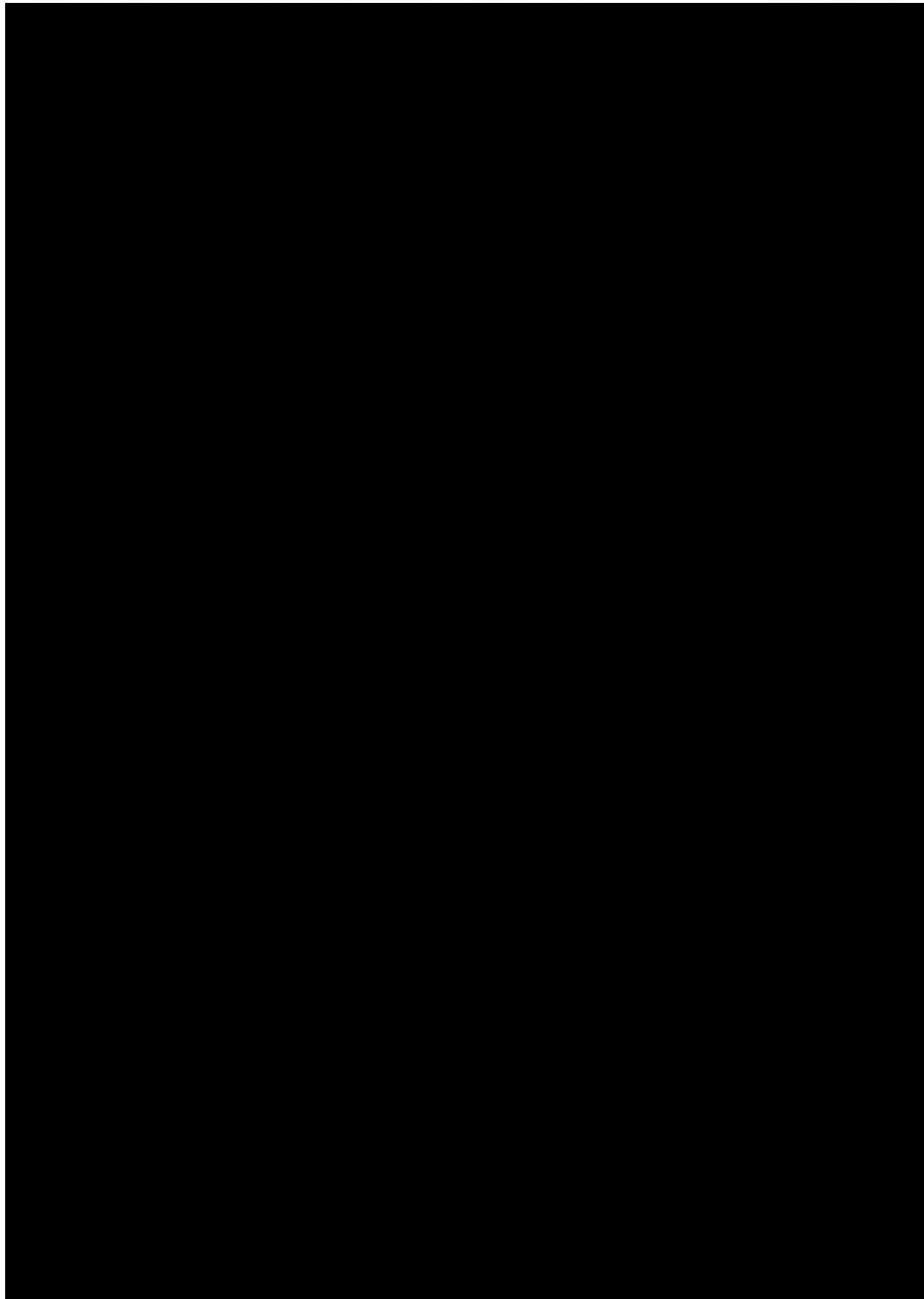


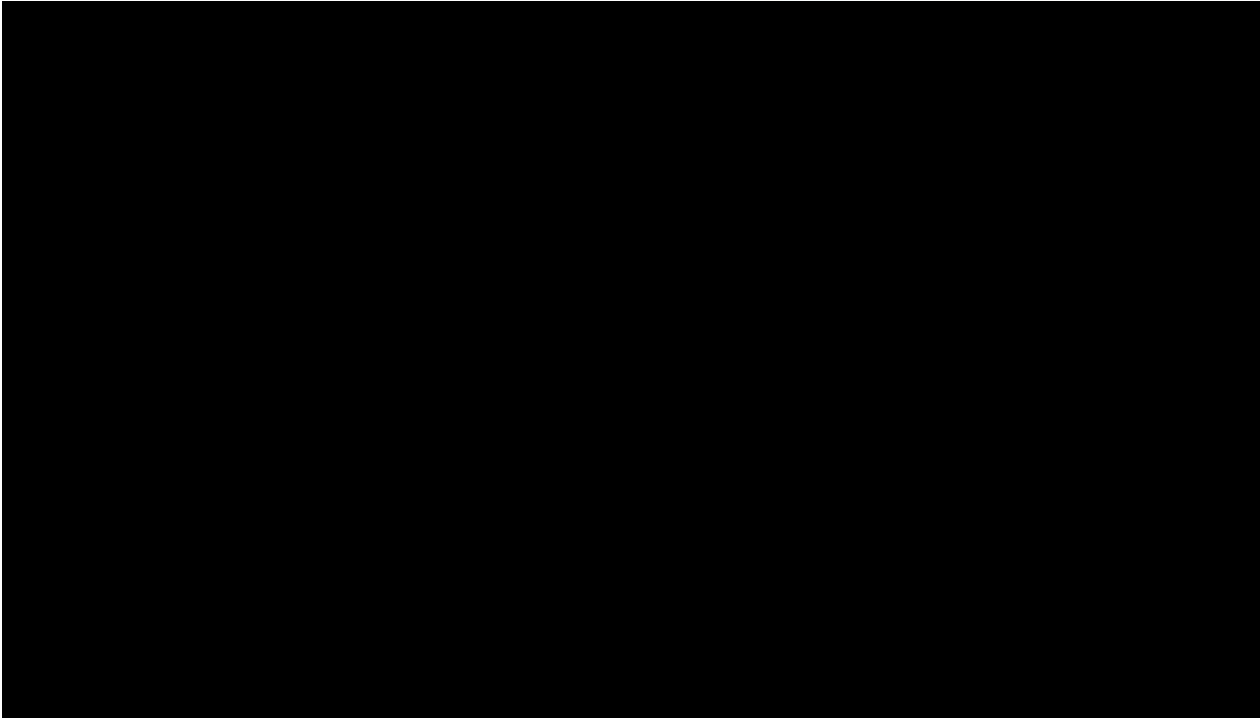












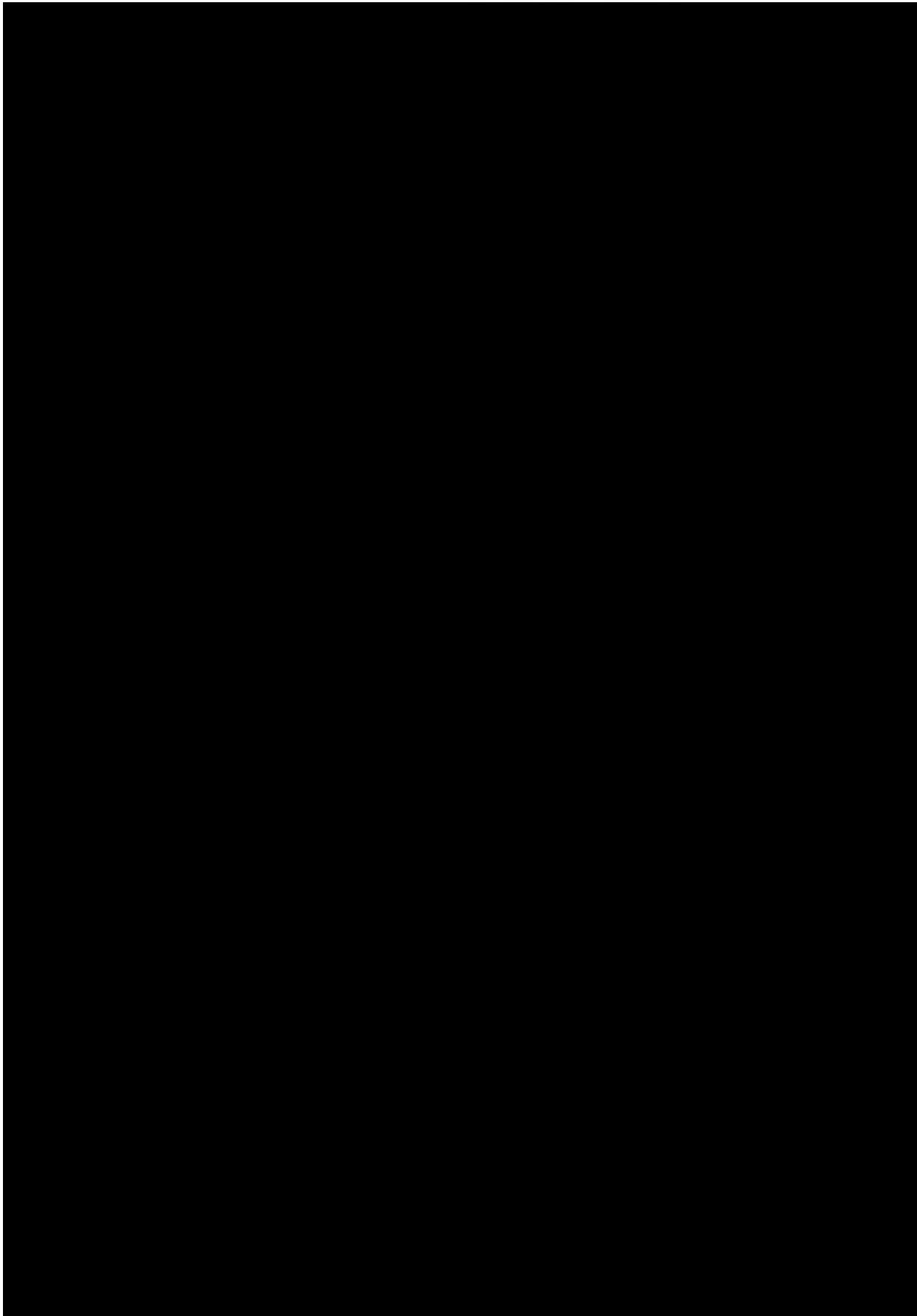
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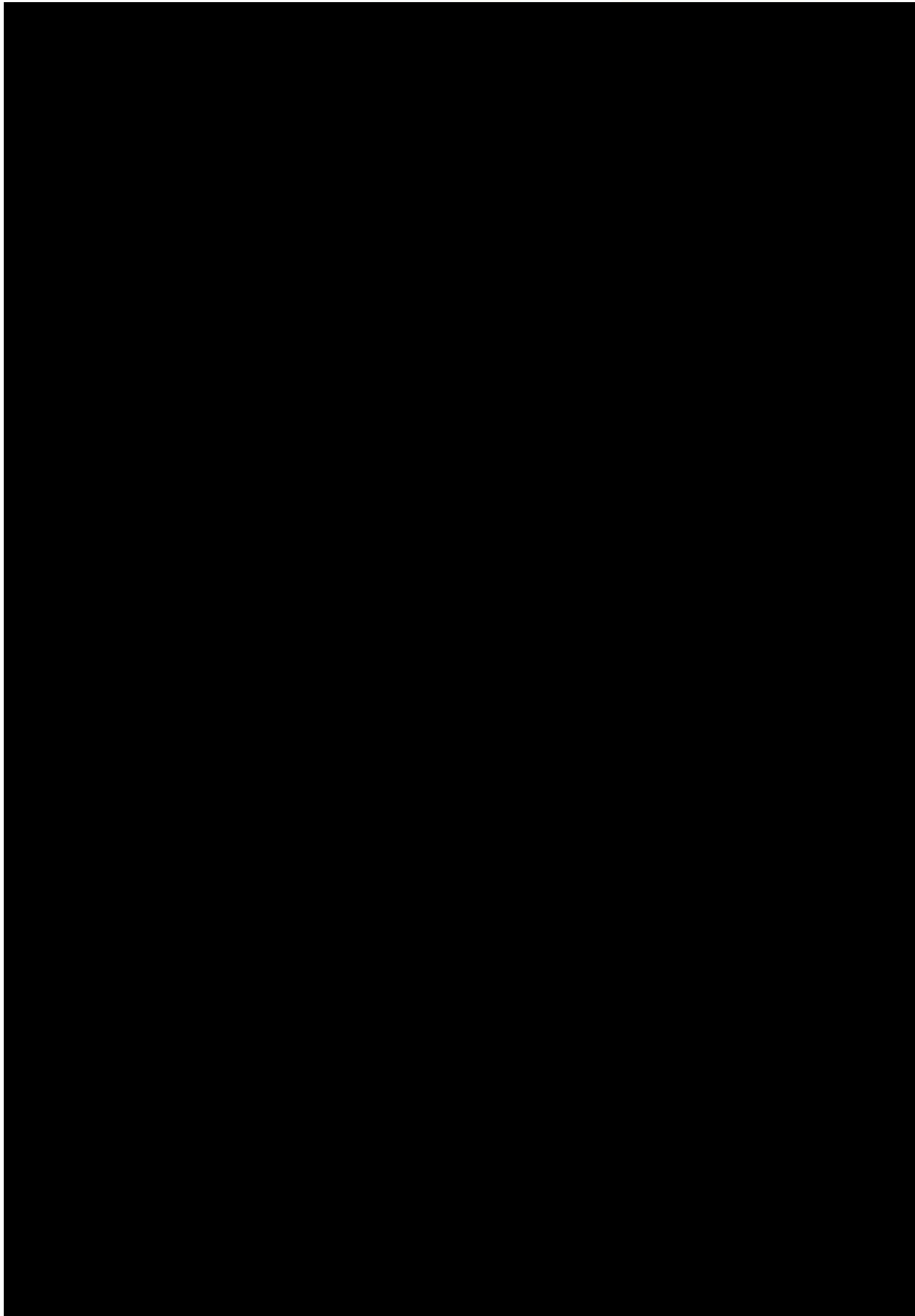
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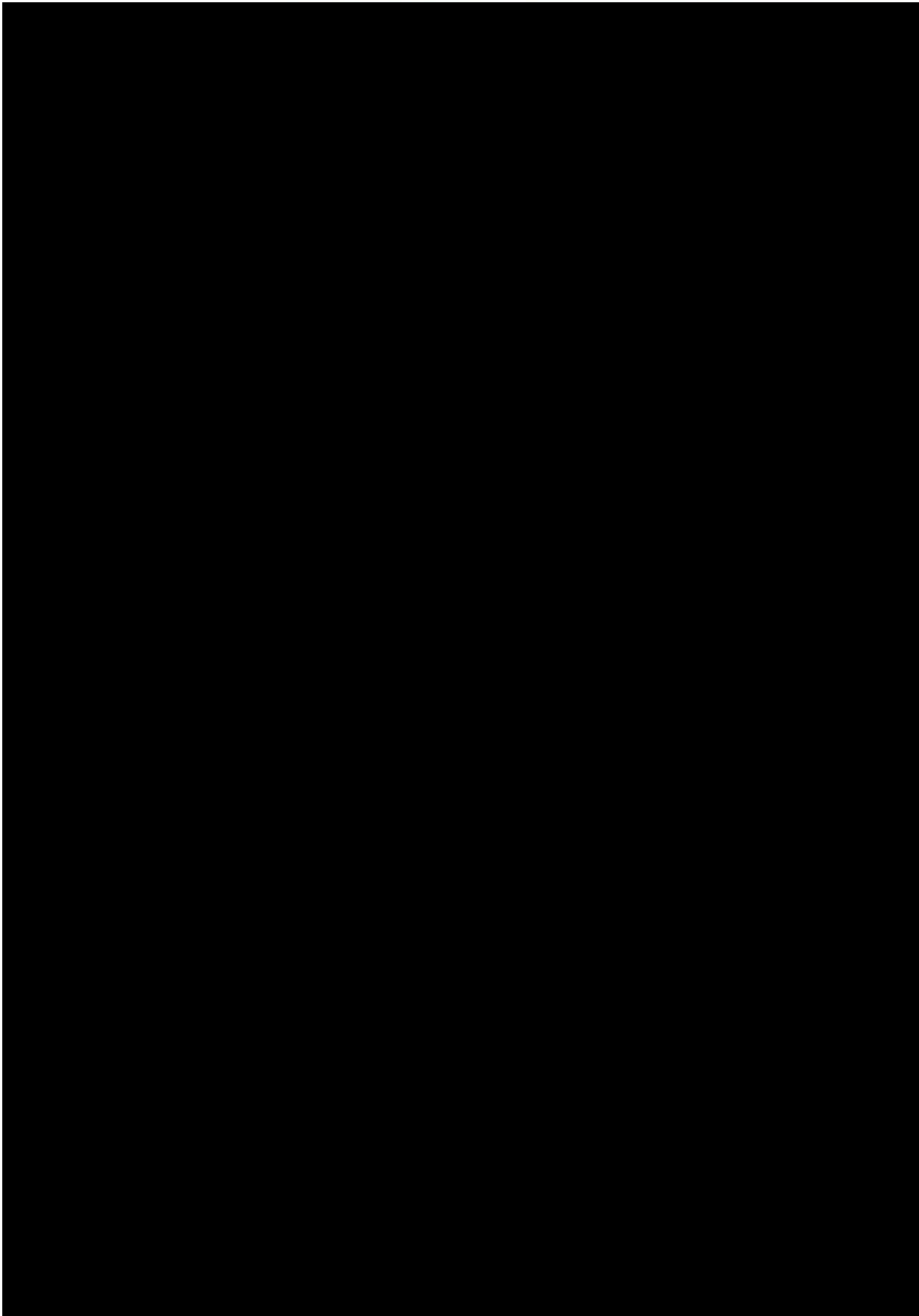
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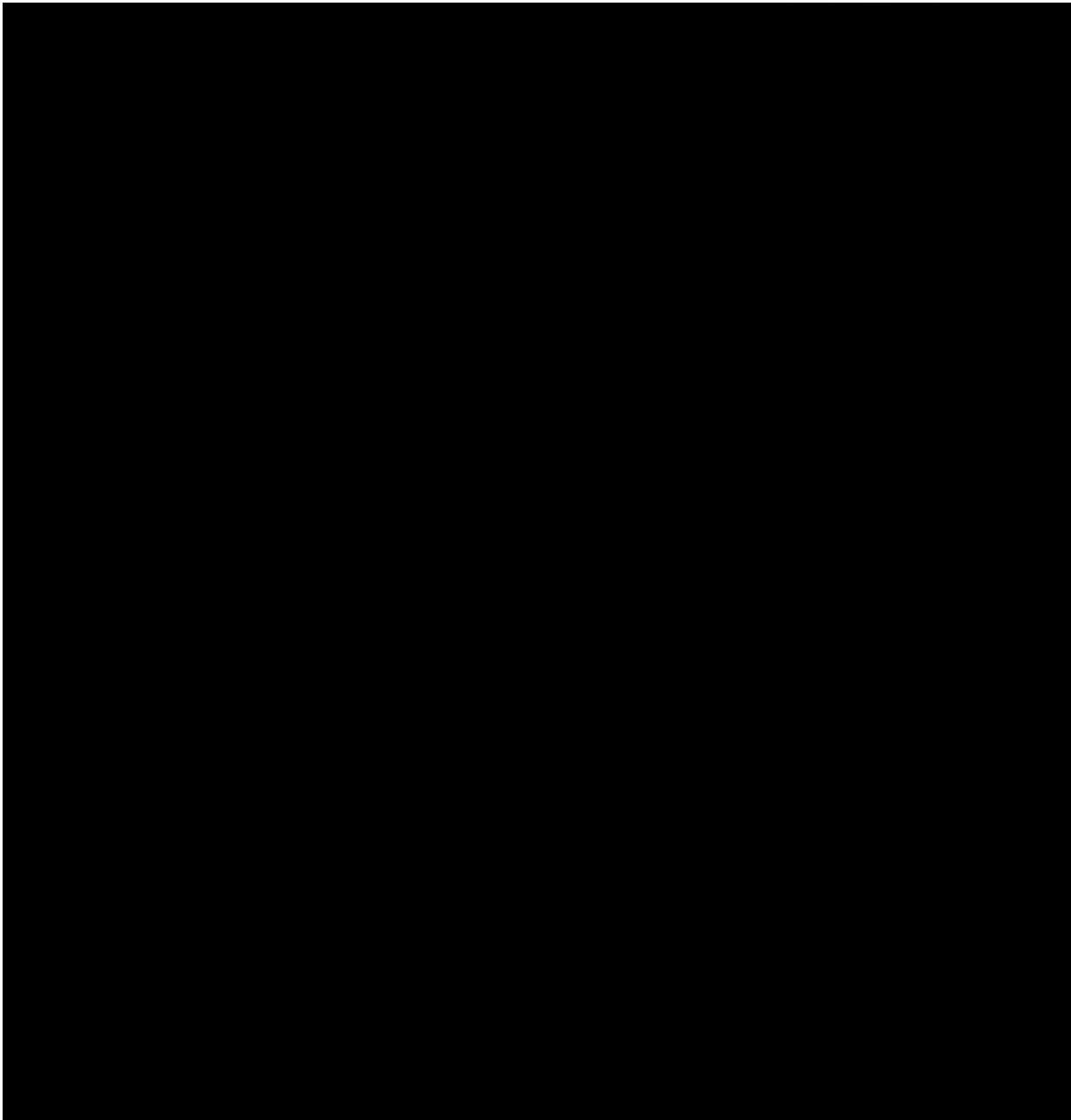
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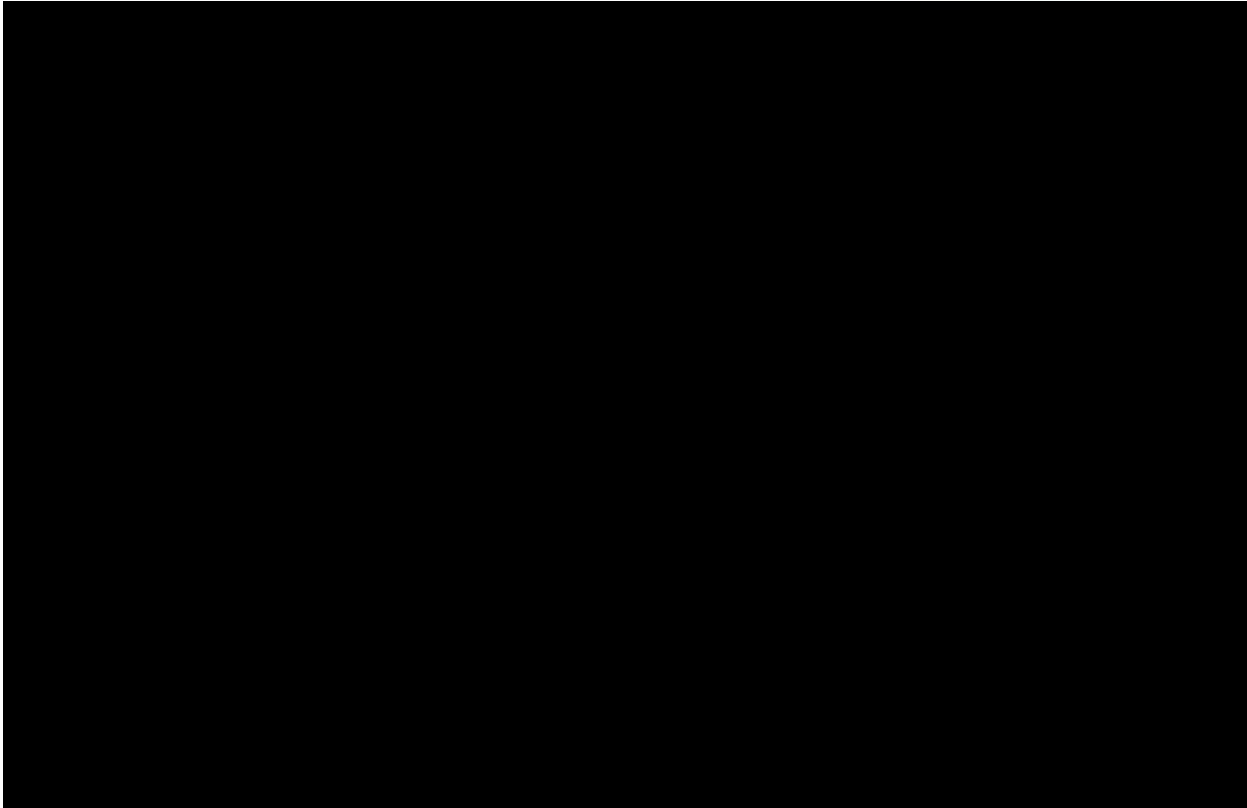
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For Inclusion
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Sydenham

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Transport
for NSW

Environmental Incident Classification Procedure

NWRL ES-PW-303/1.0

Procedure – Applicable to:

North West Rail Link/Sydney Rapid Transit

NWRL Integrated Management System

Status: FINAL

Date of issue: 1.0

Effective date: 31 March 2015

Review date: 31 March 2015

Document owner: 31 March 2016

Security classification: Deputy Project Director, Safety, Environment & Business Systems

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1. Purpose & Scope

This Procedure documents the process (including forms) to be used, and ensure a consistent approach, when classifying and reporting an environmental incident or non-compliance.

This Procedure applies to all North West Rail Link (NWRL) and Sydney Rapid Transit (SRT) alliances, contractors and subcontractors and is to be used by all NWRL/SRT employees and contract employees working on behalf of NWRL/SRT. A contractor may be a professional services contractor, construction contractor or an individual or organisation providing goods and services to NWRL/SRT. The work being undertaken may be site investigations as well as construction.

Note that this Procedure applies specifically to the reporting of environmental incidents and non-compliances to NWRL/SRT and relevant regulatory authorities, particularly the NSW Environmental Protection Authority (EPA). It does not provide guidance on management responses or corrective actions required in response to those incidents, which shall be detailed in the Environmental Management Plan relevant to the site.

2. Definitions

All terminology in this Procedure is taken to mean the generally accepted or dictionary definition. Terms and jargon specific to this Procedure are defined within the [NWRL QM-FT-435 Integrated Management System \(IMS\) Glossary](#).

3. Accountabilities

The Deputy Projector Director (DPD) Safety, Environment & Business Systems is accountable for this Procedure. Accountability includes authorising the document, monitoring its effectiveness and performing a formal document review.

Direct Reports to the Project Director are accountable for ensuring the requirements of this document are implemented within their area of responsibility.

The Direct Reports to the Project Director who are accountable for specific projects/programs are accountable for ensuring associated contractors comply with the requirements of this document.

4. Legislative Requirements

There are a number of Acts and Regulations that include a specific requirement to notify a regulatory authority as a result of pollution, contamination or environmental harm occurring, including impacts to heritage items. NWRL/SRT have defined such incidents as Notifiable Events.

4.1. Notifiable Events

A notifiable event is *any environmental incident or issue that triggers a specific statutory requirement to notify a regulatory authority*. Some event types are summarised in Table 1.

The contractors' environmental manager must determine whether an incident or issue is notifiable, with advice from the Manager Environment or Principal Manager, Sustainability, Environment & Planning as required.

Table 1: Examples of Notifiable Events

Event type	Legislation		Notification to
Pollution incident ¹	POEO Act 1997	Part 5.7	EPA Pollution Line as soon as practicable after becoming aware of the incident
	POEO (General) Regulation 2009	Section 101	
Land contamination	Contaminated Land Management Act 1997	Section 60(1)	EPA in writing as soon as practicable after becoming aware of the contamination, where required as prescribed in the EPA Guidelines on the Duty to Report Contamination
Discover aboriginal relic	National Parks & Wildlife Act 1974	Section 91	Director-General of EPA in writing within a reasonable time after becoming aware
Discover Aboriginal Remains	Commonwealth Aboriginal & Torres Strait Islanders Heritage Protection Act 1984	Section 20	Commonwealth Minister of the Environment in writing as soon as practicable after becoming aware
Discover relic	Heritage Act 1977	Section 146	Heritage Council in writing within a reasonable time after becoming aware

1. Further information on reporting pollution incidents to EPA is provided in **Section 5.2.4 Environmental Incident/Non-Compliance Report**

5. Environmental Incident Classification & Reporting Procedure

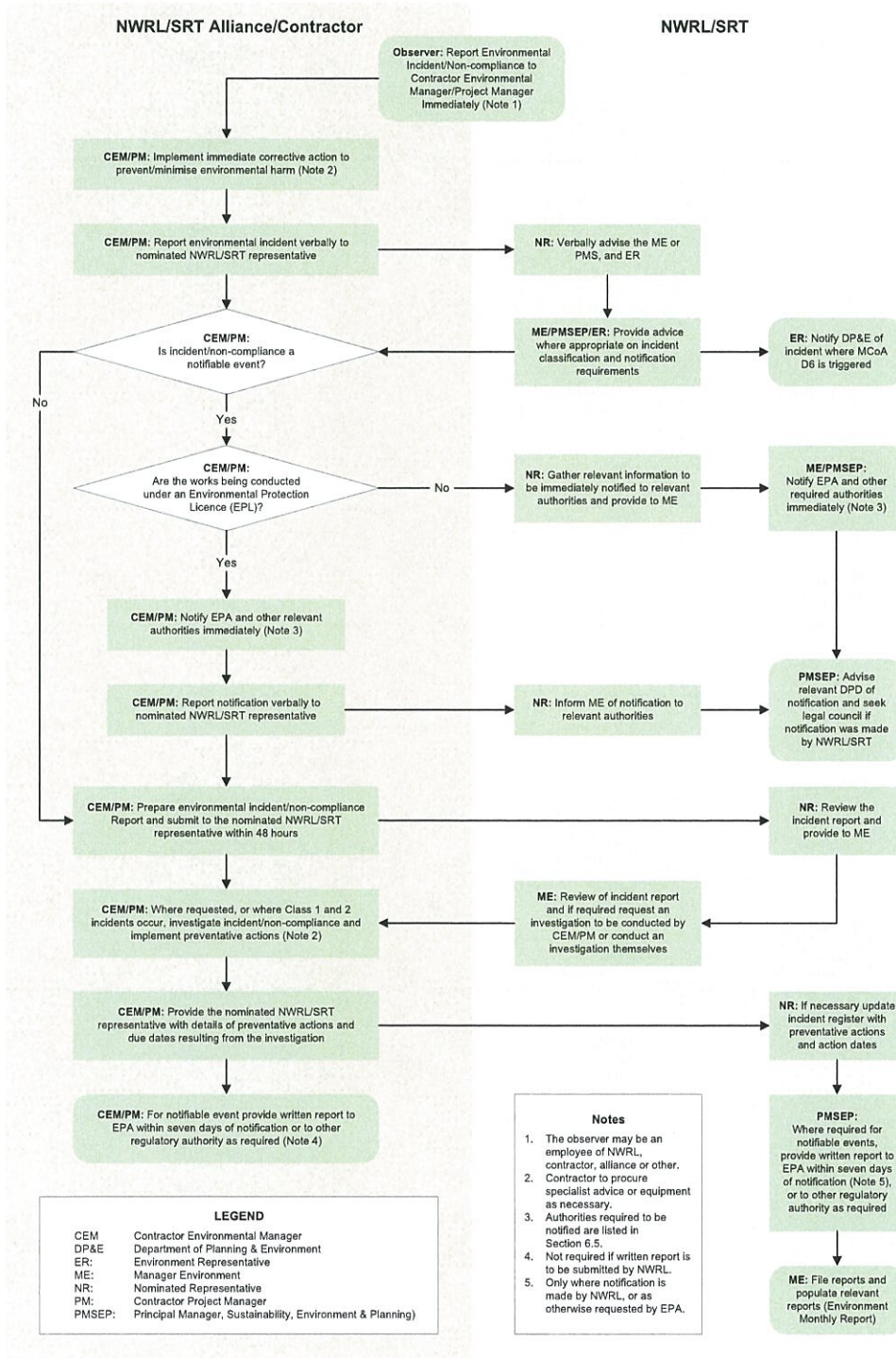


Figure 1: Environment Incident Classification & Reporting Procedure overview

5.1. Environmental Incident

NWRL/SRT have defined an environmental incident as:

An occurrence or set of circumstances, as a consequence of which pollution (air, water, noise, and land) or an adverse environmental impact has occurred or is likely to occur.

Adverse environmental impact includes contamination, harm to flora and fauna (either individual species or communities), damage to heritage items or adverse community impacts.

Table 2: Examples of Environmental Incidents

Type	Example Incident
Air	Odour that travels beyond the site boundary
Air	Dust exceeding reasonable levels without active management measures in place
Air	Operation or maintenance of plant in a manner that causes or is likely to cause air pollution
Water Pollution	Discharge of water on or off site in a manner that causes or is likely to cause water pollution
Noise and Vibration	Noise that travels beyond the site boundary as a result of poorly maintained plant or operation of plant in an inefficient manner
Noise and Vibration	Failure to comply with the approved hours of work
Land Contamination	Cause any substance to leak, spill or otherwise escape (whether or not from a container) in a manner that harms or is likely to harm the environment
Land Contamination	Spill/deposit material or allow material to be deposited on land in a manner that causes or is likely to cause land pollution
Land Contamination	Cause contamination of land
Land Contamination	Dispose of waste in a manner that harms or is likely to harm the environment
Flora and Fauna	Harm or "pick" a threatened species, endangered population or endangered ecological community
Flora and Fauna	Damage to vegetation, fauna or habitat including watercourses
Heritage	Damage, disturbance, destruction or works to heritage items/relics
Heritage	Damage, disturbance, or destruction of Aboriginal objects or places

5.1.1. Incident Classification

There are three types of environmental incident classification each of which trigger a variety of management actions and/or legislative requirements. An event is classified into one of these three categories using the Risk Matrix (refer to [NWRL Risk Management Standard](#)).

This matrix provides a range of environmental consequences (C6, C5, C4, C3, C2, C1), where C6 represents the lowest impact and C1 the highest. These categories (Class 1, 2 and 3) are used to denote the difference between the following three environmental incident classifications.

Table 3: Classification System for Environmental Incidents

Class 3			Class 2		Class 1
C6	C5	C4	C3	C2	C1
No appreciable changes to environment and/or highly localised event	Change from normal conditions within environmental regulatory limits and environmental effects are within site boundaries	Short-term and/or well-contained environmental effects. Minor remedial actions probably required	Impacts external ecosystem and considerable remediation is required	Long-term environmental impairment in neighbouring or valued ecosystems Extensive remediation required	Irreversible large-scale environmental impact with loss of valued ecosystems

5.1.2. Incident Types

In addition to the classification of an incident, each event is assigned a type. They are grouped by logical environmental management areas so that targeted auditing, training or awareness initiatives can be enacted in response to emergent trends with the objective of driving down incident rates:

- Air and dust.
- Community.
- Flora and fauna.
- Heritage.
- Land contamination.
- Noise and vibration.
- Systems and documentation.
- Traffic, transport and access.
- Unauthorised works.
- Waste and hazardous materials.
- Water pollution.

5.1.3. Environmental Issue

An environmental issue is any occurrence or set of circumstances that has the potential to cause or lead to an environmental incident if not rectified.

Environmental issues may be identified during formal or informal inspections undertaken by an alliance, contractor, NWRL/SRT employee or Environmental Representative (ER). Issues identified during NWRL/SRT inspections (e.g. those conducted by the Manager Environment) shall be recorded on the **NWRL ES-FT-406 Environmental Inspection Information & Summary Form**.

If any issues raised during an inspection are also considered to constitute an environmental incident and/or non-compliance then this must be noted on the inspection report. Any such incidents must also be reported separately in accordance with **Section 5.2 Environmental Incident Response**.

5.1.4. Environmental Non-compliance

Where an issue or incident has been raised, the Manager Environment will determine, prior to signing off the incident form, whether the situation is non-compliant with any relevant conditions of approval or other requirements.

In the event that a non-compliance has occurred, the following details are to be recorded on the incident form or entered into the incident register as an issue:

- The nature of the non-compliance.
- The relevant condition that is non-compliant.
- The date the non-compliance was raised.
- A description of the non-compliance.
- Details of actions being taken to return the condition to a compliant status.
- The status of the non-compliance (open or closed).

Where a decision is to be made to raise a non-compliance, the decision is to be made at the discretion of the Manager Environment or the Principal Manager, Sustainability, Environment and Planning.

5.2. Environmental Incident Response

5.2.1. Reporting Pollution Incidents to Relevant Authorities

If an incident or non-compliance is a notifiable event, then a report must be provided to the relevant regulatory authority within the timeframe(s) specified by the relevant legislation. For notifiable events other than pollution incidents, the alliance/contractor must seek advice from NWRL/SRT on whether the notification is to be made by NWRL/SRT or the alliance/contractor.

Pollution incidents which are causing or threatening material harm to the environment must be reported to each of the following authorities immediately after project personnel become aware of the incident, as required by Section 148 of the POEO Act 1997. The contact numbers for these authorities are listed in Table 4.

Table 4: Contact details for authorities

Authority/Service	Contact method
EPA Environment Line	131 555
Local Authority	Local Council (specific to area)
Ministry of Health	Public Health Unit (refer to web page to confirm local area contact details)
WorkCover NSW	131 050
Fire and Rescue NSW	000

Relevant Information required to be given to EPA when making a notification is specified in Section 150 of the POEO Act 1997 as follows:

- (a) Time, date, nature, duration and location of the incident.
- (b) Location of the place where pollution is occurring or is likely to occur.
- (c) Nature, the estimated quantity or volume and the concentration of any pollutants involved.
- (d) Circumstances in which the incident occurred (including the cause of the incident, if known).
- (e) Action taken or proposed to be taken to deal with the incident and any resulting pollution or threatened pollution.
- (f) Other information prescribed by the regulations.

All information known at the time of making the notification must be reported. If the information required by (c), (d) or (e) above is not known at the time of initial notification but becomes known afterwards, it must be reported to each authority immediately after it becomes known. Verbal notification must be followed by notification in writing within seven days of the date on which the incident occurred.

Pollution incidents are not required to be reported if the:

- incident has already come to the notice of EPA;
- incident is an ordinary result of action required to be taken to comply with an environment protection licence, an environment protection notice or other requirement of or made under the POEO Act 1997; and/or
- pollution incident involves only the emission of an odour.

Failure to report a pollution incident as required by the POEO Act 1997 is an offence.

Where any work or activity is regulated by an Environment Protection License (EPL), notification of a pollution incident to EPA must be made by the licensee. Thus, where the alliance/contractor holds the EPL for the project, notification to EPA shall be made by the alliance/contractor. For projects where NWRL/SRT hold the EPL, notification shall be made by NWRL/SRT.

For any work or activity that is not regulated by an EPL, notification of pollution incidents to EPA shall be made by NWRL/SRT, unless the alliance/contractor is instructed otherwise by NWRL/SRT. This includes pollution incidents that occur as a result of pre-construction activities which may be undertaken prior to an EPL being required for a project. Pre-construction activities are determined by the planning approval and may include, for example, geotechnical investigations, surveys or fencing.

Where the Environmental Representative determines there to have been a significant off-site impact on people or the biophysical environment, the Project Director will notify the Director General within 48 hours in accordance with condition D6 of the Ministers Conditions of Approval. This notification will be followed by a full written report within seven days of the date on which the incident occurred.

5.2.2. Nominated Representatives

Where this Procedure is applied within NWRL/SRT, a Nominated Representative will be selected for the relevant works package. The Nominated Representative must possess environmental experience and competency in managing incidents and be a representative of the client (Transport for NSW). This representative holds specific responsibilities in the incident management process as outlined in Figure 1.

5.2.3. Verbal Notification

The Manager Environment and Contract Delivery Management Representative must be notified verbally as soon as possible after the alliance/contractor becomes aware of the incident or non-compliance. The Manager Environment shall provide advice to the alliance/contractor on the classification of the incident/non-compliance and whether notification to any regulatory authority is required.

5.2.4. Environmental Incident/Non-Compliance Report

Environmental incident reports or Non-compliance reports must be sent to NWRL/SRT within 48 hours of occurrence after observation using either the Environmental Incident/Non-Compliance Report or another approved report form. The Manager Environment shall review the report and, if required, provide advice to the contractor on any requirements for the incident investigation, or in the case of a less serious incident, may require an investigation to be conducted.

The Nominated Representative will be responsible for updating the incident register with the details of the incident and any preventative actions.

5.2.5. Relationship to NWRL/SRT Crisis Management

Incidents which are likely to cause major damage to the environment will be managed in accordance with **NWRL PS-PW-330 Crisis Management Implementation Plan**. Determination of whether the environmental incident requires the activation of a Crisis Management Team (CMT) will be made by the Project Director (or delegate) in accordance with the assessment process and activation/escalation triggers identified in **NWRL PS-PW-330 Crisis Management Implementation Plan**.

5.3. Environmental Incident Register

The Environmental Incident Register is used to manage the information associated with reporting of environmental issues, incidents, inspections and non-compliances. This register is maintained by the Manager Environment and may be used by a variety of individuals to input data.

This register analyses the data it contains and produces environmental compliance metrics that are used for a range of environmental reporting requirements. It tracks total number:

- and types of environmental issues raised each month;
- of environmental inspections each month;
- of Class 3 incidents each month; and
- of Class 1 and 2 incidents combined each month.

6. Related Documents and References

Related Documents and References

- NWRL ES-MM-101 Environmental and Sustainability Management Manual
<http://intranet.transport.nsw.gov.au/guides/nwrl-environmental-sustainability-management-manual.pdf>
- [NWRL Risk Management Standard](#)
- NWRL PS-PW-330 Crisis Management Implementation Plan
- NWRL ES-PW-303 Environmental Incident Classification & Reporting Procedure (*this document*)
- NWRL ES-FT-403 Environmental Incident and Non-compliance Report Form
- NWRL ES-FT-406 Environmental Inspection Information & Summary Form
- NWRL QM-FT-435 Integrated Management System (IMS) Glossary:
<http://intranet.transport.nsw.gov.au/guides/nwrl-ims-glossary.pdf>

7. Superseded Documents

Superseded Documents

There are no documents superseded as a result of this document.

8. Document History

Version	Date of approval	Summary of change
1.0	31/3/2015	New document



Transport
for NSW

Water Discharge & Reuse Procedure

NWRL ES-PW-309/1.0

Procedure – Applicable to:

North West Rail Link/Sydney Rapid Transit

NWRL Integrated Management System

Status:	FINAL
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1. Purpose & Scope

The purpose of this Procedure is to provide guidance to site personnel for managing, discharging and reusing excess water on North West Rail Link (NWRL) and Sydney Rapid Transit (SRT) construction sites. This Procedure includes references to relevant industry guidelines but is not intended to replace them, nor does it override the relevant legislative and regulatory requirements.

This Procedure applies to all NWRL alliances, contractors and subcontractors.

2. Accountabilities

The Deputy Projector Director (DPD) Safety, Environment & Business Systems is accountable for this Procedure. Accountability includes authorising the document, monitoring its effectiveness and performing a formal document review.

Direct Reports to the Project Director are accountable for ensuring the requirements of this document are implemented within their area of responsibility.

The Direct Reports to the Project Director who are accountable for specific projects/programs are accountable for ensuring associated contractors comply with the requirements of this document.

3. Definitions

All terminology in this Procedure is taken to mean the generally accepted or dictionary definition. Terms and jargon specific to this Procedure are defined within the [NWRL QM-FT-435 Integrated Management System \(IMS\) Glossary](#), or are listed below.

Definitions	
The Blue Book	<i>Managing Urban Stormwater: Soils & Construction 2004</i> , Landcom.
Environment Manager	The Alliance or Contractor Environment Manager.
pH	The measure of the acidity or alkalinity of a solution.
POEO Act	Protection of the Environment Operations Act 1997.
TSS	Total suspended solids.
Waters	(as defined in the POEO Act) means the whole or any part of: (a) any river, stream, lake, lagoon, swamp, wetlands, unconfined surface water, natural or artificial watercourse, dam or tidal waters (including the sea), or (b) any water stored in artificial works, any water in water mains, water pipes or water channels, or any underground or artesian water.

4. Water Discharge and Reuse Procedure

4.1. Legislative Requirements and Due Diligence

The Protection of the Environment Operations (NSW) Act 1997 (POEO Act) is the key piece of environment protection legislation in NSW, administered by the Environmental Protection Authority (EPA). Offences under the POEO Act are classified into three tiers, with Tier 1 offences being the most serious – attracting up to \$5 million and seven years imprisonment for wilful or negligent harm to the environment. Under section 120 of this Act, any unlicensed water pollution event, no matter how minor, is illegal.

Table 1: POEO Prohibition of pollution of waters

120 Prohibition of pollution of waters
<p>(1) A person who pollutes any waters is guilty of an offence.</p> <p>(2) In this section: 'pollute' waters includes cause or permit any waters to be polluted.</p>

Note: For the definition of water pollution or pollution of waters refer to the POEO Act.

Under section 122 of the POEO Act it is a defence against prosecution under section 120 if the pollution was regulated by an EPL and the conditions of that EPL relating to pollution of waters were not contravened. In the absence of any specific EPL provision, however, to avoid causing pollution and breaches of section 120, any water discharged from site must be of the same quality, or better, than the quality of the receiving waters (at the time of discharge).

It is essential that the quality of the receiving waters is established through background monitoring and sampling, prior to any discharge from site, so that the potential impact of discharge water can be determined. Monitoring of the receiving waters must be undertaken prior to any land disturbance works (to establish a baseline) as well as during construction.

It is also essential that water management standards, and particularly erosion and sediment controls, are implemented to control and treat water. Landcom's *Managing Urban Stormwater: Soils & Construction 2004 (The Blue Book)* is considered a best practice guideline for erosion and sediment control on construction sites in NSW. If implemented, *The Blue Book* will help mitigate the impacts of land disturbance activities on soils, landforms and receiving waters and minimise the potential for water pollution events to occur.

Water quality criteria given in this procedure, such as that for Total Suspended Solids (TSS), 50mg/L, as well as testing and treatment techniques, are based on *The Blue Book*. However, compliance with *The Blue Book* does not, of itself, provide any defence to an alleged breach of section 120 of the POEO Act. Examples of situations where compliance with *The Blue Book* could still lead to a breach of section 120 are as follows:

- Water discharged with TSS below 50mg/L may still cause pollution and breach section 120, if the receiving waters have a TSS less than 50mg/L at the time the discharge occurs.
- Appropriate erosion and sediment controls are in place, but a rainfall event occurs beyond the design capacity of those controls.

Should a water pollution incident occur, being able to demonstrate due diligence in the implementation of environmental controls, and particularly erosion and sediment controls, may provide a defence against prosecution. Due diligence may be recognised if the proponent is able to demonstrate that erosion & sediment controls have been implemented in accordance with the requirements of *The Blue Book*. The Contractor must satisfy itself that appropriate management controls have been developed, implemented, maintained and documented to establish a due diligence defence.

4.2. Discharging Water

All water discharges must be documented using the NWRL Approval to Discharge or Reuse Water Form or site-specific equivalent. Discharge is not permitted until the Contractor Environment Manager or nominated representative has signed the discharge form. Note that in some cases the NWRL Manager Environment or the Environmental Representative may be required to sign off the discharge form.

This procedure is not used for discharging water where the activity is covered by an EPL. The licence holder will have their own procedure covering the process for discharging water that addresses any site specific environmental conditions.

4.2.1. Nominated Representatives

Where this procedure is applied within the NWRL project a Nominated Representative will be selected for the relevant works package. The Nominated Representative must possess environmental experience and competency in this procedure and be a representative of the client (Transport for NSW). This representative holds specific responsibilities under this procedure as outlined in Figure 1.

4.3. Requirements for Discharge to Waters

Water to be discharged must be tested and, if required, treated to ensure that it meets water quality criteria and that pollution of the receiving waters does not occur. Results of testing and details of any treatment undertaken must be noted on the Approval to Discharge or Reuse Water Form.

Note that an EPL may authorise discharge of water from specific locations or premises, and establish criteria that differ from those given in this Procedure. In such circumstances the EPL, and any conditions and criteria of that EPL, take precedence over this Procedure.

4.3.1.1. Criteria for Discharge to Waters

Before water can be discharged to any receiving waters (whether on or off site), it must as a minimum meet the following criteria.

Table 2: Criteria for Discharge to Waters

Parameter	Criterion	Method	Time prior to discharge
Oil and grease	No visible	Visual inspection	< 1 hour
pH	6.5-8.5	Probe/meter ¹	< 1 hour
Total Suspended Solids (TSS)	< 50mg/L ²	Meter/grab sample ³	< 1 hour/< 24 hours

If the criteria above are not met, the water will have to be treated and retested prior to discharge – go to [Treating Water Prior to Discharge](#). If all criteria above are met then the water may be authorised for discharge by the Manager Environment – go to [Reuse on Site](#).

Table 3: Salinity and TSS

1. Salinity	<p>Salinity is determined by measuring the electrical conductivity (EC) of the water, using a meter. Setting an acceptable criteria range for salinity of discharge water is dependent on the salinity of the receiving waters and must be determined and applied on a site-specific basis following background water quality monitoring. Measuring discharge waters for salinity shall only be undertaken if required by:</p> <ul style="list-style-type: none"> the Conditions of Approval an Environment Protection Licence (EPL). the particular conditions of the site (soil or geology) or the receiving waters.
2. Correlating Total Suspended Solid (TSS) with Turbidity	<ul style="list-style-type: none"> Consideration may be given to establishing a site-specific relationship between total suspended solids concentration (TSS) and turbidity, measured in nephelometric turbidity units (NTU). This allows the TSS to be inferred from an NTU reading. The benefit of using NTU is that it can be quickly measured on site with a hand-held meter, whereas water quality meters that measure TSS are expensive and the results from samples sent for laboratory analysis will not be available immediately. However, NTU is affected by factors other than suspended solids, such as colour (e.g. tannins may alter the NTU reading). As such, a correlation curve (i.e. across a range of readings) must be determined between TSS and NTU that is specific to the site. The correlation must be determined via laboratory analysis, by a NATA-accredited laboratory. Thorough records of the site-specific correlation must be kept, and any recommendations and/or limitations should be documented as part of the CEMP. For further information and guidance on correlating TSS with NTU refer to Appendix E of <i>The Blue Book</i>.

1 Litmus paper and pool testing kits are not to be used.

2 As discussed in Section 4, a more stringent TSS criterion may need to be adopted in certain situations.

3 Samples must be analysed at a NATA accredited laboratory.

4.3.2. Treating Water Prior to Discharge

Prior to the use of any testing equipment on site, the appropriate calibrations must be conducted as per the manufacturer's recommendations and recorded for future referral if required.

Table 4: Treating water to discharge

1. Oil and grease	<ul style="list-style-type: none"> • Examine surface of water immediately prior to discharge for evidence of oil and grease (e.g. sheen, discolouration). • No action is required if there is no visual contamination. • If there is contamination, the contaminated water must either be disposed of at a licensed disposal facility, or treated using appropriate absorbent materials, which must be spread on the surface. • Any used absorbent materials are to be disposed of appropriately.
2. pH Levels	<ul style="list-style-type: none"> • If pH is outside the range 6.5-8.5 the water will need to be neutralised. This may be achieved via three methods which are dependent on site and time constraints: <ul style="list-style-type: none"> ○ Natural – allowing the water to sit for a period of time and naturally neutralise. ○ Mixing – by mixing with other site water of a higher or lower pH (i.e. other water has also been tested), to achieve pH 6.5-8.5. ○ Acid/Base Addition - If the water is above 8.5, acid is used to lower the pH, if the water is below 6.5 a base is used to raise the pH. To treat water with acid or base, safety requirements must be followed as outlined in relevant Material Safety Data Sheet (MSDS). • Re-test the water pH following treatment – repeat as necessary, until the acceptable pH 6.5 – 8.5 range is reached.
3. Total Suspended Solids (TSS)	<ul style="list-style-type: none"> • If TSS are greater than 50mg/L, the sediments need to settle to the bottom or be removed. This can be achieved via the following methods: <ul style="list-style-type: none"> ○ Natural settlement – this could take a long time or not occur at all (e.g. with dispersible clay soils). dependent on soil type and other characteristics, (refer to <i>The Blue Book</i>, Chapter 3 for further information). ○ Flocculation – chemical treatment with a flocculent (e.g. gypsum). If the flocculent is being applied manually, an even application over the surface of the water is essential. Only environmentally safe flocculants are to be used, based on the Environment Manager's review of Safety Data Sheet (SDS) information. ○ Filtration – pumping or gravity feeding the water through a filter medium (e.g. geofabric) to another storage area (e.g. container or sediment basin) to remove sediment. • Re-testing of water is required once treatment has been undertaken to ensure criterion for TSS is met.

Following treatment and retesting to ensure compliance with the criteria the water may be authorised for discharge by the Environment Manager – go to [Reuse on Site](#).

4.4. Requirements for Discharge to Land

The objective of discharging water to land (within the site boundary) is to allow the water to infiltrate into the ground, thus avoiding direct discharge to, or pollution of, waters. Any suspended solids in the water are deposited either on the surface or retained in underlying soil layers, so the TSS criterion does not apply. However, to avoid impacts to vegetation or soil contamination pH testing and a visual inspection for oil or grease must be undertaken (refer to [Criteria for Discharge to Waters](#) for criteria and testing methods).

4.4.1. Determining a Suitable Discharge Location

Consideration must be given to the following factors when determining a suitable offsite location:

- (a) Direction of groundwater flow – recharging groundwater that will subsequently flow either back onto site, into excavations or low lying areas should be avoided.
- (b) Erosion – the receiving area must have complete groundcover (e.g. grass) and established vegetation to minimise the risk of erosion.
- (c) Flora and fauna – water must not be discharged to areas where there is potential to have an adverse affect on any flora or fauna species.
- (d) Flooding – the receiving area must have the infiltration capacity to receive the volume of water to be discharged, without causing flooding or significantly increasing the risk of flooding should subsequent rainfall occur.

4.4.2. Criteria for Discharge to Land

Discharge to land within the site boundary shall only occur if:

- (a) There is no visible oil or grease (otherwise treat in accordance with [Treating Water Prior to Discharge](#)).
- (b) The pH levels are between 6.5 and 8.5 (otherwise treat in accordance with [Treating Water Prior to Discharge](#)).
- (c) No surface runoff will be generated from the discharge and there is no potential for discharged water to reach any watercourse (within or outside the site).
- (d) No erosion is caused from the discharge and appropriate erosion and sediment control are installed in accordance with *The Blue Book*.
- (e) All discharge water can be wholly contained within the site boundary.

If all criteria above are met then the water may be authorised for discharge to land by the Environment Manager – go to [Reuse on Site](#).

4.5. Reuse on Site

Water may be reused on site, for example, for dust suppression, to assist with compaction or for watering landscape/bush regeneration areas. As with discharges to land, the TSS criterion does not apply as water will not be discharged to any watercourse. However, pH testing and a visual inspection for oil or grease must be undertaken (refer to [Criteria for Discharge to Waters](#) for criteria and testing methods).

4.5.1. Criteria for Reuse on Site

Reuse on site shall only occur if:

- (a) There is no visible oil or grease (otherwise treat in accordance with [Treating Water Prior to Discharge](#)).
- (b) The pH levels are between 6.5 and 8.5 (otherwise treat in accordance with [Treating Water Prior to Discharge](#)).
- (c) No erosion is caused from the discharge.
- (d) Any runoff generated by the reuse is controlled entirely within the site boundary and appropriate sediment controls are installed and maintained in accordance with *The Blue Book*.

If all criteria above are met then the water may be authorised for reuse by the Environment Manager – go to [Reuse on Site](#).

4.6. Discharging Water

Once water has been tested and meets all the criteria for discharge to either waters or land, or for reuse on site, the Nominated Representative must authorise the discharge by signing the Approval to Discharge or Reuse Water Form. If required, the NWRL Environment Manager, or the Environmental Representative may also sign off the form prior to commencing the discharge.

Discharge can use a siphon system or a pump, with a priority on delivering low energy flows to downstream drainage lines, watercourses or land. The flow from the outlet must be directed onto a non-erodible surface or material and, for discharges to waters, sufficient energy must be dissipated before the flow enters the natural watercourse to ensure no erosion shall occur.

The pump inlet must be placed so that it will not disturb or take in any sediment or sediment laden water.

The discharge must be monitored throughout to ensure that the water being syphoned or pumped:

- Complies with the discharge criteria.
- Does not come into contact with any soil or exposed surfaces before discharging.
- Does not mix with any sediment laden/untested water at either the inlet or outlet.

Water must never be discharged or reused onsite in a manner that exceeds the capacity of sediment controls and/or generates runoff with the potential to discharge from site.

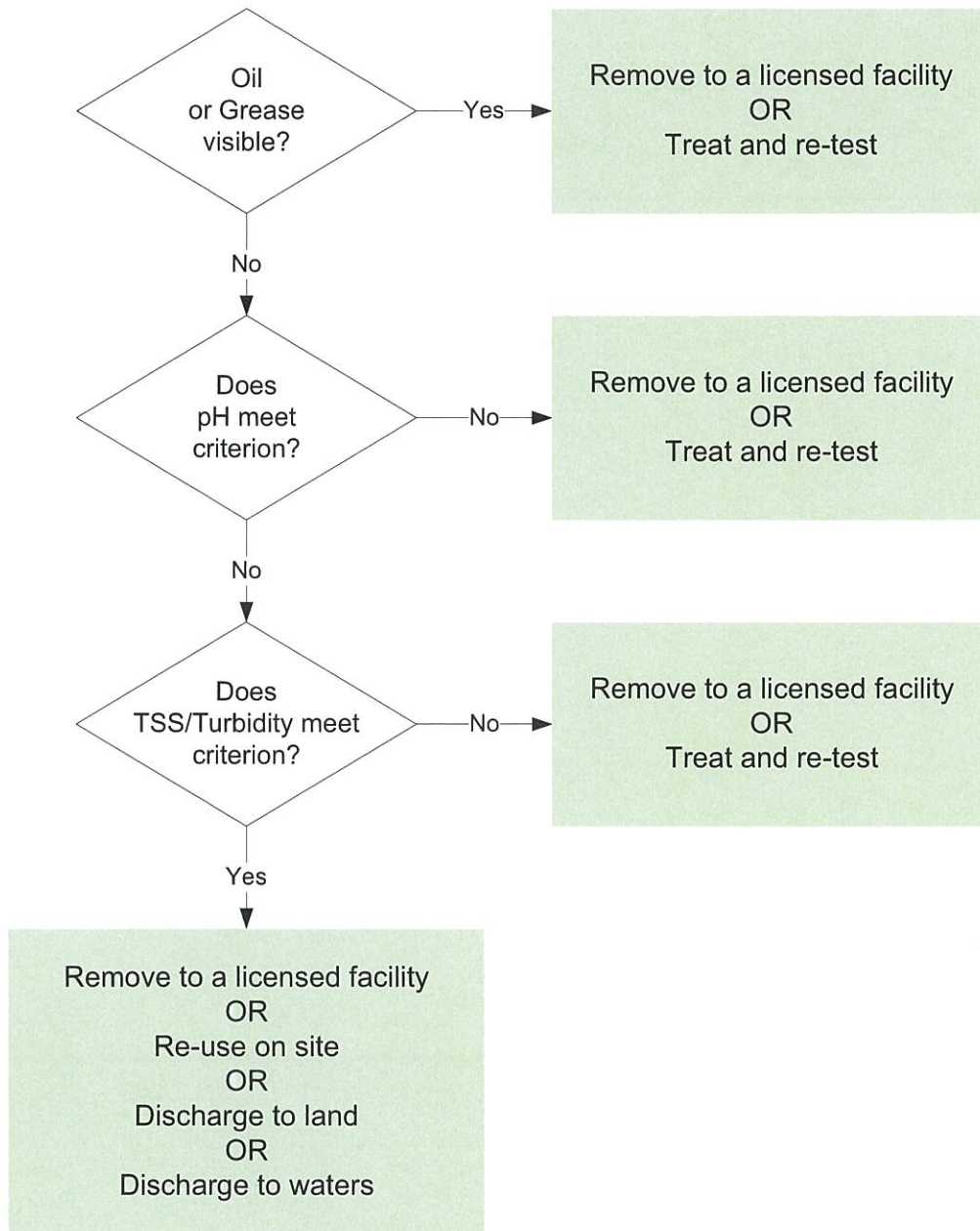


Figure 1: Process for testing water to determine options for removal, reuse, treatment or discharge

4.6.1. Monitoring and Maintenance

All sediment controls or areas that store water must be inspected to assess their integrity and capacity, as a minimum at the following times:

- Weekly during dry weather.
- Prior to forecast rainfall events.
- During rainfall events (as often as possible), within 24 hours or as soon as possible following a rainfall event when the site is unattended (e.g. on weekends).

During any offsite or onsite discharge, regular monitoring must occur to ensure compliance with the requirements specified in this Procedure.

All rain event data shall be recorded for the site, including rainfall quantities from each rain event.

4.6.2. Record Keeping

Records of all water discharges must be documented using the NWRL Approval to Discharge or Reuse Water Form or site-specific equivalent.

Records of all monitoring and maintenance measures must also be kept, on the site-specific environmental inspection checklist and other relevant document(s) (e.g. Site Foreman's diary).

5. Related Documents and References

Related Documents and References	Objective ID
<ul style="list-style-type: none"> NWRL ES-MM-101 Environmental and Sustainability Management Manual http://intranet.transport.nsw.gov.au/guides/nwrl-environmental-sustainability-management-manual.pdf NWRL ES-PW-310 Out of Hours Works Assessment Procedure NWRL ES-FT-409 Out of Hours Works (OOHW) Approval Form NWRL ES-FT-410 Out of Hours Works (OOHW) Approval Form (Non-EPL) NWRL ES-FT-412 Approval to Discharge or Reuse Water Form NWRL QM-FT-435 Integrated Management System (IMS) Glossary 	

6. Superseded Documents

Superseded Documents
There are no documents superseded as a result of this document.

7. Document History

Version	Date of approval	Summary of change
1.0	31/3/2015	New document



Integrated
Management
System

Sydney Metro Planning Approval Consistency Assessment Procedure

SM ES-PW-314/1.0

Sydney Metro Integrated Management System (IMS)

Applicable to:	Sydney Metro
Document Owner:	Principal Manager, Sustainability, Environment & Planning
System owner:	Executive Director, Safety, Sustainability & Environment
Status:	FINAL
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1. Purpose and Scope

The purpose of this document is to outline the procedure to assess whether a proposed project change is consistent with existing planning approvals.

Additionally the procedure can be used to complete the Environmental Planning Consistency Assessment.

Legislation changes are dealt with in the legislation change procedure.

2. Definitions

All terminology in this procedure is taken to mean generally accepted or dictionary definition.

3. Accountabilities

The Deputy Projector Director (DPD) Safety, Environment & Business Systems is accountable for this document. Accountability includes authorising the document, monitoring its effectiveness and performing a formal document review. Direct reports to the Program Director are accountable for ensuring the requirements of this document are implemented within their area of responsibility.

The direct reports to the Program Director who are accountable for specific projects/programs are accountable for ensuring associated contractors comply with the requirements of this document.

4. Procedure

The procedure to assess whether changes to the project are consistent with the planning approvals is illustrated in Figure 1.

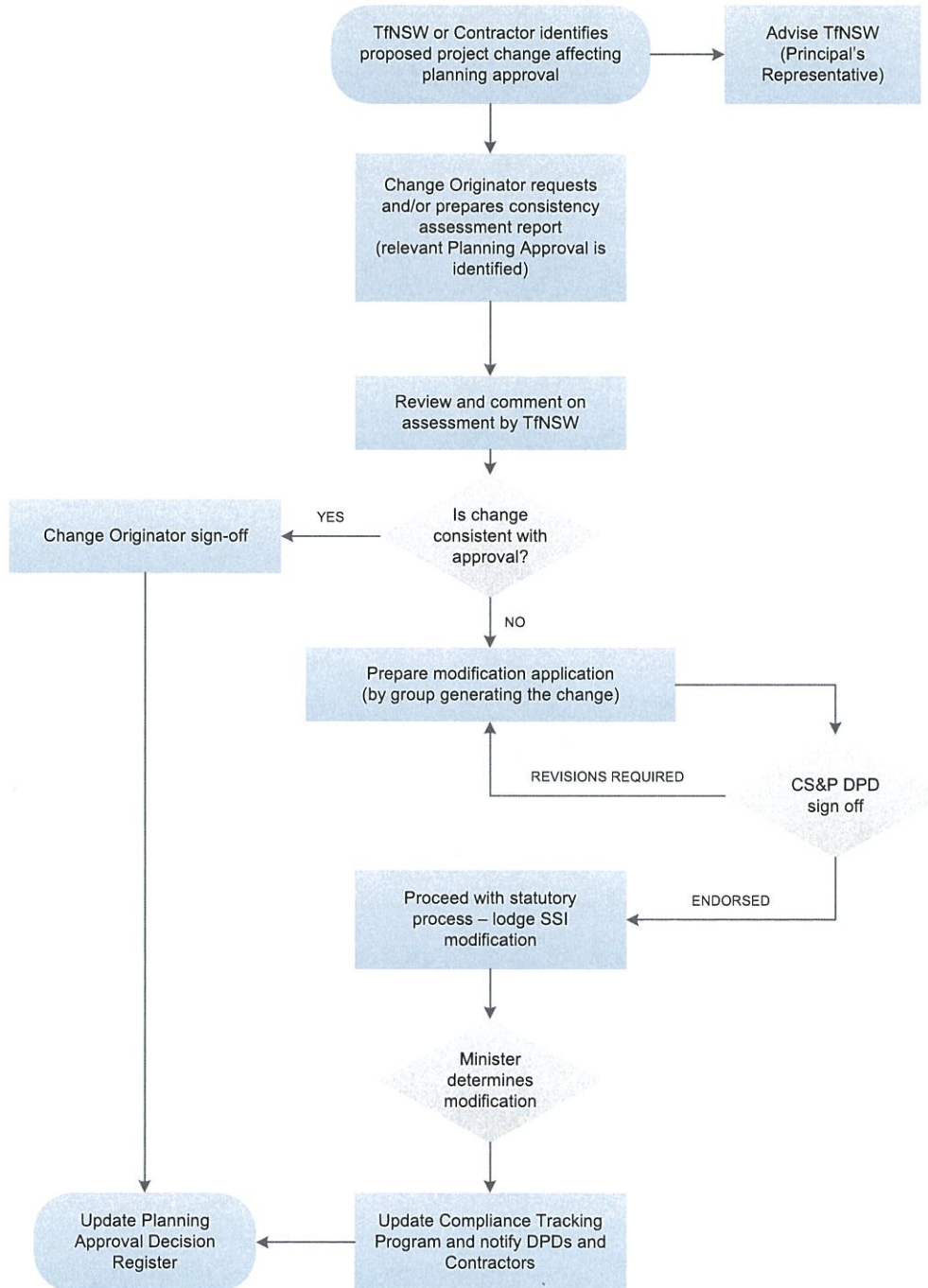


Figure 1: Planning Approval Consistency Check Procedure

4.1. Change Identification

Project changes can be identified by either a contractor or TfNSW. Not all changes will have an impact on the environmental approvals under which the project operates. A contractor is required to notify the TfNSW Contract Delivery Management Representative when they identify a potential change to a project. See Table 1 for Responsibility Matrix RACI.

Changes that could affect safety, risk, capital cost, cash flow, operating cost, time, project requirements, stakeholders and community or contract and commercial aspects of the project may be referred to the Sydney Metro Change Control Sub Committee.

4.2. Template for Planning Approval Consistency

A Planning Approval Consistency Assessment is to be prepared evaluating the consistency of a proposed change with a project as approved. The consistency assessment is to be prepared by the contractor where they have identified the proposed project change or by TfNSW in all other cases.

The TfNSW Planning Approval Consistency Assessment Template is to be used for all changes, whether it be a change identified by a contractor or TfNSW initiated.

The Planning Approval Consistency Assessment is to consider all matters as required by legislation. The checklist is to include a clear description of the site, the details of the change, rationale, and the approval to which the change relates. TfNSW will review, and may comment on, consistency assessment reports prepared by a contractor.

See Section 5 [Environmental Planning Consistency Assessment](#) for more information regarding completing the Environmental Planning Consistency Assessment.

4.3. Modification Applications and Lodgement

For works determined under Part 5.1 of the Environmental Planning and Assessment Act 1979 an application to modify the project planning approval or an additional planning approval is required where a change is found to be inconsistent with the original approval. The modification application is to be prepared by the group which generates the change. TfNSW is responsible for managing the statutory process for any modification.

For works determined under Part 5 of the Environmental Planning and Assessment Act 1979, where a change is found to be inconsistent with the Review of Environmental Factors (REF), an additional REF for the new scope or Addendum to the original REF is to be prepared. The REF is to be prepared by the group which generates the change. TfNSW is responsible for managing the statutory process for any REF.

4.4. Modification of Ministers Conditions of Approval

Where changes are identified to be inconsistent with any approval the project operates under, and a modification to those conditions has been received by the Minister, that modification may include altered or new Conditions of Approval.

Compliance to the Ministers Conditions of Approval is managed through the Sydney Metro Compliance Management Procedure. Project compliance requirements will be updated in the compliance tracking register in accordance with the Minister's determination of the modification.

4.5. Planning Approval Decision Register

Where a planning consistency assessment checklist is produced in accordance with this procedure the following information is to be recorded in the Sydney Metro Planning Approval Register.

The data captured is:

- (a) **Relevant approval:** Denotes which approval is the subject of the assessment.
- (b) **ID:** A unique identifier for each assessment.
- (c) **Assessment title:** Name given to the assessment.
- (d) **Assessment identified by:** Denotes whether the change was identified by TfNSW or a contractor.
- (e) **Date consistency assessment was approved.**
- (f) **Consistency with Approval:** Yes/No answer to whether the assessment found the change to be consistent with the relevant approval.
- (g) **Modification Application Date:** For Part 5.1 approvals the date upon which the modification application was lodged with the Department of Planning and Environment.
- (h) **Ministers Determination Date:** For Part 5.1 approvals the date upon which the Minister determined the modification.
- (i) **Compliance Tracking Program Updated:** An indication on how the Compliance Tracking Program was modified in response to the Minister's determination.
- (j) **Summary of the assessment:** Brief 25-50 word description of the change.
- (k) **Conditions:** List of the additional conditions the consistency assessment has to comply with.

5. Environmental Planning Consistency Assessment

This section is to be used when completing a checklist for Environmental Planning Consistency Assessment.

5.1. Existing Approved Project

In this section record all the relevant data for the existing project approval that you are assessing for consistency. The following should be recorded:

- (a) Planning approval reference details, i.e. the SSI number or Document number (including modifications)
- (b) Date of the original determination
- (c) Type of planning approval
- (d) Description of the existing approved project that you are assessing for consistency
- (e) Relevant background information i.e. any additional information that was not captured in the planning approval such as submissions report, conditions of approval, stakeholder outcomes etc.

5.1.1. Description of the proposed development/activity/works

Describe the ancillary activities to be assessed for consistency, including: scope, working hours, machinery, staffing levels, impacts on utilities/authorities, wastes generated or hazardous substances/dangerous goods used.

5.1.2. Timeframe

When will the proposed additional works take place? For how long?

5.1.3. Site description

Provide a description of the site on which the proposed works are to be carried out, including, Lot and Deposited Plan details if available.

Include a map to show the location of the proposed works in accordance with the approved project boundaries.

Detail the land owner.

5.1.4. Site Environmental Characteristics

Describe the environment (i.e. vegetation type, nearby waterways, land use, surrounding land use); identify likely presence of protected flora/fauna and sensitive area.

Use EIS specialist study maps where applicable.

Compare any additional specialist study outcomes with those that were presented in the EIS/REF documentation.

5.1.5. Justification for the Proposed Works

Address the need for the proposed works, whether there are alternatives to the proposed works (and why these are not appropriate), and the consequences with not proceeding with the proposed works.

5.1.6. Environmental Benefit

Identify whether there are environmental benefits associated with the proposed works. If so, provide details.

5.1.7. Control Measures

Will a project and site specific EMP be prepared?

Are appropriate control measures already identified in an existing EMP?

5.1.8. Climate Change Impacts

Is the site likely to be adversely affected by the impacts of climate change? If yes, what adaptation/mitigation measures will be incorporated into the design?

5.2. Impact Assessment – Construction

For each aspect detail the nature and extent of the impacts (whether positive or negative) during the construction phase. The assessment is to be made including the proposed control measures for the proposed activity.

For each aspect assess whether the resulting construction impact can be considered minimal impact.

The last column, Endorsed (for Planning and Environment use only) is to be completed by the certifier, see Section 5.6 [Determination](#) for more details.

Where there is no impact for a particular aspect write NA.

5.3. Impact Assessment – Operation

Similarly to the above, for each aspect detail the nature and extent of the proposed impact (whether positive or negative) during the operational life of the proposed activity. The assessment is to be made including the proposed control measures for the proposed activity.

For each aspect assess whether the resulting operational impact can be considered minimal impact.

The last column, Endorsed (for Planning and Environment use only) is to be completed by the certifier, see Section 5.6 [Determination](#) for more details.

Where there is no impact for a particular aspect write NA.

5.4. Consistency with the Approved Project

This table ties together all the assessed information and compares it to the existing approved project to determine whether it can be considered consistent or not. Each of the following questions should be completed by the assessor:

Table 1: Questions and Considerations

Question	Consider the following:
Based on a review and understanding of the existing Approved Project and the proposed modifications, is there is a transformation of the Project?	Did the original project approval anticipate works of this nature or within this particular project area? Make a comment regarding the whether this proposals overall impact in respect to the original approved project results in a transformation of the project?
Is the project as modified consistent with the objectives and functions of the Approved Project as a whole?	Will the proposed change actually assist in meeting the outcomes of the approved project as a whole?
Is the project as modified consistent with the objectives and functions of elements of the Approved Project?	Is there any specific examples from the existing approval that can be used to show consistency of elements from the objectives and functions of the proposed change?
Are there any new environmental impacts as a result of the proposed works/modifications?	Does the proposed works introduce any environmental impacts that were not already expected as part of the original approval, i.e. additional clearing or changes to a waterway – would these be easily mitigated?
Is the project as modified consistent with the conditions of approval?	Would the proposed works require additional conditions or would they be in breach of any existing conditions of approval?
Are the impacts of the proposed activity/works known and understood?	Is there enough information known about the proposed works to ensure the impact is known and understood, have further assessment or specialist studies been included or are they required? Are there similar impacts/scale of works already occurring on other portions of the approved project?
Are the impacts of the proposed activity/works able to be managed so as not to have an adverse impact?	Can the impacts be readily managed with the proposed mitigation measures and conditions of approval so as not to have an adverse impact on the environment?

5.5. Certification

This section is to be completed by the person who prepared the consistency assessment.

No consistency assessment is to be approved without this section first being completed.

5.6. Determination

This section is to be completed by TfNSW.

The person who supports and submits the form (in some cases may be the same person who prepared the assessment) is to fill out their particulars and answer the checkboxes.

Based on the above assessment, are the impacts and scope of the proposed activity/modification consistent with the existing Approved Project?

- **Yes:** The proposed activity/works can be endorsed by the Principal Manager Planning Approvals
- **No:** The proposed works/activity is not consistent with the Approved Project.
A modification or new activity approval/development consent is required.
Advise Project Manager of appropriate alternative planning approvals pathway to be undertaken.

If yes, continue the assessment by having the Principal Manager for Planning, Environment and Sustainability make the determination.

- No further assessment required?
- Further assessment is required?

If no further assessment is required, the Principal Manager can endorse the consistency assessment, including any additional conditions.

5.7. Filing

Once a Consistency Assessment has been determined it should be communicated to the project team and recorded in the Consistency Assessment Register. A copy of the Consistency Assessment should be saved in a newly created folder for each assessment, in the following location: **R:\SEBS\Planning\Post Approval Planning\Consistency Assessments and register.**

Table 2: RACI Chart

Task	Responsible	Accountable	Consulted	Informed
Project change identification	Principal Manager, Sustainability, Environment & Planning OR Contract Environment Manager	Sydney Metro Project Executive OR Contract Project Director	Relevant Sydney Metro Staff OR Contractor Staff	Principal Manager, Sustainability, Environment & Planning OR Contract Environment Manager
Notification to TfNSW of identified changes	Contract Environment Manager	Contract Project Director	–	Principal Manager, Sustainability, Environment & Planning
Referral of change to Sydney Metro Change Control Sub-Committee for determination	Manager Planning	Principal Manager, Sustainability, Environment & Planning	Contract Environment Manager OR Relevant Sydney Metro Staff	Sydney Metro Change Control Sub-Committee
Checklist for Planning Approval Consistency preparation	Contract Environment Manager OR Manager, Planning	Contract Project Director OR Principal Manager, Sustainability, Environment & Planning	Contractor Staff OR Relevant Sydney Metro Staff	Principal Manager, Sustainability, Environment & Planning
Review and comment on contractor prepared Checklist for Planning Approval Consistency	Manager, Planning	Principal Manager, Sustainability, Environment & Planning	Contract Environment Manager Principal Manager, Sustainability, Environment & Planning	Relevant Sydney Metro Staff
Preparation of Application to Modify a Part 5.1 Approval	Manager, Planning	Principal Manager, Sustainability, Environment & Planning	Contractors Environment Manager AND/OR Contractor Staff AND/OR Relevant Sydney Metro Staff	Sydney Metro Project Executive
Lodgement of Application to Modify a Part 5.1 Approval	Manager, Planning	Principal Manager, Sustainability, Environment & Planning	–	Sydney Metro Project Executive Contract Project Director Contract Environment Manager Principal Manager, Sustainability, Environment & Planning Manager, Environment Manager, Sustainability
Update of Compliance Tracking Register	Manager, Environment	Principal Manager, Sustainability, Environment & Planning	Manager, Planning	Environmental Representative Contract Environment Manager Contract Delivery Management Representative
Update of Planning Approvals Decision Register	Manager, Planning	Principal Manager, Sustainability, Environment & Planning	–	Principal Manager, Sustainability, Environment & Planning Manager, Environment Manager, Sustainability

Table 3: Training Needs Analysis

Task	Sydney Metro Executive	Principal Manager, Sustainability, Environment & Planning	Manager, Planning	Sydney Metro Change Control Sub-Committee	Environmental Representative	Manager, Environment	Manager, Sustainability	Relevant Sydney Metro Staff	Contract Delivery Management Representative
Project change identification	-	-	EP&A Act. Training	-	-	EP&A Act. Training	EP&A Act. Training	Sydney Metro Induction	EP&A Act. Training
Notification to TfNSW of identified changes	-	-	-	-	-	-	-	-	-
Referral of change to SYDNEY METRO Change Control Sub-Committee for determination	-	-	-	EP&A Act. Training	-	-	-	-	-
Consistency Assessment Report preparation	-	-	-	-	-	-	-	-	-
Review and comment on contractor prepared Checklist for Environmental Consistency Assessment	-	-	-	-	-	-	-	Sydney Metro Induction	-
Preparation of Application to Modify a Part 5.1 Approval	-	-	-	-	-	-	-	Sydney Metro Induction	-
Lodgement of Application to modify a Part 5.1 Planning Approval	-	-	-	-	-	-	-	-	-
Update of Compliance Tracking Register	-	-	-	-	-	-	-	-	-
Update of Planning Approvals Decision Register	-	-	-	-	-	-	-	-	-

6. Related Documents and References

Related Documents and References

- Sydney Metro Integrated Management System (IMS) Framework:
http://147.200.0.71/businesspublisher/link.do?login=gen_tfnsw_sm_usr&password=d34qTaR655kHMxz&localeid=1033&ph=0d8htm2&modelguid=0a49eda1-df6b-11e5-27fd-0050568c98f9
- Manuals, Standards and Procedures – Environment & Sustainability Library:
http://147.200.0.71:80/businesspublisher/link.do?login=gen_tfnsw_sm_usr&password=d34qTaR655kHMxz&localeid=1033&ph=0d8htm2&modelguid=61313a82-e4c3-11e5-27fd-0050568c98f9
- Guide for Planning and Environmental Approvals SYDNEY METRO-00000-GU-PLE-00001-v1.0-Guide for PLE APP
- Summary of Environmental Legislation Notification Requirement SYDNEY METRO-00000-SUM-EM-00001-v1.0-Legislation Req
- Environmental Impact Statement Stage 1 – Major Civil Construction Works and associated Minister's Conditions of Approval and Revised Environmental Mitigation Measures
- Environmental Impact Statement Stage 2 – Stations, Rail Infrastructure and Systems and associated Minister's Conditions of Approval and Revised Environmental Mitigation Measures

7. Superseded Documents

Superseded Documents

There are no documents superseded as a result of this document.

8. Document History

Version	Date of approval	Notes
1.0	7/7/2016	New IMS document.



Transport
for NSW

Environment & Sustainability Policy



This Policy reflects a commitment in our delivery of the Sydney Metro program to:

- Align with, and support, Transport for NSW (TfNSW) Environment & Sustainability Policy.
- Optimise sustainability outcomes, transport service quality, and cost effectiveness.
- Develop effective and appropriate responses to the challenges of climate change, carbon management, resource and waste management, land use integration, customer and community expectation, and heritage and biodiversity conservation.
- Be environmentally responsible, by avoiding pollution, enhancing the natural environment and reducing the project ecological footprint, while complying with all applicable environmental laws, regulations and statutory obligations.
- Be socially responsible by delivering a workforce legacy which benefits individuals, communities, the project and industry, and is achieved through collaboration and partnerships.

To deliver on these commitments, the Sydney Metro team will:

Industry leadership

- Implement coordinated and transparent decision making, by engaging with stakeholders and suppliers, encouraging innovation and demonstrating sustainability leadership.
- Explore new benchmarks for the transport infrastructure sector by requiring high standards from our designers, contractors and suppliers, building on experience gained through development of Sydney Metro Northwest.

Community and customer

- Provide accessible, safe, pleasurable, and convenient access and transport service for all customers.
- Establish positive relationships with community and stakeholders to maximise opportunities to add value to local communities.

Land use integration and place making

- Create desirable places, promote liveability, cultural heritage, and optimise both community and economic benefit.
- Balance transit oriented development opportunities with stakeholder expectations.

Embedding environmental and social sustainability

- Establish robust sustainability objectives and targets.
- Maintain an environmental management system that is integrated into all our project activities.
- Ensure thorough and open environmental assessment processes are developed and maintained.
- Develop and maintain an environmental management framework to embed best practice pollution management and sustainable outcomes during construction.
- Apply effective assurance processes to monitor performance against the project environment and sustainability objectives and identify appropriate reward or corrective action, as required.
- Apply environment and sustainability specific processes to the procurement of delivery activities.

Accountability

- Undertake public sustainability reporting.
- Hold employees and contractors accountable for proactively meeting their environmental and social sustainability responsibilities.
- Provide appropriate training and resources necessary to meet our responsibilities.

Rodd Staples
Program Director, Sydney Metro

Carbon Estimate & Reporting Tool v1.1

About Infrastructure and Services

Within Transport for NSW (TfNSW) the Infrastructure and Services Division (I&S) is responsible for delivering cost-effective and sustainable transport solutions to support the growth of NSW, enhancing its natural and urban environments to provide tangible benefits to customers.

I&S delivers a diverse portfolio of projects ranging in type and size. This includes:

- Infrastructure projects – rail, light rail, commuter car parks, station upgrades etc.
- Fleet procurement – rollingstock, ferries etc.
- Power supply upgrades

In addition to project delivery, I&S delivers environmental, urban design, heritage, sustainability, property, quality management, safety management and commercial support services.

Why we built this tool

The NSW Long Term Transport Master Plan sets a clear strategic direction for transport in NSW for the next 20 years and sets actions for implementation across the transport sector. Reducing greenhouse gas (GHG) emissions and managing energy use is identified as a key transport challenge in the Plan.

TfNSW's Transport Environment and Sustainability Policy Framework includes Energy Management as a key theme, with an action to "identify GHG emission sources at project planning stage and measures taken, where cost effective, to reduce these emissions through design and construction processes."

I&S is also committed to sustainability and the practical implementation of sustainability initiatives across its projects.

Historically, the Greenhouse Gas Inventory Guide for Construction Projects has required projects to establish GHG assessment boundaries as per the GHG Protocol Corporate Accounting and Reporting Standard. I&S has undertaken a materiality exercise based on previous I&S project GHG assessments to determine the typical material GHG emitting activities. This has informed a prescriptive approach to determining the GHG emitting activities to be included in I&S project assessments.

I&S is also introducing the concept of 'forecast', 'base case' and 'actual' to the GHG assessment and reporting process. This will allow reduction from mitigation measures to be demonstrated, and will meet ISCA's IS Rating Tool 'Reference Design' or 'Base Case'

About this tool

This Carbon Estimate and Reporting Tool (CERT) has been developed to provide consistency in GHG assessment and reporting across all I&S projects and streamline and simplify the GHG assessment process for both I&S and its supply chain. The tool has been structured to enable the user to input data across a range of stages, from SDR (or equivalent design stage) through to construction (at 6-month intervals).

Use of the CERT will be required on new projects with a value ≥\$15 million.

The tool has two main objectives:

- 1) To estimate a project's construction phase GHG emissions profile at detailed design through to construction.
- 2) To encourage the investigation and implementation of GHG reduction (mitigation) measures.

The tool has been structured across 6 core tabs:

- a) Introduction (this – light orange – tab) – provides an overview of the tool.
- b) Navigation (yellow tab) – enables the user to select their relevant input reporting stage (SDR, CDR etc).
- c) Project detail (grey tab) – requires the user to input relevant project information, including any project-specific reduction targets, and includes a section for data to be validated and approved prior to submission.
- d) Data input (orange tab) – comprises the core data entry and calculation component of the tool includes calculators associated with usage and mitigation for: Materials; Energy Use; Waste; Land Use/Vegetation Clearance.
- e) Detailed results (red tab) – there are 2 red tabs, both of which provide report summary information including useful tables and graphs. The detailed results tab also provides a breakdown of scope 1 and scope 2 emissions for use towards the ISCA Ene-1 credit.
- f) Dashboard (red tab) – The dashboard provides a performance summary of the relevant project stages in comparison to a base case (an auto-generated business as usual scenario) and analyses performance against project reduction targets.

* In addition to the above, there are four empty worksheets at the back of this CERT tool. You can use these for interim calculations, notes, etc. Make sure you copy or link to the relevant information in the data input sheets; otherwise it will not be picked up

Useful links and references

A comprehensive user guide has been developed to assist users in completing the tool. If you do not have a copy of the guide please contact cert@transport.nsw.gov.au to request a copy.

CERT makes reference to the TAGG Greenhouse Gas Assessment Workbook for Road Projects which can be accessed [here](#).

[TfNSW Transport Environment and Sustainability Policy Framework](#)

[TfNSW Transport Projects Sustainability Framework – Key performance indicators and targets](#)

[NSW Long Term Transport Master Plan](#)

[A list of common conversion factors is included in the formulas and background worksheet.](#)

Version control

CERT v1.1 for publication by TfNSW, 17 November 2015

Developed by:



Carbon Estimate & Reporting Tool v1.1



Select reporting period:

CDR (or equivalent) design

Data input: Colour Legend

Concrete	Click text to go to calculator
250.0	Calculated result
	Cell for user input
	Cell for user commentary

Quick guide to using this tool:

- A First, fill in the project details tab.
- B Then come back to this tab and select the relevant reporting period in the blue field above.
- C Click the button <Go to Data input> to get taken to the correct data entry tab.
- D Send completed reports to TfNSW
- E Repeat data entry for each relevant period
- F View (intermediate) results on the "Detailed results" and "Dashboard" tabs

Project details

Carbon Estimate & Reporting Tool v1.1



Project details

Project name
 Project value
 Primary project type
 Secondary project type
 Project geographical scale, primary
 Project geographical scale, secondary
 Expected construction start date
 Expected construction date of completion

Use comments

Project description

(Enter a detailed description of the project)

Use comments

Define your GHG assessment and mitigation requirements

Select all that apply
 ISO 14064
 US Corporate Update
 ICA
 ICA
 Other Contract Requirements
 Other (please specify in user comments)

Enter reduction target(s) below for selected item(s)

Maximum GHG reduction target you are required to achieve: **0.0%**

If we have set an internal (informal) GHG reduction target, you can enter this here to keep track of progress towards this target.
 Internal GHG % reduction requirement

Use comments

These four ICA Dom 1 items cannot be included with technical measures and require a % reduction against an ICA certified base line. Therefore the maximum reduction for this ICA item must not be greater than 0.0%

Contact information

Person(s) to be invited to audit
 Project Organisations
 Contact details
 Address
 City
 State
 Postcode
 Telephone or mobile contact number
 E-mail
 Address
 City
 State
 Postcode

Use comments

Date validation

Validated by
 Signature
 Sign-off by
 Signature

Use comments

For internal use by US only:

Project calculated and accepted by
 User accept

US ONLY comments

Category	Sub-category	Value	Unit
Energy use	Electricity	1000	kWh
	Gas	500	therms
	Oil	200	gallons
	Coal	100	tons
Water	Water	10000	gallons
	Wastewater	5000	gallons
	Steam	2000	gallons
	Refrigerant	1000	gallons
Materials	Concrete	10000	cubic yards
	Steel	5000	tons
	Brick	2000	thousands
	Other	1000	tons

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	Steam	2000	gallons
	Refrigerant	1000	gallons
Materials	Concrete	10000	cubic yards
	Steel	5000	tons
	Brick	2000	thousands
	Other	1000	tons

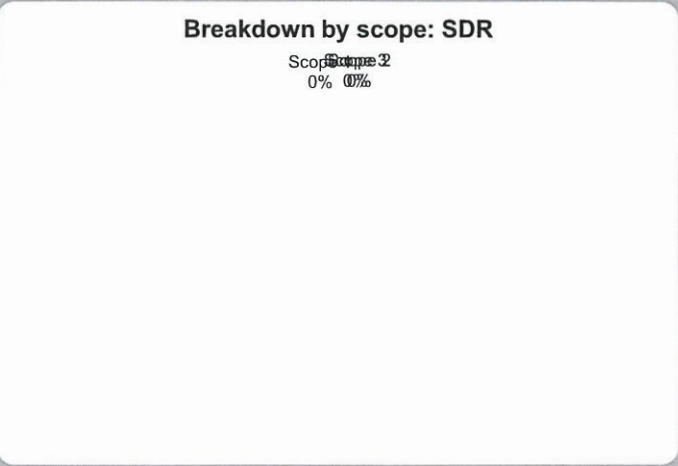
Summary

Detailed Results:

Breakdown per emission source

Period to show: SDR

Period to show: SDR



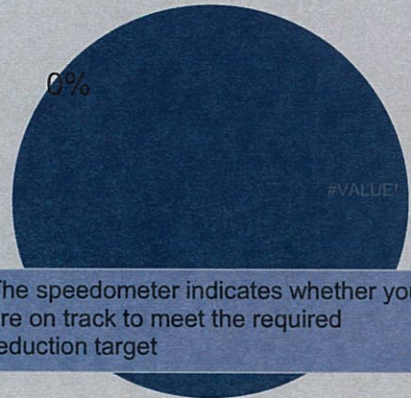
Breakdown of scope 1 and scope 2 emissions for use towards ISCA Ene-1 Credit

Emission source	Design / Construction stage	SDR (t CO ₂ e)	CDR (t CO ₂ e)	Final (End of Construction) (t CO ₂ e)
Diesel consumption for site vehicles, scope 1		0	0	0
Diesel consumption for stationary plant and equipment, scope 1		0	0	0
Diesel consumption for mobile plant and equipment, scope 1		0	0	0
Total of other fuels consumed on-site in site vehicles, stationary and mobile plant, scope 1		0	0	0
Land use / vegetation clearing		0	0	0
Total Scope 1 Emissions (t CO₂e)		0	0	0
Electricity use, on-site total, scope 2		0	0	0

Results Dashboard:

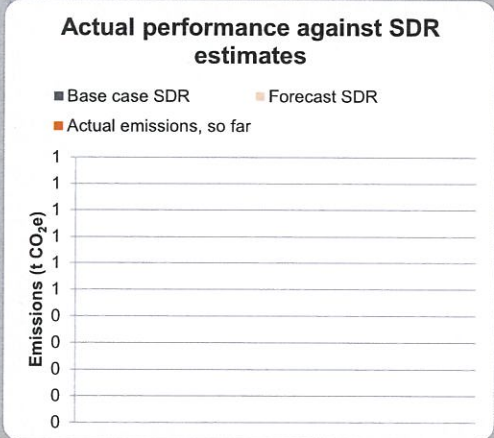


Project Stage	Forecast or Actual Emissions	Base Case emissions	Reduction against the Base Case
SDR	0 t CO ₂ e	0 t CO ₂ e	0 t CO ₂ e
CDR	0 t CO ₂ e	0 t CO ₂ e	0 t CO ₂ e
Actual	0 t CO ₂ e	0 t CO ₂ e	0 t CO ₂ e

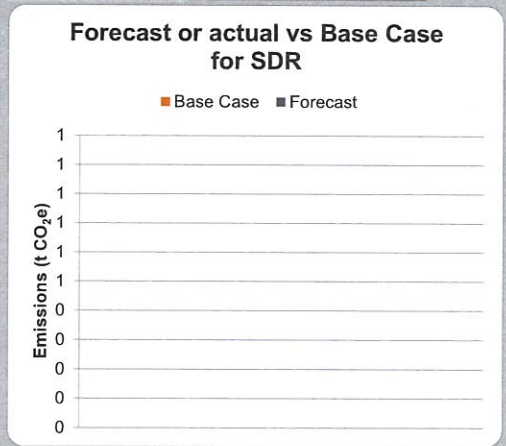


The speedometer indicates whether you are on track to meet the required reduction target

Reference to show: SDR



Show emissions for: SDR



Show equivalences for: SDR

t CO₂e reduction is equal to...
 return flights Sydney - Melbourne, or
 average Australians (per capita emissions for one year), or
 return car trips from Sydney - Perth, or
 average NSW households (residential emissions only).

KPI: Greenhouse gas emissions per million dollars (t CO ₂ e/\$m)	
<i>Project value:</i>	\$0
Forecast SDR emissions:	0 t CO ₂ e
Forecast SDR emissions intensity:	t CO ₂ e/\$m
Forecast CDR emissions:	0 t CO ₂ e
Forecast CDR emissions intensity:	t CO ₂ e/\$m
CDR vs. SDR reduction forecasted:	
Actual emissions:	0 t CO ₂ e
Actual emissions intensity:	t CO ₂ e/\$m



Carbon Estimate and Reporting Tool

7TP-ST-035/4.0

Standard – Applicable to Transport Projects

Quality Management System

Status:	Approved
Version:	4.0
Branch:	Service Planning and Development
Business unit:	Planning and Environment Services
Date of issue:	26 February 2016
Review date:	26 February 2017
Audience:	Project Delivery/External TSR/External Reference Material/Branch Wide document only/Functional Wide document
Asset classes:	<input checked="" type="checkbox"/> Heavy Rail; <input checked="" type="checkbox"/> Light Rail; <input checked="" type="checkbox"/> Multi Sites; <input checked="" type="checkbox"/> Systems; <input checked="" type="checkbox"/> Fleets
Project delivery model:	Infrastructure and Services/Alliance/Novo Rail
Project type:	For all project types
Project lifecycle:	<input type="checkbox"/> Feasibility; <input checked="" type="checkbox"/> Scoping; <input checked="" type="checkbox"/> Definition; <input checked="" type="checkbox"/> Construction readiness; <input checked="" type="checkbox"/> Implementation; <input checked="" type="checkbox"/> Finalisation; <input type="checkbox"/> Not applicable
Process owner:	Technical Director Planning and Environment Services

Document History

Version	Date of approval	Doc. control no.	Summary of change
1.0	16 May 11	1380388_1	A standard approach to GHG reporting so that projects can be easily compared and project specific GHG emission results can be included within summary GHG reporting documents.
2.0	1 Nov 11	1380388_2	Document re-branding to Transport Construction Authority.
3.0	1 Apr 13	1380388_3	Document re-branded to Transport Projects.
4.0	26 February 2016	1380388_5	The document is updated to reflect the new method in estimating GHG emissions.

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1. Introduction

Within Transport for New South Wales (TfNSW) the Infrastructure and Services Division (I&S) is responsible for delivering cost-effective and sustainable transport solutions to support the growth of NSW, enhancing its natural and urban environments to provide tangible benefits to customers.

I&S deliver a diverse portfolio of projects ranging in type and size. This includes:

- Infrastructure projects – rail, light rail, commuter car parks, station upgrades, etc.
- Fleet procurement – rolling stock, ferries, etc.
- Power supply upgrades.

In addition to project delivery, I&S delivers environmental, urban design, heritage, sustainability, property, quality management, safety management and commercial support services.

The Carbon Estimate and Reporting Tool (CERT) – ‘the tool’ - has been developed to provide consistency in Greenhouse Gas (GHG) emission assessment and reporting across all I&S projects, and to streamline and simplify the GHG assessment process for I&S, its service providers/contractors and, its stakeholders.

The introduction of the CERT supersedes the previous reporting requirements within the current TfNSW Greenhouse Gas Inventory for Construction Projects.

TfNSW’s Standard Requirements – Environment (TSR-E) will be updated to require completion of the CERT by suppliers, for all projects \geq \$15 million that are also required to complete the Sustainable Design Guidelines.

The tool, an Excel spread sheet, has been structured to enable the user to input data across a range of stages, from System Design Review (SDR) - or equivalent design stage - through to construction (at six-monthly intervals).

The tool is structured across six core tabs:

1. **Introduction** (light orange tab) – provides an overview of the background of the tool.
2. **Navigation** (yellow tab) – enables the user to select their relevant input reporting stage (e.g. SDR, CDR, six-monthly periods during construction).
3. **Project detail** (grey tab) – requires the user to input relevant project information, including any project-specific reduction targets, and includes a section for signing off on data validation and approval prior to submission.
4. **Data input** (orange tab) – comprises the core data entry component of the tool. It includes data entry sections and conversion calculators associated with usage and mitigation for: Materials; Energy Use; Waste; Land Use/Vegetation Clearance.
5. **Detailed results** (red tab) – there are two red tabs, both of which provide report summary information including useful tables and graphs. The detailed results tab also provides a breakdown of scope 1 and scope 2 emissions for use towards the ISCA Ene-1 credit.
6. **Dashboard** (red tab) – The dashboard provides a performance summary of the relevant project stages in comparison to a base case (an auto-generated business-as-usual scenario) and analyses performance against project GHG reduction targets.

In addition to the above, there are a number of accompanying tabs that provide background detail on the operation of the tool (flow-chart); calculations; formulas; emission factors and data sources; and a series of empty worksheets to enable interim calculations, note taking etc. throughout the completion process.

The CERT emission categories and sources have been determined based on a materiality assessment exercise undertaken by I&S. The tool is specifically designed to capture a project's most significant/material carbon emissions.

1.1. General guidance and information

The following provides a summary of supporting information that will be useful in completing the tool.

Further support can be obtained by contacting cert@transport.nsw.gov.au. TfNSW also welcomes feedback on the tool and encourages its stakeholders to provide comment through use of this email address.

1.1.1. Understanding the terminology

Appendix A provides a summary of commonly used terminology referenced throughout the tool. A full list of abbreviations is included at the front of this guide.

1.1.2. Hints and tips before you start

There are a number of CERT functions that are common, and therefore featured repeatedly, across the various themes of the tool and throughout the lifecycle of project's assessment (i.e. will appear across SDR, CDR and construction stage reporting). These are captured below.

Note: Unless a particular material, energy source, etc. is not being used – data must be entered for **all** emitting categories.

Updating the CERT across relevant project stages

To keep track of the CERT data entries across the respective project stages, it is recommended each version is saved using a unique name. The following naming convention is suggested:

"[tool version] – [project name] – [reporting period] – [submission date]"

For example: "TfNSW CERT v1 – Newcastle Light Rail – CDR – 30 June 2015". When reporting against each reporting period, it is recommended the latest version of the file is used and is renamed/updated according to the relevant reporting period.

Data entry cells

As stated, there are six main tabs within the tool that relate to its completion. Within these tabs are the associated data entry cells that enable the tool user to enter relevant information. The data entry tabs are colour coded as follows:

- Orange cells: represent editable data input cells – the tool user is required to enter information directly into these cells. To avoid error, some cells may have limitations to the values that can be entered.
- Orange cells: When a dropdown is available within an orange cell, a value from the dropdown menu must be selected (or the cell should remain empty if not relevant).
- Grey cells: represent non-editable cells. The data in these cells comprise calculations and formulas that are automatically generated by carrying information

over from other parts of the tool. I.e. completing the associated emissions calculators will automatically update these cells.

- Blue cells: represent editable evidence cells – the tool user is required to enter evidence/data sources/comments to support the information provided
- Orange underlined text: Hyperlinked text. Clicking on the hyperlinked text will take the tool user to the relevant section of the CERT for data entry.
- Pop up notes: Many data entry cells will show a pop-up note when selected. These notes contain useful information to assist tool users when entering data.

Returning to main entry sheet

Throughout the tool, and in particular on the relevant calculator worksheets, a (purple) 'go back' button has been included. This button enables easy navigation between the main data entry sheet and the respective (conversion) calculators. Clicking on the 'go back' button will return the tool user to the main data entry sheet once they have finished completing the calculator section.

Evidence/data source/comments

In both the main data entry section and within the respective (conversion) calculators, tool users are required to complete an evidence/data source/comments box to assist with data verification (these cells are blue in colour).

At a minimum, referencing should include the following: "Document title; Version; Issue date; and, page/section reference".

The nominated I&S Sustainability Officer will perform spot checks of the supporting evidence. A copy of the page/section must be made available on request. The I&S Sustainability Officer may also request confirmation/clarification where a particular data source has not been declared.

The tool user should use their discretion in determining the suitability of evidence. A general rule of thumb is that the evidence identified would clearly link to a) the emission source in question; and b) the volume/quantity stated.

Note: Evidence information must be completed prior to submitting the tool. If the same comment applies to multiple data entries, either copy and paste the response into the relevant cell; or, reference the comments box that is applicable to the section. I.e. "As per comments for Ready Mixed concrete calculator".

Help function

A series of 'help' buttons designed to provide further assistance with completing the tool are included within the various sections of the CERT. Clicking on these will provide a greater level of clarification, context and examples on how to complete the associated section.

Transport Scenarios Calculator

For all materials used across each stage of the project lifecycle, the tool user is required to select the relevant transport scenario from the orange data input cells. Selection is based on a 'default domestic', 'default imported' or 'user defined' scenario based on transport from the point of manufacture. If details regarding the transport-to-site are not (yet) known, the most relevant default scenario for that material should be used (e.g. default domestic/default imported). When the supplier location is (approximately) known, the tool user should select 'user defined' and complete and/or update the transport calculator (click on 'Transport scenario' to be taken to the transport calculator).

Note: Where the transport scenario has not been entered, the tool will automatically revert to default/base case transport scenarios. The default transport scenarios have been estimated based on rounded (conservative) estimates of typical material supply.

Further information on the emission factors used to determine the transport emissions can be found in the 'Formulas and Background' tab of the tool.

Entering data

Only data inputs cells can be altered by tool users. All other parts of the CERT have been locked to prevent unintentional loss of functionality.

Tool users can use the 'Tab' key on their keyboard to move to the next data input cell.

Tip - Workshop the tool: Completing the CERT in a workshop environment with a cross section of the Project team may streamline the process and add value in identifying mitigation measures.

2. Abbreviations and definitions

All terminology in this Standard is taken to mean the generally accepted or dictionary definition with the exception of the following terms which have a specifically defined meaning:

Acronym / specific term used	Definition
ALCAS	Australian Life Cycle Assessment Society
AusLCI	Australian National Life Cycle Inventory Database
BOQ	Bill of Quantities
BPIC	Building Products Innovation Council
CDR	Critical Design Review – refers to completed (100%) detailed design
CERT	Carbon Estimate and Reporting Tool (the 'tool')
EPD	Environmental Product Declaration
FAQs	Frequently Asked Questions
GHGs	Greenhouse Gas Emissions
GWP	Global Warming Potential
HDPE	High-density polyethylene
IPCC	Intergovernmental Panel on Climate Change
I&S	Infrastructure and Services Division
ISCA	Infrastructure Sustainability Council of Australia
IS rating tool	Infrastructure Sustainability rating tool – administered by ISCA.
NGA	National Greenhouse Accounts
NGERS	National Greenhouse and Energy Reporting Scheme
LCA	Lifecycle Assessment
PVC	Polyvinyl chloride
TAGG	Transport Authorities Greenhouse Group
TfNSW	Transport for New South Wales
SDGs	TfNSW Sustainable Design Guidelines
SDR	System Design Review – refers to designs that are at least 20% complete

3. Core Tabs

3.1. Navigation Tab

The CERT requires input at the following stages:

- SDR (or equivalent design) stage (~20% design)
- CDR (or equivalent design) stage (100% design)
- Six-monthly during construction (the six-monthly reporting periods run from 1 January – 30 June and from 1 July – 31 December. If a construction period starts on 1 June 2015, the first reporting period will show 1 January 2015 – 30 June 2015.)

The tool is able to cope with projects that cover a construction period of up to five years¹. To reduce the chance of entering data into the wrong period, a 'navigation' tab is included. The navigation tab is where the relevant reporting stage is selected (refer Step 1 in the following instructions). Clicking on the 'Go to Data input' button (Step 2) will take the tool user to the appropriate data entry tab.

To switch to the appropriate period for each reporting cycle (SDR, CDR, six-monthly construction) be sure to return to the navigation tab each time. (Refer Section 1.1.2 for guidance on saving different versions of the tool.)

3.1.1. Selecting the relevant project reporting stage

Step 1: Select reporting period from drop down box.

Step 2: Click on 'Go to data input' button to be taken to the main data entry sheet.

Note: Click on the 'feedback' button for details on how to provide feedback on the tool.

Note: The 'navigation tab' allows the tool user to select the design stage or construction stage needing to be assessed, hiding the other tabs for ease of use.

The construction start and end dates will determine the number of available six-monthly reporting tabs. As a general rule of thumb, construction includes all project work other than minor works such as: fencing, investigative drilling/excavation; building/road dilapidation; minor access roads; minor adjustments to services/utilities; establishing temporary construction sites; and minor clearing.

3.2. Project Details Tab

The 'project details' tab identifies the project being assessed, provides contact details, ensures any reduction targets are articulated, and provides assurance details (i.e. assessment sign off).

Note:

- Information relating to the project's value can be updated at each reporting period as required. This information is collected for internal benchmarking purposes only.
- SDR/CDR – data validation (sign off) must be provided by either a cost planner, design manager or other such equivalent with visibility of the cost planning/tender estimate process.
- Construction – data validation must be provided by the Construction Manager or equivalent (refer Step 9 below).

¹ Please contact I&S if your project will have a construction period in excess of five years.

Step 1: Enter project details (including the project's capital value). Primary and secondary project types can be selected from the drop down box to confirm the scope of your project. For example, the primary project type might be a station, whereas the secondary project type might be a car park.

Step 2: From the drop down box, select the appropriate scale of measurement and then enter the quantity/scale. E.g. the size of the station might equal 750m² and 200 car parking spaces would be provided.

Step 3: It is important to enter the expected start and completion dates for construction as this information will automatically update the six-monthly reporting tabs within the 'navigation' tab.

Step 4: Enter a project description providing an overview of the scope and remit of the project. This information can usually be extracted from existing planning reports/documentation.

Step 5: Enter any relevant reduction targets that might be specified through the Sustainable Design Guidelines (SDGs); Transport for NSW Standard Requirements (TSR); Infrastructure Sustainability Council of Australia (ISCA); or other requirements as applicable (tick all that apply).

Step 6: Once you have entered the relevant targets, this cell will auto-complete with the total minimum reduction target.

Step 7: Completion of this cell is optional. If you have set an internal (informal) GHG reduction target, you can enter this here to keep track of progress towards this target.

Step 8: Provide details for key contacts responsible for entering the data. You will also need to enter the site address and project location details (where this information differs).

Step 9: To support data accuracy, it is important to ensure data is validated prior to submission. Enter the details of the project team member responsible for validating the CERT submission prior to it issue to I&S

Step 10: This information is for internal I&S use only – do not complete this section.

3.3. Data Input tab

The data input tab can be accessed manually by clicking on the tab within the tool, or automatically by clicking on the 'Go to data input' button within the 'navigation' tab. The following provides detailed guidance on how to complete this section.

Note: Completing this section of the tool will require referral to the tender estimate, Bill of Quantities (BOQ), or equivalent – i.e. those document/s that were used to price the contractor's tender - based on material types, volumes etc. In some instances there may be gaps in the data. In these instances assumptions will need to be made in order to complete the data. (For example: assumptions may be needed if there are only high level estimates available - such as km rail or m² of station area – in these instances a cost planner/s should be consulted.).

Tip: As SDR is an early design iteration, it is assumed there will be no, or only minor, changes from the tender estimate through to SDR. The SDR assessment is to be submitted at SDR stage however can be based on the tender BOQ.

3.4. SDR Stage: Data Entry

The following steps provide guidance on completing the tool specific to the SDR project lifecycle stage.

3.4.1. Materials

Within the data input tab the 'materials' section requires information to be entered for the following:

- Concrete and reinforcement – ready mixed concrete, pre-cast concrete, reinforcement steel: refer 2.4.1.1.
- Steel – structural steel and post-tensioned steel; galvanised steel; total steel rails (heavy and light).
- Asphalt and Aggregates – asphalt; coarse aggregates; recycled (coarse) aggregates; ballast; sand; manufactured sand.
- Piping – reinforced concrete pipes; steel pipes and tubes; HDPE pipes; PVC pipes, etc.
- Other materials – i.e. glass; aluminium; ceramics, etc.
- Additional materials – any other materials that have not been previously represented and/or captured that are believed to represent $\geq 5\%$ of the project's total GHG emissions.

3.4.1.1. Concrete and Reinforcement

The following outlines the necessary steps required to complete the concrete and reinforcement data related to ready mixed concrete; precast concrete and reinforcement steel.

Entering ready mixed concrete quantities

The ready mixed concrete calculator allows input of up to 15 different compressive strengths and mix designs (defined by rate of Portland cement content).

Step 1: Click on hyperlink to access the ready mix concrete calculator.

Step 2: From the drop down boxes – first select the concrete strength grade and relevant unit of quantity (m^3 or tonnes). Now enter the quantity of ready mix concrete and the Portland cement content if known (if unknown leave blank).

Note:

- Portland cement content is used as a proxy for GHG intensity of concrete. Although other components will have some effect, the chosen approach was considered the most practical way for determining the absolute GHG intensity of concrete.
- The base case for Portland cement content is embedded in the calculator; i.e. a benchmark for Portland cement rate in kg/m^3 of concrete. If a lower Portland cement rate is being proposed for a certain application, the subsequent reductions will be credited once the lower kg/m^3 rate is inserted; i.e. this forms a mitigation measure to reduce from the base case.

Portland cement rate can be sourced from supplier mix design sheets.

Entering precast concrete quantities

The precast concrete calculator allows up to 15 different compressive strengths and mix designs (namely Portland cement content) to be entered.

Step 1: Click on hyperlink to access the precast concrete calculator.

Step 2: Select strength grade from drop down menu.

Step 3: Enter quantity and select relevant metric (m³ or tonnes).

Reminder: Once you have completed the necessary calculator click this button to return to the main tool interface and continue the data entry process.

Note: In contrast to the ready-mixed concrete calculator, the Portland cement content of precast concrete is estimated based on the strength grade. The reason for this difference in approach is that the exact Portland cement content of precast products could be too difficult to establish for the tool user.

Reinforcement steel incorporated into the precast concrete products should also be entered in this section.

Tip: Consult the product supplier/manufacturer for this information.

Reinforcement steel

The quantity of reinforcement steel used with ready mixed concrete can be entered directly into the tool. Reinforcement steel embedded in precast concrete should be entered in the precast concrete calculator section. Post-tensioning steel information should be entered in the Steel section.²

Step 1: Enter the quantity of reinforcement steel directly into the tool

Tip: Reinforcement steel quantity would typically be sourced from the Bill of Quantities.

Entering transport scenarios for ready-mixed, precast concrete and reinforcement steel

Once you have finished entering data into the main data entry sheet and the respective calculators, you will need to enter data on materials transport ('transport scenarios').

User defined transport scenarios are intended to reward local procurement initiatives. The default transport benchmarks are listed next to the user defined section for ease of comparison. The source of assumptions for the default transport scenarios are provided in the Formulas and background tab within the tool.

Step 1: From the drop down list, select the option to define the transport scenario 'user defined' or use the default scenario 'default domestic'. When you are ready, to enter user defined transport information, click on 'Transport scenario'.

Prompt: The correct transport scenario must be selected before proceeding – either default domestic, default imported (where available) or user defined (see Step 1 above). If an appropriate option is not selected, the tool will revert to a default. If you have selected the user defined option, clicking on 'Transport scenario' will take you to the following transport calculator where transport data should be entered.

Step 2: Insert the distance travelled by the relevant type of vehicle for each material.

Note: If travel distances are not entered, the tool will automatically default to the base case scenarios.

Steel

There are three components that comprise the entries for 'Steel' within the tool. Of these, two ('structural steel and post-tensioned steel' and 'galvanised steel') enable quantities to be directly entered into the relevant data input cells. Only data entry regarding 'total steel rails (heavy & light)' requires use of the relevant calculator.

² The reasons for splitting up these three types of reinforcement steel are due to differences in emission factors as well as differences in how the information is typically available to the tool user.

Step 1: Enter materials quantities directly into the cells for the first two components. Be sure to complete the transport scenarios calculator and provide the relevant compliance evidence.

Step 2: Click on the hyperlink to access the rail calculator.

Step 3: Enter track type quantities.

Tip: Note that the length is expressed in track metres. One track metre consists of two metres of rail. The mass of the rail is expressed in kg/m of single rail (not track metres).

Step 4: If applicable, select the rail type from the drop down menu, then enter rail mass (kg/m) and quantity (length of track in m)

Tip: Use the empty worksheet tab 'Sheet for notes (Materials)' to record quantities of structural steel and post-tensioning steel before aggregating them into the data input cell.

3.4.1.2. Asphalt and Aggregates

This section requires the tool user to enter details for asphalt and aggregates usage. Asphalt information can be entered using the relevant calculator (see Asphalt Step 1 below), whereas aggregates information should be entered directly into the main data entry sheet.

Asphalt

The asphalt calculator allows the tool user to input details on the type of asphalt being used and the unit of measurement (tonnes/m³) from the drop down list.

Step 1: Click on hyperlink to access Asphalt calculator.

Step 2: Select the type of asphalt to be used from the drop down list. Enter the appropriate quantity and unit of measurement (m³/tonnes).

Aggregates

Step 1: Select the unit of measurement from the drop down menu and enter the quantity of aggregates directly into the tool.

Step 2: Be sure to update the transport scenarios calculator to account for the travel associated with asphalt and aggregates.

3.4.1.3. Piping

There are a total of four calculators to assist the completion of piping information. The tool user will need to complete these in order to populate the grey (auto-complete) cells on the main data entry sheet. Once information on quantity has been entered, the appropriate transport scenarios will need to be completed to finish this section.

Step 1: Click on relevant hyperlink to access piping calculators.

Note: This section of the tool provides calculators for each of the listed piping types. To enter the relevant type of piping just scroll down the page or click on the relevant hyperlink.

Step 2: Calculate the quantity of each of the four identified piping categories by completing the relevant calculators. Information regarding nominal pipe lengths and mass can be found in the supplier's product documentation.

3.4.1.4. Other materials

Step 1: Enter the quantities of aluminium and ceramics used directly into the corresponding cells. For glass and electrical cables click on the hyperlink to access the relevant calculators.

Note: This section of the tool provides calculators for each of the listed electric cabling types: copper conductors; aluminium conductors; other conductors. To enter the relevant types of cabling just scroll down the page to access these.

Step 2: Update the transport scenarios for other materials.

Step 3: Enter details on the type of glass/application; glass thickness (refer supplier's product documentation); and quantity (m²) used on the project.

Step 4: Calculate the quantity of each of the three identified cabling categories by completing the relevant calculators.

Information regarding conductor area and mass can be found in the supplier's product documentation.

3.4.1.5. Additional materials

For any further materials that may not already be captured, there is an additional area for inclusion. As these will be different across various projects, emission factors for these will need to be sourced and provided by the tool user when completing the section.

Tool users only need to enter data into this section if the additional materials have a significant impact on the project GHG emissions. Small amounts of materials that are not covered elsewhere in CERT do not have to be included.

This section is intended to accommodate materials that were not identified and included in the CERT as a result of I&S's materiality assessment and innovative materials (e.g. geopolymer concrete) not typically used on infrastructure projects but could reduce emissions.

Note: Evidence of emission factors should be provided by suppliers, e.g. through registered Environmental Product Declarations (EPDs), plant or equipment product specifications, or equivalent.

Step 1: Identify additional materials including quantity, unit and emission factor.

Step 2: Calculate transport associated emissions.

3.4.2. Materials mitigation measures

The 'materials mitigation' section seeks to capture and reward opportunities to mitigate the emissions associated with materials. Mitigation measures might include alternative material solutions; optimising design (value engineering), etc.

Value engineering has been disabled at the SDR stage, as it is deemed too early in the design stage to claim design changes.

Step 1: Define the materials mitigation activity and enter the quantity of materials contributing to the reduction and specify the associated unit of measurement from the drop down box.

Step 2: Identify the emission reduction factor.

Note: The change in material quantities calculator is not available for the SDR tab. This is because the project team has not progressed the design and therefore cannot realistically identify what design changes/optimisation will/have taken place.

Tip: The mitigation achieved through 'Reduction in material transport' is calculated automatically based on the user defined scenarios that have been entered.

3.4.3. Energy use

The energy use category comprises of a number of calculators associated with:

- Electricity use – total used on-site.
- Diesel consumption for site vehicles.
- Diesel consumption for stationary plant and equipment.
- Diesel consumption for mobile plant and equipment.
- Total usage of other fuels that have been consumed on-site in site vehicles, stationary and mobile plant equipment.

3.4.3.1. Energy - electricity use on-site

The energy (electricity) calculator provides the tool user with two options for data entry.

Note: It is important to avoid double counting by using one of the options. However, use of both options may be appropriate where, for example, total electricity use specifically excludes certain plant/equipment and this is known to the tool user.

Step 1: Click on hyperlink to access electricity use, on-site total calculator.

Step 2: Enter electricity consumption data into either Option 1 (per site/grand total) or Option 2 (per type of equipment used).

3.4.3.2. Diesel (fuel) consumption for site vehicles

This section provides the tool user with three options for completing the relevant calculator. Options are based on the level of data available.

Step 1: Click on hyperlink to access diesel consumption for site vehicles calculator

Step 2: The energy calculator for fuel allows you to enter data using a range of options. (Fuel types can be selected from the drop down list)

- Option 1: input kL estimates for each fuel type to be used.
- Option 2: estimate emissions based on construction months and size of project.
- Option 3: estimate emissions based on vehicles types and km travelled.

Note: Contractor site vehicles are not included in the scope of the CERT.

3.4.4. Diesel (fuel) consumption for stationary plant

Tool users are provided with two options for uploading relevant data.

Step 1: Click on hyperlink to access diesel consumption for stationary plant calculator.

Step 2: Complete Option 1 (total fuel consumption estimates) or Option 2 (equipment and plant hours) based on available data.

3.4.4.1. Diesel consumption from mobile plant

Tool users are able to enter diesel consumption from mobile plant through two options:

- Option 1: based on total fuel consumption estimates.
- Option 2: based on equipment and plant hours.

It also provides the tool user the option to include any additional equipment not previously listed.

Note: It is important to avoid double counting by using one of the options within each energy (fuel) emission source. However, multiple options may be appropriate where for example total fuel use is known for the principal contractor's plant and equipment and dry hire; but for wet hire, assumptions need to be made based on specific equipment types.

Step 1: Click on hyperlink to access diesel consumption for mobile plant calculator.

Step 2: Enter data based on total fuel consumption estimates (Option 1) or equipment and plant hours (Option 2).

Step 3: If there is any additional equipment that has not yet been captured, use this table to enter relevant information.

3.4.4.2. Total of other fuels consumed on-site in site vehicles, stationary and mobile plant

Within the energy-use calculators, tool users are asked to specify the 'fuel type' from a drop down box listing diesel, petrol, LPG and Ethanol blend (10%) as options. The cell containing 'total of other fuels consumed on-site in site vehicles, stationary, and mobile plant' automatically completes to include all petrol, LPG and Ethanol blend (10%) consumed on-site once the relevant calculators have been updated.

Note: This information automatically generates based on the entries related to petrol, LPG and Ethanol blend (10%) consumption entered for the other calculators.

3.4.5. Energy use - mitigation measures

This section enables energy mitigation measures to be registered for the project. The tool identifies a series of pre-determined energy mitigation areas (e.g. electricity from renewable sources, reduction in electricity use, etc.) and also provides the opportunity to capture any other categories that may not be covered by those listed.

It allows the tool user to input relevant information based on energy content (kWh, GJ), fuel use (kL) or percentage reduction.

Once the unit of measurement has been selected from the drop down box, information can be entered directly into the relevant cells.

Note: Remember to reference relevant policies and evidence to support the mitigation measures listed. Examples might include a copy of an idling policy; renewable energy generated onsite; specifications outlining the use of efficient plant and equipment etc.

Step 1: Input relevant energy mitigation measures for all those initiatives that apply.

Step 2: Input additional mitigation measures as appropriate.

Tip: The emission reduction factor shows as zero until a unit is selected. When the unit is based on a percentage reduction, the emission reduction factor will be determined based on the relevant amount of energy consumed and represents 1% of emissions associated with total energy use for the category (e.g. electricity, mobile plant, etc.).

3.4.6. Waste generated

This section of the tool assesses the amount of waste generated by the project and sent to landfill or recycling centres.

In order to account for emissions from degradation in landfill, the tool user is required to distinguish inert waste (such as concrete, metals, glass, sand, spoil etc); timber and vegetation waste; and, mixed waste (i.e. a mix of concrete, timber, bricks etc). A transport distance of 50 km to the landfill site is automatically assumed.

Note: Transport of waste to landfill automatically generates based on the below inputs.

Step 1: Enter waste details directly into tool including relevant quantities and units – tonnes or m³.

3.4.7. Waste mitigation measures

The measurement of waste mitigation measures aims to capture details on the amount of waste being diverted from landfill. Waste transport to an off-site recycling centre is included. It assumes a transport distance of 22 km to the recycling centre.

Additionally, the tool seeks to capture any waste mitigation measures that might have been adopted onsite i.e. materials that have been constructed off site or the selection of prefabricated components etc.

Step 1: Enter quantities of waste sent off site for recycling and the amounts reused on site. The grey cell associated with waste transport will automatically generate based on the quantities entered for waste sent off-site.

Step 2: Enter any additional waste mitigation measures, then input the quantity and from the drop-down box select the appropriate unit of measurement – kg; tonnes; m³; tkm. Following this, identify and enter the emission factor relevant to the mitigation measure identified.

3.4.8. Land use / vegetation clearing

The land use category seeks to identify the emissions associated with vegetation clearing. A specific calculator has been included to assist with identifying the type of vegetation being cleared.

Based on the maps provided in [Attachment A of the TAGG 2013 Workbook](#) the tool user is required to identify the vegetation type and the 'Maxbio' class for the location within the calculator (refer Appendix B).

Step 1: Click on the 'total area of vegetation cleared' hyperlink – the cells in this section auto-complete once data has been entered into the vegetation clearing/land use calculator.

Step 2: Select the vegetation class from the drop down box; and enter the appropriate Maxbio class (refer Appendix C).

Step 3: Enter the area cleared in hectares; the tool will then automatically calculate the emission factors and total emissions.

3.4.9. Revegetation – mitigation

The tool does not enable revegetation measures associated with carbon sequestration to be captured. This aligns with the approach outlined in the TAGG 2013 Workbook which considers offsets from revegetation as non-viable due to the implementation costs. Mitigation from vegetation offsets provided within the project boundaries are not currently accounted for in the tool.

Note: this section does not require any data input.

3.4.10. Completion of SDR Stage Data Entry

Once data for land use/vegetation clearing has been entered and appropriate evidence documentation completed across all categories, CERT reporting for this stage of the project is complete.

Prior to submitting the completed SDR CERT to I&S for review, ensure the data is checked and verified/assured as per the guidance outlined in Section 2.2.

Reminder: To keep track of the CERT data entries across the respective project stages, it is recommended that each version is saved using a unique name.

The following naming convention is suggested:

"[tool version] – [project name] – [reporting period] – [submission date]".

For example: "TfNSW CERT v1 – Newcastle Light Rail – CDR – 30 June 2015". When reporting for each reporting period, it is recommended the latest version of the file is used and is renamed/updated according to the relevant reporting period.

3.5. CDR Stage: Data Entry

For the most part, the steps required to complete the tool during CDR stage are the same as those required with completion during SDR stage.

The following section notes specific differences between SDR and CDR reporting stages and provides clarity on data and tasks required specific to the CDR stage of the CERT.

3.5.1. Data Input

A key functionality at the CDR reporting stage is the ability to carry across source data from SDR. This functionality enables the tool user to input data by either copying it across from the SDR data page, or updating based on new CDR data (e.g. revised Cost Plan or equivalent). In most instances (depending on variables such as the size of the project), a new BOQ would be developed or the tender phase BOQ refined as part of updating the Cost Plan to reflect final design. The project cost planners or procurement teams should have access to this revised Cost Plan/BOQ information.

Note: clicking on the grey 'SDR to CDR' button, automatically updates the CDR data entry sheet with all information entered during the project's SDR stage

Tip: Copying data over from SDR to CDR will overwrite any data the user already entered on the CDR tab. Therefore it is recommended to copy data across first before changes are made to the CDR tab.

The extent to which the design may change from SDR to CDR is dependent on the project. Typically there would be substantive design changes driven by activities associated with scope variation or design optimisation (such as value engineering) exercises.

The CERT manages this issue by enabling different options for data input from SDR to CDR stage.

The tool user may either:

1. Copy SDR input data to the CDR tab and leave unchanged.
2. Copy SDR input data to the CDR tab and update based on final design and associated BOQ.
3. Start afresh using a blank CDR worksheet to input new CDR data based on final design and associated BOQ.

3.5.1.1. Materials mitigation measures

The main area of difference between the SDR and CDR stage reporting relates to materials mitigation.

During CDR stage the functionality to include design optimisation options is enabled and the tool user can opt to include user defined mitigation measures (such as recycled material) and/or can use the change in material quantities calculator.

The following example is based on using 500 tonnes of TonerPave asphalt to replace 500 tonnes of asphalt. This is captured in both the mitigation measures section of the table and the value engineering table.

The first step would be to enter the relevant material and define the emission factor for the material (in this case TonerPave). Following this you would need to enter those materials to be replaced/engineered out – in this case 500 tonnes of Asphalt.

Change in material quantities – design optimisation

Design optimisation can be captured in the value engineering section under 'Materials Related Mitigation Measures'. This is only applicable to CDR as at SDR stage design is not sufficiently progressed to have implemented design optimisation opportunities.

Note: Design optimisation must be accompanied by evidence (e.g. meeting minutes) and must be an active decision to improve design, namely reduce or optimise material consumption. A change (lessening) of design scope (e.g. removal of bridge) is a scope change and cannot be considered a mitigation measure.

Option 1: Copy SDR input data to the CDR tab and leave unchanged.

The 'change in material quantities' calculator can be used to demonstrate improvements from early (SDR) design to CDR. It is important to note both material reductions and additions must be accounted for. This is enabled through the allocation of a +ve or -ve in the calculator. While some design optimisation may constitute a simple reduction in materials, in many instances a reduction in one material may require an increase in another. Such increases need to be included to ensure a balanced representation of design changes.

Example: In the SDR phase 400 tonnes of 40 MPa concrete was used for a car park floor base ('Ready mixed concrete (I)' in *Ready mixed concrete* calculator). Through design optimisation, 350 tonnes of concrete will be used based on CDR design. By selecting the appropriate material and inserting -50 tonnes into the calculator, a reduction from the base case will be enabled.

Step 1: Insert reduction in material. E.g. ready mixed concrete reduction of 50 tonnes.

Step 2: The tool auto-generates the amount of CO₂ saved as a positive figure (e.g. 8 tCO₂e). This figure is then added to the total forecast CDR emissions to account for mitigation.

Note: As there are only 12 rows available in the Change in material quantities calculator, only significant design optimisation/change exercises should be captured.

Option 2: Copy SDR input data to the CDR tab and update based on final design and associated BOQ.

By updating the SDR input data based on new BOQ information, any efficiencies gained from SDR to CDR will be lost. This is because there is NO automatic linking of data in SDR to CDR.

Therefore the only option to demonstrate improvements i.e. material reductions and efficiencies from SDR to CDR is to use the Change in material quantities calculator.

A limitation of inputting data using this method is that it will create an artificially smaller GHG footprint as it is subtracting from the CDR design data (which is the final design; not a base case). This does not pose a significant issue because the purpose of this exercise is to encourage mitigation and measure implementation, and at the design stage the calculation always provides an estimated forecast of construction emissions. What is important is the approximate per cent (%) reduction achieved so as to support six-monthly reporting on actual emissions (see Section 2.6).

Option 3: Start blank, inputting new CDR data based on final design and associated BOQ.

The tool user may choose to start the CDR data input sheet blank (e.g. choose not to copy information across from SDR stage). If this option is selected then the same approach as identified for Option 2 above will apply.

3.6. Six Monthly Construction Stages: Data Entry

The data entry processes for entering six-monthly construction stage reporting are the same as those entered at the SDR stage. The key difference between reporting at construction phase as opposed to design phase (SDR and CDR) is that the data entered will be actual data i.e. based on invoices; meter readings etc. In instances where invoices are late, the tool user is advised to retain this information and simply add it to the reporting data for the next six-months. At project completion, all materials used in the project should have been accounted for.

The reporting periods are defined as from 1 January – 30 June, and 1 July – 31 December across the full program of construction.

3.7. Detailed Results tab

The 'detailed results tab' provides a range of graphs that are informed by the data entered across the project lifecycle. The detailed results tab provides useful summary information through a number of graphs that help track progress. Notably, this section of the tool also provides a breakdown of scope 1 and scope 2 emissions for use towards the ISCA Ene-1 credit (refer Appendix D). Key graphs within this section include:

- Breakdown of emissions per emitting category for each stage of the project.
The graph can also be generated to show emissions for all stages of the project. From the drop down box available, the tool user will need to select the relevant reporting period to be represented.
- Breakdown of emissions by scope for each stage of the project.

The graph can also be generated to show the breakdown of scopes across all stages of the project. From the drop down box available, the tool user will need to select the relevant reporting period to be represented – the graph can also be generated to show the breakdown of scopes across all project stages.

- Six-monthly absolute or cumulative project emissions.

The tool user will first need to select the option to display cumulative or absolute emissions from the drop down box. Then you will need to select the data to be shown by checking the relevant tick boxes.

- Reductions achieved across key emitting categories (materials, energy, land use, waste).

The tool user will need to select which reporting period is to be displayed from the drop down box (includes an option to display all periods).

3.8. Dashboard tab

The 'dashboard tab' provides an outline of the forecast and actual emissions against the base-case in order to present the total percentage reduction in project emissions. This information is presented in a table and 'speedometer' graphic – both of which are auto-generated based on the information added at the project details stage and across all of the project's reporting stages.

The table appearing at the top of the worksheet summarises forecast and actual emissions across the relevant project stages to highlight the level of emissions reduction achieved relative to the base case.

The speedometer provides a graphic display on how the project has tracked against the emissions reduction targets identified for the project

Note: The information button on this page provides further information about the data represented in the table and speedometer.

The dashboard also provides the user with the option to generate graphs based on actual performance against the estimates entered at design stages of the project. You can do this by selecting the relevant design period to be displayed – SDR or CDR.

Emissions against the base case for the various project periods can also be displayed. To do this select the relevant project stage to be shown from the drop-down box.

To assist with the broader benchmarking and comparison across I&S projects, an auto-generated KPI response is included in the dashboard that presents the total amount of GHG emissions per million dollars (tCO₂e/\$m).

The final feature of the dashboard is to present a summary of emissions reduction equivalent to a number of car trips; number of flights; average Australian per capita and NSW households. This has been developed to assist with communicating emission reductions to third parties. It provides an idea of the size of emissions reduction compared to the base case for each stage of the project and shows equivalences for the relevant stages of the project, which can be selected from the relevant drop down box.

4. Related documents and references

[Environmental Management System Manual - 1TP-ST-052](#)

Appendix A: CERT Glossary

Table 1 CERT Glossary

Term	Definition
Actual Emissions	Relates to the project's construction stage emissions. As the name suggests, these relate to the actual emissions being produced during project construction. Data will largely be informed and confirmed by invoices.
Base Case	<p>The tool automatically calculates a project base case for each associated stage of the tool (SDR, CDR or actual). It is designed to provide an understanding of a business-as-usual approach that does not factor in mitigation measures.</p> <p>Emissions reduction across the construction life of the project is measured against the respective base-case NOT against each respective stage. For example, CDR emissions reductions are based on the auto-generated CDR base case – they are not based on emissions reduced through design refinements since SDR.</p> <p>The base case is calculated by applying default emission factors for relevant materials (e.g. concrete, asphalt etc.) to the quantities of materials entered by the tool user. It also takes into account a default transport scenario for the associated materials.</p> <p>Any value engineering options that lead to changes in the materials quantities (typically a reduction in materials or switch from one material to another) should be entered in the 'Materials – mitigation measures' section. (This is possible from CDR stage onwards.)</p> <p>Note: It is possible to end up with a design that has higher emissions than the base case. This would be the case if for example the cement content in the specified concrete is higher than business as usual, or if transport distances are much larger than usual.</p> <p>The base case relates to all data (excluding mitigation measures) associated with materials, energy, waste and land use.</p>
Carbon dioxide equivalent (CO ₂ e)	<p>A standard measure that takes account of the different global warming potentials (GWPs) of greenhouse gases and expresses the cumulative effect in a common, universal unit of measurement.</p> <p>CERT uses GWPs taken from the IPCC's Second Assessment Report (SAR), applying a 100 year time horizon. This is consistent with NGA and NGRS reporting.</p>
Critical Design Review (CDR)	CDR represents design completion. CDR tool entries would be based on the project's completed detailed design (i.e. 100%).
Emission Factors	<p>Emission factors for calculating emissions are generally expressed in the form of a quantity of GHG emitted per unit of activity – e.g. energy (kg CO₂e /GJ), fuel (kg CO₂e/L diesel) or material (kg CO₂e/kg steel). Emission factors are used to calculate GHG emissions by multiplying the factor (e.g. kg CO₂e/GJ energy in petrol) with activity data (e.g. kilolitres x energy density of petrol used).</p> <p>The emission factors used in CERT cover scope 1, 2 and 3 emissions.</p>
Forecast Emissions	Forecast emissions relate to those emissions estimated during SDR and CDR reporting stages. They are based on design estimates rather than actual emissions that are generated through the construction phase.
Mitigation	Represents measures and initiatives to reduce the GHG emissions associated with materials, energy and waste in the project.
System Design Review	SDR commonly represents approximately 20% design completion. The CERT supports completion of a preliminary carbon estimate based on early design

(SDR)	details.
Tool user	<p>Throughout the steps outlined in the guide, reference is made to the 'tool user'. This is the person or people whose responsibility it is to complete the CERT for their respective project.</p> <p>Note: It is at the discretion of the contractor/consultant to nominate the individual/s responsible for completing the CERT and submitting the accompanying reports. However at both SDR and CDR or equivalent stages, signoff must be provided by a cost planner, design manager or equivalent representative with visibility of the cost planning/tender estimate process.</p>

Appendix B: Maxbio Classification Maps - NSW

[TAGG 2013 Workbook, Attachment A - Maximum Potential Biomass Classes:](#)

Appendix C: Supporting information

A selection of supporting information is provided to address a number of CERT requirements that might need further clarification.

Mitigation evidence requirements

While it is important to include evidence requirements as identified in Section 1.1.2, it is important to note that mitigation evidence in particular, will be reviewed in greater detail i.e. with more numerous spot checks as per above method. It is critical that all references to mitigation evidence, as a minimum follow the following referencing protocol:

- document title;
- document version;
- issue date; and,
- page/section reference.

Table 2 below provides examples of acceptable mitigation evidence for the different emission categories and sources.

Table 2 Example of acceptable mitigation evidence

Source	Example evidence
Materials	
User defined Portland cement content for ready mix concrete	<ul style="list-style-type: none"> • Concrete mix design sheet
Recycled/alternative material	<ul style="list-style-type: none"> • Page of BOQ, or • Supplier invoice, and • Emission factor source
Change in material quantities (value engineering)	<ul style="list-style-type: none"> • Meeting minutes from value engineering workshop
Energy Use	
Green Power	<ul style="list-style-type: none"> • Copy of contract with electricity supplier
Reduction in diesel consumption for mobile plant (e.g. via idling procedure)	<ul style="list-style-type: none"> • Copy of idling procedure, and • Audit results from onsite idling checks
Waste	
Waste reused on site (e.g. reuse ballast for road base)	<ul style="list-style-type: none"> • Photos of material in end use, and • Email from Construction Manager estimating volumes of material reused

Submission requirements

The following provides general guidance related to report submission requirements. It is noted that these may change for a particular project and any project specific

requirements as outlined by the TfNSW Project Sustainability Officer should be followed.

Generally, completed CERT reports should be sent to the TfNSW Project Sustainability Officer in line with the following requirements:

- Submit the final version of the CERT to the nominated TfNSW Sustainability Officer at:
 - SDR design stage (or equivalent)
 - CDR design stage (or equivalent)
 - Six-monthly (from official start of construction)
- Once the tool has been completed for each of the above stages, submit a short memo (template provided in Appendix E) outlining the key results

Important: TfNSW will only accept CERT submissions that are:

- **Complete** – quantities have been completed for all emitting categories and sources (unless the source is not applicable to the project)
- **Supported by documented evidence** – a 90% evidence inclusion rate is required for general data input. A 100% evidence inclusion rate is required for evidence of mitigation measures

Note: at SDR and CDR stage, some mitigation measures may be likely but not 'locked in'. However some evidence of the source of the proposed measure is required e.g. email communication to a supplier of an alternate material.

If these minimum criteria are not met, the Sustainability Officer may return the report for revision by the tool user.

Constraints and common questions

While every effort has been made to facilitate the creation of a flexible and user-friendly tool interface we acknowledge the CERT will have some limitations. [Feedback](#) is both encouraged and welcomed to help refine and improve future versions on the tool.

The following section provides an overview of some of the known constraints of the tool to help tool users understand current limitations.

A summary of frequently asked questions has also been included – these have been generated through the engagement process that has underpinned the tool's development.

Constraints

- To simplify the tool's data entry process, the option has been included to either input transport scenarios specifically, or use default, business-as-usual transport scenarios. The transport of materials is and will remain a difficult/contentious issue particularly with regard to referencing a base case. For example, some of the emission factors are not state specific due to information not being available which means they assume a worse case or better case baseline than what could be realistically expected for NSW. Further it is impractical to record all raw materials from the beginning of the project lifecycle (e.g. iron ore and cokes used for steel production).
- Transport is not a major contributor to GHG emissions for most projects (less than 10% on average based on the materiality assessment undertaken by I&S). The decisions made regarding transport distances, modes, return loads, etc. will have a limited effect on the overall carbon footprint of a project.

- In order to develop the base case some assumptions have been required due to a lack of existing data and/or reference material. Where assumptions have been made this information is documented, refer 'formulas and background tab'.
- In line with the TAGG 2013 Workbook vegetation offsets are not included as part of land clearing mitigation. It is acknowledged that this could present an issue for greenfield projects as land clearing can produce large emissions profile. It is anticipated this will be reconsidered when the second version of the tool is planned.
- The CERT tool is a simplified, high level GHG reporting tool. It is not designed to substitute detailed Life Cycle Analysis (LCA) models – future versions of the tool make seek to reconcile the inclusion of LCA.

Frequently Asked Questions

The following outlines a number of frequently asked questions (FAQ) that have been posed during the tool's development and pilot stages. They are designed to provide further context and guidance to support completion of the tool.

Table 3 CERT frequently asked questions

Question	Response
Interface with design	
My project has more than one design package, with design review/submission dates differing in terms of program. How does the CERT facilitate this?	Please use more than one copy of the CERT for each major design package. TfNSW will accept multiple submission of the CERT for large projects with complex design packages. However the memo (refer Appendix E) should collate the results to represent one project.
Can't I just "over design" at SDR to look better at CDR and construction stage reporting?	No. The aim of the tool is not to compare the various stages against each other, but to compare them against the auto-generated base case. Conservative/over designing at SDR stage to try and achieve efficiencies later in the project will serve no benefit as all emissions reductions are charted against the respective base case.
Why haven't operational emissions been included in the tool?	Development of the CERT has borne out of the GHG Inventory Guide for Construction Project – this approach has not included operational emissions and as such at this point in time operational emissions are not included.
What if the quantification is way off, quantification can be way out from reality? Is there a margin for error? Contingency?	There is always a risk that quantities are off. Until now, this was difficult to spot because of the variation in reporting formats, scope, etc. With CERT, TfNSW can compare materials use and greenhouse gas emissions to other (similar) projects.
I can only change the Portland cement quantity to achieve reductions for ready mix and precast concrete. What about recycled aggregates etc?	Recycled aggregates only have minor impacts on the carbon footprint of concrete. Therefore it was determined that there is no need to distinguish these for the purposes of the CERT
So if I copy across SDR data to CDR and update the changes to CDR manually efficiencies from SDR to CDR will be lost?	Yes, while improvements in managing design change and optimisation in subsequent CERT versions may be considered, currently if you choose this data input option you will need to use the change in material quantities calculator to demonstrate efficiencies and reductions.
Base case generation	

How is the base case generated?	The base case is generated via: i) Business as usual assumptions related to transport scenarios and concrete Portland cement content, and ii) The mitigation measures identified by the tool user The base case is the estimated forecast or actual emissions for the project without any user defined i) transport/concrete estimates and ii) mitigation measures. (Refer Appendix A)
My mitigation measure is not provided for in the CERT. How can I include it?	Each category (except land use change) allows for user defined mitigation measures. The tool user must source the emission factor.
Compliance with other standards and requirements	
How does the CERT relate to the National Greenhouse and Energy Reporting Scheme (NGERS)?	The CERT scope of emissions sources differs from that of NGERS e.g. it allows estimation of scope 3 emissions. However, the energy use category has been developed to allow data gathered for NGERS reporting purposes to be easily transferred for CERT reporting
Does the CERT align with commonly accepted standards for GHG assessment??	There are a number of Standards (e.g. WRI GHG Protocol, ISO14040, ISO14067, PAS2050) that could be applied, and all are slightly different. Although the calculator uses key carbon accounting principles, it is also a simplified reporting tool with limited scope. There has been no formal assessment of consistency with different Standards as yet.
Why aren't Scope 3 emissions captured more fully?	The tool was informed by a materiality assessment that sought to identify significant emissions sources for projects. Therefore only those emissions that are of material impact have been included.
Will completing the CERT automatically meet the associated requirements under the ISCA tool?	No. I&S has worked in close collaboration with ISCA to align the CERT with the Infrastructure Sustainability rating tool where possible, but the use of the CERT does not automatically comply with the IS requirements for energy and materials. Notably, completing the CERT will meet ISCA's reporting requirements for Ene-1 emissions associated with design and construction but not for operation. As noted previously, operation is not covered by CERT and will need to be calculated separately to meet ISCA's requirements.
Is the ISCA base-case and CERT base case the same?	The CERT base-case may provide a basis for an ISCA base case once combined with suitable operation emissions and subject to verification through ISCA.
Emissions factors change fairly regularly – how frequently will the tool be updated?	I&S acknowledges that emission factors for both electricity and materials are updated frequently. It is anticipated that emission factors will be reviewed on an annual basis and I&S will work closely with key stakeholders to ensure this is an efficient process. It should be noted that projects will not be required to change to future versions of the CERT once reporting has commenced. For example, if a project commences reporting at SDR using CERT v.1 it should use CERT v.1 for all subsequent stages of project reporting.

Appendix D: CERT overview and Context

Introduction

TfNSW is committed to working in partnership to deliver innovative and sustainable transport networks that make NSW a great place to live and work. As an organisation, TfNSW has a demonstrated commitment to sustainability and aims to be a world class authority delivering safe, reliable and integrated transport across the State.

As part of its broader sustainability commitment, greenhouse gas (GHG) or carbon emissions, are viewed as a key sustainability issue for TfNSW and have been identified as an appropriate metric for measuring sustainability performance. The measurement of GHG emissions are central themes in the:

- **TfNSW Environment and Sustainability Framework:** the Department's corporate sustainability framework includes key themes around energy and resource management that seek to reduce consumption and emissions.
- **TfNSW Transport Projects' Sustainability Framework:** Infrastructure and Services Division (I&S) confirms a GHG emissions reduction target of 15% (from a 2010 baseline) by 2020. It also identifies a need to reduce the absolute quantity of Portland cement by at least 30% as an average across all concrete mixes subject to meeting strength and durability requirements).
- **TfNSW Sustainable Design Guidelines:** The Sustainable Design Guidelines (SDGs) support the preparation of a carbon footprint assessment for all projects, and, reducing the use of Portland cement quantity.

It is important to note, the introduction of the CERT does not place an additional reporting requirement on I&S's stakeholders. Rather, it seeks to streamline and simplify the current process associated with the assessment of project GHG emissions from design through to construction. The introduction of the CERT will supersede the requirements within the current TfNSW *Greenhouse Gas Inventory for Construction Projects*, and in future TfNSW's Standard Requirements – Environment (TSR-E) will be updated to require completion of the CERT for all projects \geq \$15million.

Purpose and objectives

Development of the CERT serves two main purposes for I&S:

- To provide consistency in GHG assessment and reporting (i.e. to ensure all projects measure and report emissions in the same way).
- To streamline and simplify the GHG reporting and assessment process for both I&S and its supply chain.

Its main objectives are:

- To estimate a project's construction phase GHG emissions profile from detailed (SDR) design stage through to construction completion.
- To encourage the investigation and implementation of GHG reduction (mitigation) measures.

Ultimately, it is anticipated the CERT will ease the burden of reporting by making the data input process easier and more straightforward.

Developing the CERT

At its core, the GHG emission sources included in the CERT have been informed by a materiality review undertaken by I&S's Sustainability and System's team. The aim of the review was to identify the material (i.e. significant and/or important) emissions sources across a cross-section of typical I&S projects.

The outcomes from this materiality assessment have directly informed development of the CERT. The tool comprises a number of predefined GHG emitting activities/sources.

A comprehensive engagement process has further informed development of the CERT. Key stakeholders that were engaged throughout the process include (but are not restricted to):

- Sydney Trains
- Roads and Maritime Services (RMS)
- Transport Projects Delivery Office (I&S)
- Various tier 1 and 2 contractors
- Wickham Transport Interchange (WTI) project team
- Infrastructure Sustainability Council of Australia (ISCA)

A key component of developing the tool was testing and piloting the draft tool on the Wickham Transport Interchange project to gain practical insight into its useability and functionality. I&S has also worked closely with ISCA to seek alignment (where possible) with relevant categories within the Infrastructure Sustainability (IS) rating tool e.g. Energy-1 (Ene-1) and Materials-1 (Mat-1). Further details on the tool's engagement and development process can be found in Appendix D.

4.1.1.1. ISCA and CERT

Reflecting the I&S requirement for all projects \geq \$50 million to achieve an ISCA rating, many I&S projects will be applying both the CERT and the ISCA IS rating tool in parallel. As such, efforts have been made to align the requirements of the CERT with those included in the IS rating tool where possible.

An Ene-1 output table has been included in the 'Detailed Results' tab of the CERT. Completion of this table supports the reporting requirements for design and construction as outlined in ISCA's Ene-1 category: Energy and carbon monitoring and reduction.

Within the tool there are useful reminder prompts that provide further information regarding the CERT's interface with the Ene-1 requirements.

ISCA and I&S are working together to seek closer alignment between the materials emission factors included in both tools. In CERT, emission factors for materials are based on the Australian National Life Cycle Inventory Database (AusLCI), including its shadow-database. The only exceptions are factors for asphalt (based on TAGG 2013 Workbook) and recycled aggregates (based on a 2010 study for Sustainable Aggregates South Australia).

I&S is committed to reviewing the emission factors included in the CERT on a regular basis (at a minimum this will be done every 12 months) with a view to updating information as appropriate. I&S will look to engage with key stakeholders including ALCAS and ISCA to discuss update and revision timeframes.

Note: To achieve the ISCA credits associated with the Ene-1 criteria, additional work will be needed to estimate operational emissions. The CERT only provides emissions estimates for design and construction.

CERT structure

The CERT is structured to require input during three key stages of the project (initial/preliminary design – System Design Review (SDR); design completion – Critical Design Review (CDR); and six-monthly reporting during construction.

The tool is designed to capture relevant and material Scope 1, 2 and 3 GHG emissions as identified through the internal I&S emissions materiality assessment. The following provides a breakdown of the three relevant scope categories:

- Scope 1: All direct GHG emissions. E.g. emissions generated by the use of diesel fuel by construction plan/equipment; clearing of vegetation.
- Scope 2: Indirect GHG emissions from consumption of purchased electricity, heat or steam. E.g. Energy purchased to operate and run plant and equipment, power site offices, etc.
- Scope 3: Indirect upstream emissions. E.g. emissions from construction materials; disposal of waste; fuel used to transport materials and waste.

The information entered during each stage of the project informs the next. For example, once the SDR equivalent (representing approximately 20% design completion) has been completed, this information can then be used to inform the CDR stage which represents the 100% completed design. Following the design stages; reporting is to take place every six months during construction. The tool will automatically show the relevant number of reporting periods to cover the construction duration of your project.

The following provides a reporting template of key project information generated using the CERT. This information should be completed for each stage of the project and submitted to I&S along with the completed CERT. It is designed to provide I&S with a quick reference of high-level project results. It may also be used internally to communicate progress.

Reporting Area	Response
Project Name	
Reporting stage covered by submission (<i>delete as appropriate</i>)	<ul style="list-style-type: none"> • SDR • CDR • Six-monthly construction reporting
Project GHG Reduction Target/s	
Key materials mitigation opportunities explored	
Key energy mitigation opportunities explored	
Key waste mitigation opportunities explores	
Total forecast/actual emissions for relevant reporting stage (tCO₂e)	
Total base case emissions for relevant reporting stage (tCO₂e)	
Total emissions reduction identified (tCO₂e)	



The Government Resource Efficiency Policy (GREP) requires government sector agencies to report performance against the policy by publishing financial year data annually.

This reporting workbook is prepared for the contractors / Alliance partners to provide information on the performance of their mobile non-road diesel equipment against US EPA, EU, or equivalent emissions standards.

(US and EU non-road diesel engine emission standards are the most widely referenced and applied standards, and most countries have adopted emissions standards derived from those models. For equipment that meets another international standard, record the equivalent US or EU standard.)

For additional information about the GREP, please refer to the Office of Environment and Heritage (OEH) website:

<http://www.environment.nsw.gov.au/government/140567-resource-efficiency.htm>

Definition of 'mobile non-road diesel plant and equipment' for GREP

For the purposes of GREP annual reporting, *mobile non-road diesel plant and equipment* means diesel engines used in a wide range of construction, agricultural and industrial equipment. It includes compression-ignition, internal combustion engines installed on self-propelled equipment and equipment that is propelled while performing its function, for example, tractors, excavators, bulldozers, loaders, graders, logging equipment, portable generators, forklifts, etc.

The reporting template includes an extensive list of equipment, as well as general groupings (eg, 'other construction equipment') for items not listed.

The following non-road engine categories are **NOT** to be included in the GREP reporting:

- engines less than 19kW (25HP)
- registered motor vehicle engines (but DO include non-road vehicles with conditional registration);
- stationary engines (or engines that generally remain at one location);
- engines used in aircraft;
- engines used in railway locomotives;
- engines used in marine vessels
- engines used in underground mining equipment.

Projects involving multiple LGAs

If a project involves multiple LGAs, select either the LGA where the majority of the work will be undertaken, or one of the 'Multiple' options (Sydney, Lower Hunter, Illawarra, Regional), if more appropriate.

Questions

Please contact Principal Manager, Environment Management at (02) 9200 0200

Sydney Metro City & Southwest Sustainability Reporting Template



Contract:	Demolition			
Instructions:	The Contractor must provide the sustainability performance data specified below to TfNSW on a monthly basis.			
Reporting month/year:	(Contractor to complete)			
Metric	Type	Unit	Cumulative total to date	Monthly total
Quantity of electricity consumed	-	kWh		
Quantity of fuel consumed	Petrol	kL		
	Diesel	kL		
	Other (Contractor to specify)	kL		
Quantity of waste generated	Hazardous waste	tonnes		
	Base building demolition waste	tonnes		
	Fit out waste	tonnes		
	Other non-hazardous waste	tonnes		
	Other (Contractor to specify)	tonnes		
Quantity of waste reused or recycled	Base building demolition waste	tonnes		
	Fit out waste	tonnes		
	Other non-hazardous waste	tonnes		
	Other (Contractor to specify)	tonnes		
Quantity of waste disposed to landfill	Hazardous waste	tonnes		
	Base building demolition waste	tonnes		
	Fit out waste	tonnes		
	Other non-hazardous waste	tonnes		
	Other (Contractor to specify)	tonnes		
Quantity of materials salvaged for reuse/recycling	(Contractor to specify)	(Contractor to specify)		
	(Contractor to specify)	(Contractor to specify)		
	(Contractor to specify)	(Contractor to specify)		
Quantity of mains (potable) water consumed	-	kL		
Quantity of water consumed from other sources	(Contractor to specify source(s))	kL		

Sydney Metro City & Southwest
Environmental Reporting Template



Contract:		
Instructions:		
Issues	This month	To date
Air quality issues raised	x	y
Community, stakeholder and business issues raised	x	y
Design issues raised	x	y
Flora and fauna issues raised	x	y
Heritage issues raised	x	y
Management systems issues raised	x	y
Noise and vibration issues raised	x	y
Soil and water issues raised	x	y
Traffic transport and access issues raised	x	y
Waste and spoil issues raised	x	y
Incidents	This month	To date
Number of Class 1 incident occurrences	x	y
Number of Class 2 incident occurrences	x	y
Number of Class 3 incident occurrences	x	y
Non-compliances	This month	To date
Number of non-compliances raised	x	y
Number of open non-compliances	x	y
Corrective and Preventative Actions (Incidents and Non-compliances only)	This month	To date
Number of open Corrective Actions	x	y
Percentage and number of closed Corrective Actions	x	y
Environmental Audit Findings	This month	To date
Number of audit findings on Environmental Requirements which since the audit date have been open	>120 days	x
	between 120 and 60 days	x
	<60 days	x
Number (and percentage) of open environmental audit findings closed in the month	[x(y%)]	
Environmental Protection Licence	This month	To date
Licence variations	x	y
Emergency out of hours work (OOHW) events	x	y
EPA Inspections	x	y
Environmental Approvals	This month	To date
Consistency Assessments Determined by Sydney Metro	x	y
Total ongoing Environmental Requirements	x	y
Total Completed Environmental Requirements	x	y
Environmental Training	This month	To date
Number of environmental training courses delivered	x	y



Integrated
Management
System

Principal's General Specifications

G10 - Traffic and Transport Management

SM ES-ST-214

Sydney Metro Integrated Management System (IMS)

Applicable to:	Sydney Metro Northwest/City & Southwest
Document Owner:	Philip Brogan
System owner:	Stuart Hodgson
Status:	Final
Version:	0.2
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1. General

1.1. Introduction

This Principal's Specification G10 contains the traffic and transport management requirements that are to be met by the Contractor during the performance of the Contractor's Activities, including the management of the impacts of the Contractor's Activities on road and pedestrian traffic.

All temporary traffic arrangements required by the Contractor's activities must comply with this specification unless stated otherwise.

1.2. Interpretation and Definitions

- (a) A reference to an "Annexure" is a reference to an Annexure attached to this Principal's Specification G10, unless stated otherwise.
- (b) A reference to a "clause" is to a clause of this Principal's Specification G10, unless stated otherwise.
- (c) In this Principal's Specification G10, the following terms have the following meanings

"Approval" means any licence, permit, consent or approval required to be obtained from any Authority to perform the Construction Activities or required in relation to the Construction Site;

"Authority" or "Authorities" means any authority or person that has a right to impose requirements on any part of the Contractor's Activities or over the Construction Site;

"Construction Site" generally means the land where the Contractor undertakes the Contractor's Activities;

"Construction Traffic Management Plan" (CTPM) means the Construction Traffic Management Plan required by the Project Planning Approval. The CTMP is a plan showing how traffic will be managed when construction works are being carried out. It describes the work activities being proposed, their impact on the roadway and on road users, and how these impacts are being addressed. A CTMP will incorporate Traffic Staging Plans, Traffic Control Plans, Vehicle Movement Plans and Pedestrian Movement Plans. City & Southwest Metro Contract wide CTMPs will need to be prepared in addition to Site-specific CTMPs.

"Contract" means the agreement between the Principal and the Contractor;

"Contractor" means the organisation engaged by the Principal for the delivery of the Project Works and the Temporary Works;

"Contractor's Activities" means all things and tasks which the Contractor is required to do under the Contract whether or not such things and tasks are performed by Subcontractors;

"Hold Point" means a point beyond which a work process must not proceed without the authorisation or release of a designated authority;

"Identified Records" means those records identified in Table A2 in Annexure G10/A;

"Principal" means Transport for NSW;

"Principal's General Specification Reference Document" means a document listed in Annexure G10/B and any updated or replacement version of these documents that may be issued from time to time;

"Principal's Representative" means the representative authorised under the Contract to act on behalf of the Principal;

"Project Works" means any permanent works which the Contractor is required to design, construct, complete and hand over;

"Subcontractor" means a subcontractor of the Contractor and includes a supplier of goods or services (including professional services and construction plant hire) or both;

"Road Occupancy" means an activity that is likely to impact on the traffic flow of the road network, and may involve the closure of traffic lane(s) or parking lane (s);

"Road Occupancy Licence" means a licence for Road Occupancy issued by TMC that allows the holder to use or occupy a specified road space at approved times, providing that certain conditions are met;

"Temporary Works" means any temporary works required to carry out the Contractor's Activities but which do not form part of the Project Works;

"Traffic Control Plan" means a diagram showing signs and devices arranged to warn traffic and to guide it around, past or if necessary through a work site or temporary hazard.

1.3. Principal's Specification Reference Documents

The Contractor must comply with the Principal's General Specification Reference Documents. The Contractor must comply with the version of the Principal's General Specification Reference Document that is current at the time that the relevant Contractor's Activities are undertaken.

1.4. Hold Points and Identified Records

The Hold Point listed in Table A1 in Annexure G10/A must be observed by the Contractor.

Identified Records are nominated for the purposes of the Principal's Specification Q6 and are required to be created by the Contractor.

1.5. Traffic control at work sites

The Contractor must develop and implement construction traffic management plans to minimise and mitigate traffic impacts, including road safety impacts, caused by the Contractor's activities. In consultation with the Transport Management Centre (TMC), Roads and Maritime Services (RMS) and the CBD Coordination Office (CCO), the Contractor must develop, formalise and implement, traffic management, control and operational protocols, procedures, processes, systems and communications between the Contractor and the TMC and CCO.

2. Traffic and Transport Management Requirements

2.1. Contractor Requirements

- (a) The Contractor must construct the Project Works and construct and remove the Temporary Works with the least possible obstruction to pedestrians, cyclists, public transport services and road traffic.
- (b) The Contractor must undertake all work necessary to provide for the safe movement of pedestrians, cyclists, public transport services and road traffic and the protection of persons and property around the Construction Site and all other areas affected by the Project Works, the Temporary Works and the Contractor's Activities.
- (c) The Contractor must prepare and submit the Construction Traffic Management Plan and, where required, all Traffic Control Plans to the Principal's Representative and each relevant Authority and obtain all necessary Approvals from the relevant Authority for temporary pedestrian, cyclist, public transport service and road traffic arrangements, including the installation of and changes to any regulatory traffic control devices, road or thoroughfare.
- (d) The Contractor must also obtain all necessary Approvals from each relevant Authority to enable it to direct traffic and to appoint Traffic Controllers to provide for the safe movement of pedestrians, cyclists, public transport services and road traffic and the protection of persons and property around the Construction Site.
- (e) The Contractor must conform to the requirements of all relevant Authorities, the RMS Traffic Control at Worksites Manual, AS 1742.3 Manual of uniform traffic control devices Part 3: Traffic control devices for works on roads and this Principal's Specification G10, when planning and carrying out traffic and transport management.
- (f) The Contractor must conform to applicable vulnerable road user initiatives required by the Principal and relevant Authority to enhance pedestrian, cyclist and motorist safety in the vicinity of construction sites. These may include measures such as deployment of speed awareness signs in conjunction with variable message signs, blind spot and other construction vehicle devices, Metro project specific heavy vehicle driver training and shared experience educational events.
- (g) The Contractor must not reduce or adversely impact road network traffic capacity and traffic flow efficiency, except after hours, where approved.

2.2. Construction Traffic Management Plan

At least four (4) weeks before proposing to undertake work which affects traffic conditions, the Contractor must submit to the Principal's Representative a Construction Traffic Management Plan that complies with and addresses the following requirements:

- (a) RMS Traffic Control at Worksites Manual;
- (b) AS 1742.3 Manual of uniform traffic control devices Part 3: Traffic control for works on roads;
- (c) Relevant Austroads Guides; and
- (d) RMS Supplements to Australian Standards and Austroads.

The Contractor must revise the Construction Traffic Management Plan and implement more appropriate procedures if the original pedestrian, cyclist, public transport service and road traffic management practices prove not to be fully effective.

The CTMP must include the following elements, unless otherwise agreed in writing with the Principal's Representative:

- (a) Details of any traffic staging arrangements associated with each proposed construction stage, including Traffic Staging Plans, and the time periods during which each stage will be in operation.
- (b) Traffic Control Plans (TCP), including provision for cyclists, and any specific traffic control arrangements associated with the conditions of approval of the ROL. The TCP sets out the specific traffic and transport management arrangements to be implemented at specific locations during the construction of the Project Works and Temporary Works.
- (c) Vehicle Movement Plans (VMP) showing the preferred travel paths for vehicles to enter, leave or cross the through traffic stream. A VMP is a diagram showing the preferred travel paths for vehicles associated with a work site entering, leaving or crossing the through traffic stream. A VMP may be combined with or superimposed on a TCP.
- (d) Pedestrian Movement Plans (PMP) showing the allocated travel paths for workers or pedestrians around or through the work site. A PMP may be combined with or superimposed on a TCP.
- (e) Parking Management Plans (PMP) that identify parking requirements and on and offsite parking arrangements and associated impacts; remote parking arrangements and associated access between sites and public transport nodes; alternate parking arrangements for displaced parking, and communication and parking management measures. For any proposed kerbside use impacts in the CBD a proposal for relocation of impacted users is required.
- (f) Provision of access to adjoining properties and side roads affected by the construction.
- (g) Copies of any ROL and approvals from other relevant authorities obtained;
- (h) Design drawings for any temporary roadways and detours, including alignment and surface levels, pavement widths, pavement cross-sections and drainage.
- (i) Names and contact details of nominated personnel responsible for attendance at traffic incidents where required to do so by the Police and emergency services, and for maintenance of traffic control devices and temporary roadways outside normal working hours. Provide confirmation that these details have been provided to the Police.

2.3. Traffic Control Plans

The Contractor must submit all required Traffic Control Plans to the Principal's Representative and each relevant Authority. The Contractor may use standard TCPs contained in the Traffic Control at Worksites (TCWS), with minor modifications if necessary to suit a specific work location, if they are appropriate. If traffic staging is applicable, an individual TCP for each traffic stage may be required. If lane occupancy is required, the Contractor must comply with the requirements of Section 2.4 for obtaining the ROL. The selection and minor modification of a standard TCP to suit a specific work location must only be carried out by a person who is qualified in the RMS "Select / Modify Traffic Control Plans" course (i.e. holds a current Red Card).

The TCP must show, where applicable and appropriate, the following details:

- (a) Types and locations of permanent regulatory (R series) and warning (W series) signs.
- (b) Types and locations of temporary signs (T series) including advance warning signs and variable message signs (VMS).
- (c) Locations of permanent and temporary traffic signals.
- (d) Locations of any required Traffic Controllers.
- (e) Locations and lengths of taper and safety buffer areas.
- (f) Locations of safety barrier systems including end terminals.
- (g) Pedestrians and cyclists paths.
- (h) Locations of entry and exit gates to work areas, individually numbered and signposted.
- (i) Details of access to adjoining properties, car parking areas, and side roads.
- (j) Pavement marking details, including types of delineation required, turning arrows, stop/holding lines and other road markings, types and positions of raised pavement markers and other delineation devices.
- (k) Locations of temporary lighting.

2.4. Traffic Staging Plans

The Contractor must prepare Traffic Staging Plans to show how traffic will pass safely through or around the Construction Site during the various construction stages. Traffic Staging Plans may be integrated with any construction staging plans prepared by the Contractor.

The Traffic Staging Plans must show, where applicable and appropriate, the following details:

- (a) Lane configurations on existing and new (temporary and permanent) pavements, indicating any departures from existing traffic lanes.
- (b) Intersection layouts and temporary traffic signal arrangements.
- (c) Working areas and pedestrian and cyclist paths.
- (d) Access to residential properties, local businesses and community facilities.
- (e) Pavement markings.
- (f) Drainage system, both temporary and permanent, including any pollution control measures.
- (g) Utility services and their impact on the Project works, temporary works and Contactor's activities.
- (h) If removal of pavement markings is required, details of the proposed methods for removal, the estimated durations to carry out the removal, and if necessary any proposed measures to restore the road surface.

2.5. Road Occupancy Licences

- (a) When the Contractor's planned activity requires an existing road to be used in such a way that affects traffic flow, obtain a Road Occupancy Licence (ROL).
- (b) This ROL applies only to occupation of the road space, and does not grant permission for or approval to the actual/physical work being undertaken.
- (c) The Contractor must allow a minimum of 10 working days for a response to an application for an activity requiring a road occupancy.
- (d) The activity must not commence until the ROL is obtained.
- (e) The lane occupancy hours granted in the ROL may be less than, and will override, the working hours stated in the Contract, for work that requires the lane occupancy.
- (f) The Contractor's Activities must comply at all times with the lane occupancy hours granted in the ROL.
- (g) Notwithstanding any ROL granted for any lane or shoulder closure, co-operate with RMS and other Authorities, such as the Police or State Emergency Services, to facilitate traffic flows on the roadway through the Site.
- (h) The Principal may at any time direct the Contractor to temporarily cease work and re-open any closed lane or shoulder.
- (i) Keep a copy of the ROL on site at all times when the ROL is in operation.
- (j) The contractor is to prepare and maintain a register of RoL applications and approvals providing stakeholders with status information throughout construction.

All Road Occupancy Licence Applications (ROLA) are now processed through a new online system called OPLINC 2. To submit a ROLA the Contractor must first register on line. To register as a company the Contractor must have an ACN number (9 digit number – not ABN) and a valid mobile phone number. Google Chrome must be used as the web browser (the map function only works in Chrome). There is need to access the following link to proceed with the registration:

<https://myrta.com/oplinc2>

Once the registration process is complete there is need to push the submit button to submit the registration request. The system then will generate an email to the email address included in the registration. The contractor must click on the link shown in the email to validate the registration request and once completed the registration request will be authorised by the Road Occupancy Unit within five (5) days.

Note that the system will permit the Contractor to complete the new Road Occupancy Licence Applications, however the system will not allow the Contractor to submit any Road Occupancy Licence Applications until the new user account has been authorised by the Road Occupancy unit.

3. Temporary Roadways and Detours

3.1. Traffic Control Devices

The Contractor must supply and install regulatory traffic control devices, and remove them when the devices are no longer required, as part of the provisions for control of traffic in accordance with the requirements of each relevant Authority.

The Contractor must supply and install temporary speed zoning signs in accordance with the requirements of all relevant Authorities. Temporary speed zoning must only be implemented with the approval of all relevant Authorities.

The Contractor must supply and install portable and temporary fixed traffic signals, and remove them when the signals are no longer required, as part of the provisions for control of traffic in accordance with the requirements of all relevant Authorities.

The Contractor will need to take account of potentially lengthy approval lead times in any works involving traffic signal construction or modifications.

The Contractor must supply and install public transport service related portable and temporary fixed regulatory and advisory signage, and remove them when the signs are no longer required, as part of the provisions for control of pedestrians, cyclists, public transport services and road traffic in accordance with the requirements of all relevant Authorities. Public transport service portable and temporary fixed regulatory and advisory signage must be legible, of a high standard and similar to that used in permanent situations to the satisfaction of the Principal.

3.2. Roads and Property Accesses

The Contractor must at all times provide safe and convenient passage for vehicles, pedestrians and cyclists along, to and from roads and property. Contractor's Activities that affect the use of areas around the Construction Site and existing accesses must not be undertaken without providing adequate alternative provisions, as required by all relevant Authorities and affected property owners, and to the prior satisfaction of the Principal's Representative.

3.3. Traffic Controllers

The Contractor must advise the Principal's Representative of the names of proposed traffic controllers and their traffic controllers' certificate numbers and expiry dates.

3.4. Opening Temporary Roadways and Detours to Traffic

All signposting, pavement marking, safety barriers and portable or temporary traffic signals must be completed before the opening of temporary roadways to traffic, pedestrian and cyclist route changes and public transport facility changes.

HOLD POINT

Process Held:	Opening of temporary roadways and detours to traffic, pedestrians and cyclists (including portable or temporary traffic signals sites) must not proceed without giving notice and receiving approval.
Submission Details:	Notice that work is conforming and ready for inspection. Evidence of approval by all relevant Authorities.
Release of Hold Point:	The Principal's Representative will inspect the Construction Site, with relevant agency representatives where required, prior to authorising the release the Hold Point.

Unless otherwise approved by the Principal's Representative, traffic may only be switched to a temporary roadway or detour where the Contractor's personnel will be working on that site for a minimum of 2 days thereafter.

3.5. Maintenance

The Contractor is responsible for the maintenance of temporary pedestrian and cyclist thoroughfares and detours, temporary public transport facilities and temporary roadways and detours and must ensure the thoroughfares and road surfaces are kept safe for pedestrians, cyclists and traffic. Any potholes or other failures must be repaired without delay and within 2 days of the occurrence of the pothole or failure.

3.6. Removal

Upon completion of the Project Works all temporary pedestrian and cyclist thoroughfares and detours, temporary public transport facilities and temporary roadways and detour arrangements must be removed and the area restored to at least the state which existed prior to the commencement of the Contractor's Activities.

4. Pedestrian and cycle traffic management**4.1. Pedestrian****4.1.1. The Contractor must make the following pedestrian traffic management measures:**

- i. Existing longitudinal pedestrian footpaths will be maintained either in their current form, or on an alternative adjacent alignment. Wherever possible works on footpaths (where required) will be scheduled to occur outside of peak pedestrian times.
- ii. Where construction works require full or partial occupation of the existing footpath, the Contractor must temporarily narrow footpaths around the worksite or to divert pedestrians to adjacent footpaths via safe crossing facilities with the appropriate barriers and signage. Any diversions may require pedestrian demand modelling and must be agreed with the relevant Authorities.
- iii. Footpath widths are to allow two-way pedestrian traffic that meets the pedestrian demand and has sufficient space provided to accommodate

prams, strollers and wheelchairs without requiring temporary widening from their existing width prior to construction commencement. Narrowing of footpath width if required is to be approved by the relevant authorities.

- iv. Access to public transport facilities must be made available for customers at all times. Where excavation works and associated works limit accessibility to a facility, the Contractor must provide safe and secure temporary access incorporating handrails and other infrastructure where required. All temporary works must be in accordance with relevant standards.
- v. Access to shops must be available for the public during business hours. Where excavation works limit accessibility to a shop during business hours, the Contractor must provide safe and secure temporary access incorporating handrails where required. All temporary works must be in accordance with relevant standards.
- vi. The Contractor must provide additional traffic control at locations where there is an interaction between pedestrians and construction vehicles.
- vii. Existing transverse pedestrian movements must be maintained at existing pedestrian crossing facilities using existing traffic control signals or controlled by traffic controllers, unless approved otherwise.
- viii. All mid-block transverse pedestrian crossings must be maintained by the Contractor during construction of the Works.
- ix. The width of the mid-block crossing at Martin Place will require pedestrian demand modelling to determine the optimum width during construction. Approval will be by the relevant Authorities. It is anticipated that a larger crossing or multiple crossings is likely to be required at this location to accommodate the high pedestrian flows.

4.2. 4.2 Cycle routes

Where the Sydney Metro Works will impact cycling routes, the Contractor must provide alternative cycle routes. The Contractor must consult with local bicycle user groups, local communities, and relevant authorities regarding any proposed alternative route. The Contractor must submit that proposal and summaries of that consultation for approval by TfNSW and RMS prior to implementation.

5. Roads Safety Audits

All Road Safety Audits will be undertaken in accordance with the RMS 'Guidelines for Road Safety Audit Practices (2011), with reference to current practices outlined in Austroads Guide to Road Safety Part 6 Road Safety Audit (2009) and the Sydney Metro Principal Contractor H&S Standard. Road safety audits shall be undertaken with due consideration to the high levels of pedestrian activity in the Sydney and North Sydney CBD environments.

Annexure G10/A Schedule of Hold Points and Identified Records

Table A1 Schedule of Hold Points

Clause	Description
3.4	Opening to traffic.

Table A2 Schedule of Identified Records

The records listed below are Identified Records for the purposes of the Principal's Specification Q6.

Clause	Description of the Identified Record
2.2	Construction Traffic Management Plan.
2.3	Full details of the Traffic Control Plans including temporary signposting, traffic control devices and traffic control methods.
2.5	Register of Road Occupancy Licences.
3.4	Notice that temporary roadways and detour to traffic (including portable signs or temporary traffic signals) are conforming.

Annexure G10/B Principal's Specification Reference Documents

5.1. B1 Standards Australia Codes, Standards and Specifications

- (a) AS 1742.3 Manual of uniform traffic control devices Part 3: Traffic control for works on roads

5.2. B2 Other Documents

- (a) RMS Traffic Control at Worksites Manual
- (b) Relevant Austroads Guides
- (c) RMS Supplements to Austroads and Australian Standards

Road Occupancy Licence Application (ROLA)

TfNSW has introduced a new online system to manage Road Occupancy Applications.

All Road Occupancy Licence Applications (ROLA) are now processed through this new online system called OPLINC 2 and we are no longer accepting applications through TMC inbox or fax.

To submit your ROLA, you must first register online. To register as a company, you must have an ACN number (9 digit number - not ABN) and a valid mobile phone number.

You must use Google Chrome as your web browser (there is a map function that only works in Chrome)

Please access the following link and proceed to register:

<https://myrta.com/oplinc2>

Once you have completed the registration process and submit your request by pushing the submit button, the system will generate an email to the email address you have included in your registration.

You must click on the link shown in the email to validate your registration request and once that is completed, your registration request will be authorised by the Road Occupancy Unit within five (5) business days.

Please note the system will permit you to complete new Road Occupancy Licence Applications. However, the system will not allow you to submit any Road Occupancy Application, until the new user account created has been authorised by the Road Occupancy Unit.

Should you require any clarification on the above matter, please contact the TMC Road Occupancy Unit on 8396 1513 during normal business hours or at TMC_PIU@tmc.transport.nsw.gov.au



Transport
for NSW

Framework Construction Traffic Management Plan

Sydney Metro City & Southwest
Chatswood to Sydenham

Revision 1 (November 2016)

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1 Procedural Requirements/Document control

1.1 Preparation

This Framework Construction Traffic Management Plan (FCTMP) has been prepared in response to the Sydney Metro City & Southwest SSI 15_7400 project approval issued by the Department of Planning and Environment in December 2016. The Plan provides a strategic overview of the proposed traffic management measures to be established and operate during the construction of the Sydney Metro City & Southwest, between the Chatswood Dive Site and the Marrickville Dive Site (the Project).

This document provides base information for Construction Traffic Management Plans to be developed for each of the construction sites along the route of the Project.

The intent is for this document to comply with the Conditions of the SSI Approval for the Chatswood to Sydenham component of the Sydney Metro Program. The document also addresses Contractor requirements including those detailed in project specific agreements including Work Authorisation Deed (WAD) agreements with RMS.

1.2 Purpose and scope

This FCTMP provides an outline of the traffic management requirements and processes which will be common to each of the proposed work sites along the route of the Sydney Metro City & Southwest. Contract wide and site specific Construction Traffic Management Plans (CTMP) will be prepared, along with Traffic Control Plans (TCP's), as required. These documents are to be prepared by the Sydney Metro City & Southwest Contractor having regard to the contents, principles and objectives of this FCTMP, contractual requirements, Revised Environmental Mitigation Measures (REMM) and other obligations of the SSI Planning Approval.

This FCTMP establishes the traffic management processes and acceptable criterion regarding management of the adjacent roads to be considered and followed in the preparation of the CTMP's for the Sydney Metro City & Southwest.

1.3 Review

This document may be reviewed and expanded subsequent to the approval of the Bankstown to Sydenham section of the program..

1.4 Plan Control

The approved version of the Plan will be available on the Sydney Metro Delivery Office document management system for all Project personnel.

The Principal will be the document owner of the approved Plan.

1.5 Definitions and terminology

In this document the following terms refer to the following:

- **"Approval"** means any licence, permit, consent or approval required to be obtained from any Authority to perform the Construction Activities or required in relation to the Construction Site by the Contractor.
- **"Authority" or "Authorities"** means any authority or person that has a right to impose requirements on any part of the Contractor's Activities or over the Construction Site.

- **"Construction Site"** generally means the land where the Contractor undertakes the Contractor's Activities.
- **"CBD Co-ordination Office"** means the delivery office established to lead the proactive planning and coordination of the operations and management of the transport network for the Sydney CBD and approaches on behalf of Transport for NSW.
- **"Construction Traffic Management Plan" (CTMP)** means the Construction Traffic Management Plan required by the Project Planning Approval. The CTMP is a plan showing how traffic will be managed when construction works are being carried out. It describes the work activities being proposed, their impact on the roadway and on road users, and how these impacts are being addressed. A CTMP will incorporate Traffic Staging Plans, Traffic Control Plans and Vehicle Movement Plans. Pedestrian Movement Plans may also be required to be incorporated. City & Southwest Metro Contract wide CTMPs will need to be prepared in addition to Site-specific CTMPs.
- **"Contractor"** means the organisation engaged by the Principal for the delivery of the Project Works and the Temporary Works.
- **"Contractor's Activities"** means all things and tasks which the Contractor is required to do under the Contract whether or not such things and tasks are performed by Subcontractors.
- **"Disability Discrimination Act" (DDA)** means the *Disability Discrimination Act 1992*.
- **"Emergency"** means an unforeseen event which requires urgent action to protect life or property, or an occasion when emergency services (Police, Fire & Rescue, Ambulance or State Emergency Services) take control of a portion of the road network.
- **"Hold Point"** means a point beyond which a work process must not proceed without the authorisation or release of a designated authority.
- **"Long term works"** means works that impact on the road network for more than one shift. Traffic management measures will be installed on one day/night and remain in place for weeks or months but are removed on completion of the project or that work, eg: concrete barriers and signage.
- **"Pedestrian Movement Plan"** means a diagram showing the allocated travel paths for workers or pedestrians around or through a work site. A PMP may be combined with or superimposed on a Traffic Control Plan.
- **"Planning Approval"** means the approval being sought under the EP&A Act by TfNSW and which is required to be complied with by the Contractor, as directed in respective Project Deeds.
- **"Preferred Infrastructure Report" (PIR)** means the report prepared to address issues raised in submissions on the Environmental Impact Statement and any proposed changes to the project to minimise its environmental impact.
- **"Principal"** means Transport for NSW.
- **"Project Works"** means any permanent works which the Contractor is required to design, construct, complete and hand over.
- **"Reference Documents"** means the codes, standards, specification and guidelines specified in this document.
- **"Revised Environmental Mitigation Measures"** means mitigation measures – additional to the project design which are identified through the environment impact assessment and updated in Chapter 11 of the Chatswood to Sydenham Submissions and Preferred Infrastructure Report, October 2016.

- **“Road Occupancy”** means an activity that is likely to impact on the traffic flow of the road network, and may involve the closure of traffic lane(s) or parking lane(s).
- **“Road Occupancy Licence”** means a licence for Road Occupancy issued by TMC that allows the holder to use or occupy a specified road space at approved times, providing that certain conditions are met.
- **“Road Safety Audit” (RSA)** means an assessment and report of a road's safety performance and crash potential at various stages of a road/project's life cycle.
- **“Road User”** means all users of roads and public spaces including, but not limited to, pedestrians, pedal cyclists, public transport passengers, public transport operators and motorists.
- **“Short Term Works”** means works that are undertaken for one shift only. They may return the next day/night but it is set up and packed entirely in one shift, eg: cones and signs for a lane closure.
- **“Subcontractor”** means a subcontractor of the Contractor and includes a supplier of goods or services (including professional services and construction plant hire) or both.
- **“Sydney Metro City & Southwest”** means that section of the proposed Sydney Metro City & Southwest between the Chatswood Dive Site and the Marrickville Dive Site, including the proposed construction sites along its length.
- **“Temporary Works”** means any temporary works required to carry out the Contractor's Activities but which do not form part of the Project Works.
- **“TBM”** means tunnel boring machine.
- **“Traffic Control Plan”** means a diagram showing signs and devices arranged to warn traffic and to guide it around, past or if necessary through a work site or temporary hazard.
- **“Traffic Control Group”** means a group chaired by the CBD Co-ordination Office and including the Principal, relevant Contractor's Traffic and Transport representative and other stakeholders.
- **“Traffic Staging Plan”** means road design drawings showing traffic lane configurations to be provided for traffic passing through the Site during the various construction stages, including details of road alignment and geometry, intersection layouts, provision for buses and cyclists, work areas and pedestrian areas, drainage, signs and pavement markings, etc.
- **“Traffic and Transport Liaison Group”** means the group formed by the Principal in accordance with the requirements in the Project Planning Approval.
- **“Transport Management Centre”** means the Transport for NSW Transport Management Centre located at Eveleigh.
- **“Traffic and Transport Representative”** means the person appointed to the position of Transport and Transport Representative by the Contractor.
- **“Vehicle Movement Plan”** means a diagram showing the preferred travel paths for vehicles associated with a work site entering, leaving or crossing the through traffic stream. A VMP may be combined with or superimposed on a Traffic Control Plan.
- **“Verifier”** means a person appointed to the position of Verifier by the Contractor.
- **“WAD”** means Works Authorisation Deed.
- **“WHS”** means workplace health and safety.

2 Introduction

2.1 Project background

Sydney Metro is a key component of *Sydney's Rail Future* (Transport for NSW, 2012), a plan to transform and modernise Sydney's rail network so that it can grow with the city's population and meet the needs of customers in the future. The Sydney Metro network consists of Sydney Metro Northwest (previously known as the North West Rail Link) and Sydney Metro City & Southwest. The proposed Sydney Metro City & Southwest comprises two core components:

- Chatswood to Sydenham - New 15.5 kilometre twin tunnels from Chatswood, under Sydney Harbour through Sydney's CBD to Sydenham.
- Sydenham to Bankstown upgrade - Proposed upgrade and conversion of the existing 13.5 kilometre railway from Sydenham Station to Bankstown, to metro standards. This will be subject to a separate environmental assessment process.

The key components of the project (from north to south) would include:

- Realignment of T1 North Shore Line surface track within the existing rail corridor between Chatswood Station and Brand Street, Artarmon including a new bridge for a section of the 'down' (northbound) track to pass over the proposed Chatswood dive structure.
- About 250 metres of new above ground metro tracks between Chatswood Station and the Chatswood dive structure.
- A northern dive structure (about 400 metres in length) and tunnel portal just north of Mowbray Road, Chatswood.
- About 15.5 kilometres of twin rail tunnels (that is, two tunnels located side-by-side) between the northern dive structure and Bedwin Road, Marrickville (the Marrickville dive structure)
- A substation (for traction power supply) at Artarmon.
- New metro stations at Crows Nest, Victoria Cross, Barangaroo, Martin Place, Pitt Street and Waterloo, as well as new underground platforms at Central Station.
- A southern dive structure (about 400 metres in length) and tunnel portal north of Sydenham Station and south of Bedwin Road, Marrickville.
- A services facility (for traction power supply and an operational water treatment plant) adjacent to the southern dive structure.

The project would also include a number of ancillary components, including new and alterations to existing overhead wiring, signalling, access tracks / paths, rail corridor fencing, noise walls, fresh air ventilation equipment, temporary and permanent alterations to the road network, facilities for pedestrians, and other construction related works.

2.2 Stations/worksites

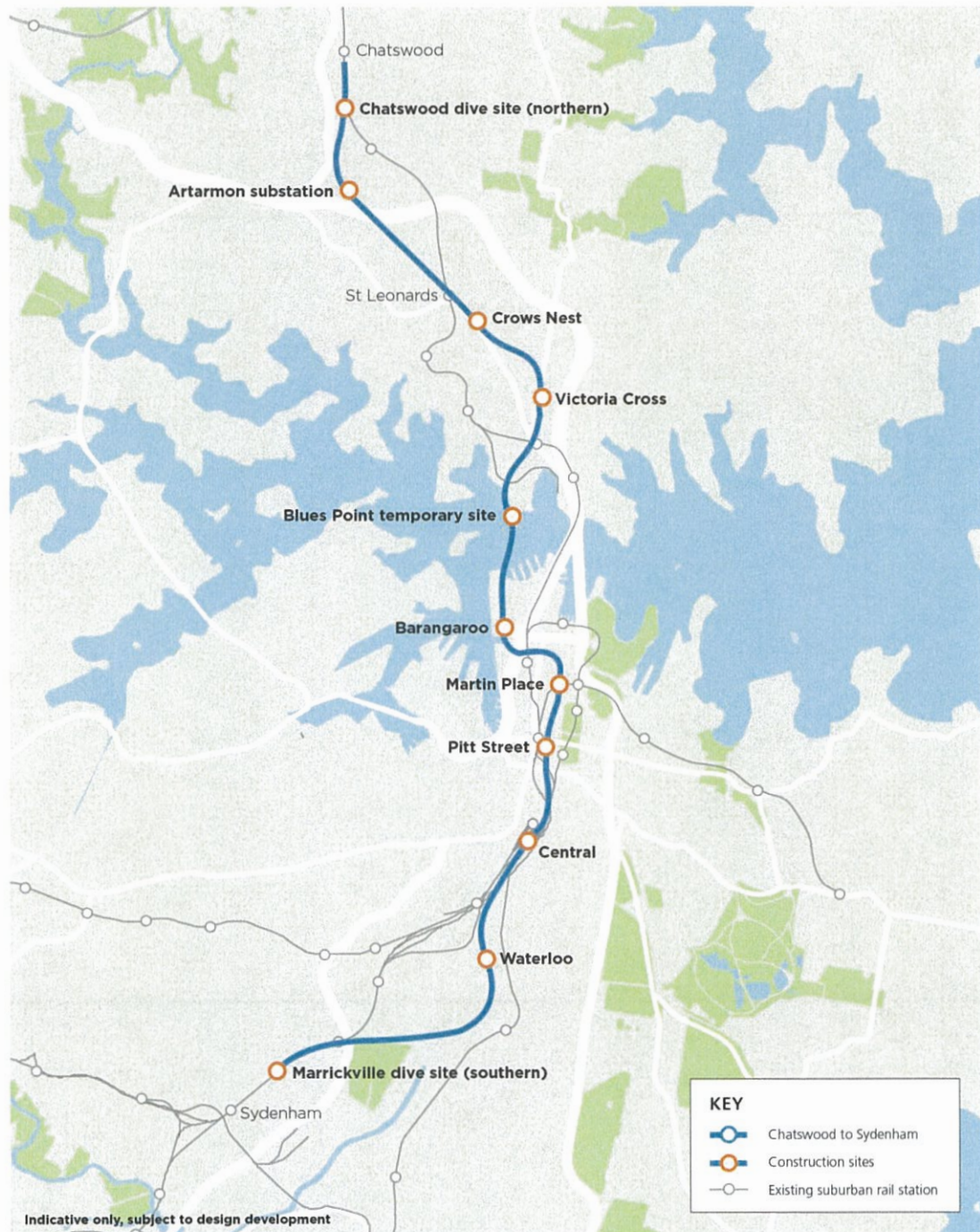
Details of station and construction work sites are to be provided in the contract wide CTMPs and each of the site specific CTMPs for:

- Chatswood Dive Site

- Artarmon Sub-station
- Crows Nest
- Victoria Cross (North Sydney)
- Blues Point
- Barangaroo
- Martin Place (north and south)
- Pitt Street (north and south)
- Central
- Waterloo
- Marrickville Dive Site

Figure 2.1 indicates the locations of the proposed stations and work sites.

Figure 2.1 – Proposed work sites



2.3 Construction stages and timing

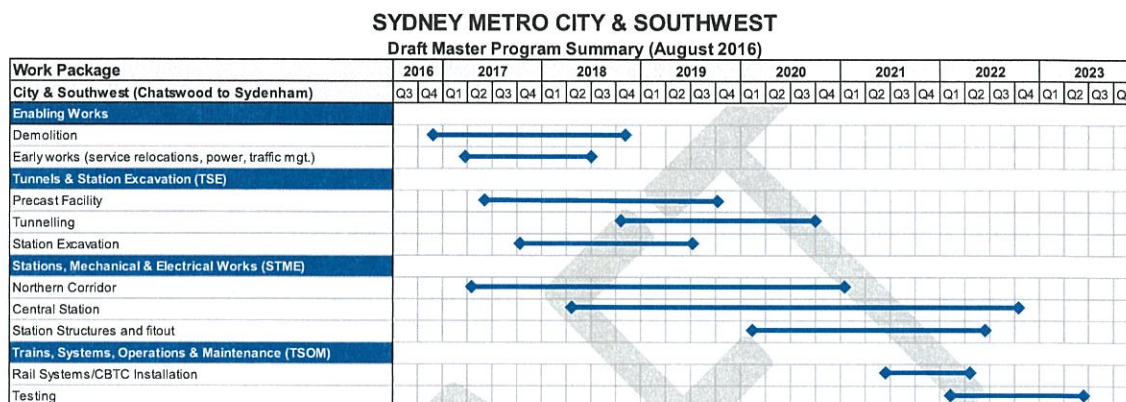
It is proposed that construction works for the Sydney Metro City & Southwest will commence in early 2017 with trains operating by 2024. The delivery packages are:

- Enabling Works (EW)
- Demolition (Demo 1 & Demo 2)

- Sydney Yard Access Bridge (SYAB)
- Central Station Works (CSW)
- Tunnel and Station Excavation (TSE)
- Trains Systems Operations and Maintenance (TSOM)
- New Stations Track Mechanical & Electrical Works (STME)

The August 2016 draft program is outlined in **Figure 2.2**.

Figure 2.2 – Draft Construction Program



2.4 Traffic management planning

The project requires construction work to be undertaken for the tunnels, stations, ancillary facilities and connections to the stations at various locations within the Sydney CBD, North Sydney Council, Willoughby Council and Inner West (formerly Marrickville, Leichhardt, Ashfield) Council areas. It is important that there is a robust approach to managing the impacts of construction traffic on the road and pedestrian networks in the vicinity of the surface construction works.

The Framework Construction Traffic Management Plan (FCTMP) is one of a number of Management Plans to be prepared for the construction of the Sydney Metro City & Southwest. If this FCTMP is not updated and expanded upon receipt of SSI approval for the Sydenham to Bankstown section of the program, a separate FCTMP will be prepared for the Sydenham to Bankstown upgrade.

The levels and responsibilities for preparation of Management Plans for the Sydney Metro City & Southwest are:

Framework Construction Traffic Management Plan (this document) – Sydney Metro Delivery Office

Contract wide Construction Traffic Management Plans – Contractor (excludes demolition contract)

Site specific Construction Traffic Management Plans – Contractor

Traffic Control Plans (and supporting plans) – Contractor

The purpose of each of the above documents is outlined in **Table 2.1**.

Table 2.1 – Traffic Management Plans Hierarchy

Document	Purpose	Produced by
Framework Construction Traffic Management Plan (FCTMP)	Provides the framework within which subsequent contract specific and site specific CTMPs will be prepared.	Sydney Metro Delivery Office
Contract wide Construction Traffic Management Plan (CTMP)	Contract specific CTMPs are to be prepared for each Sydney Metro City & Southwest contract.	Contractor (excluding demolition contract)
Site specific Construction Traffic Management Plan (CTMP)	Site specific CTMPs are to be prepared for each Sydney Metro City & Southwest construction site for each contract.	Contractor
Traffic Control Plans (TCP)	Produced for each traffic change, and road occupancy, for all work sites. Requires the preparation of supporting plans.	Contractor

*A contract wide CTMP will not be required for the two demolition contracts because the demolition task within each contract is geographically and methodologically separate. Sufficient detail can be provided within each site specific CTMP for each demolition site.

2.4.1 Framework Construction Traffic Management Plan (this document)

The FCTMP provides the framework within which subsequent contract specific and site specific CTMPs will be prepared. The FCTMP describes the traffic management objectives, principles and strategies to be implemented during Sydney Metro City & Southwest construction, having regard to contractual requirements, the Revised Environmental Mitigation Measures (REMM) and other obligations of the SSI Planning Approval

This FCTMP identifies and outlines the major sections of the Project that require consideration of matters for traffic management, cycling and pedestrian management for the areas that will be potentially impacted by the construction works. The suitable development of traffic management plans for the potential impacts of the works is a key component to ensure that the impacts are minimised as much as possible with regard to vehicle and people movement disruption and to manage the efficient construction of the Sydney Metro City & Southwest.

2.4.2 Construction Traffic Management Plans

Contract wide Construction Traffic Management Plans (CTMPs) will be prepared by Contractors, covering the full spatial extent of their works and multiple sites. As the two demolition contracts cover multiple geographically and methodologically separate sites, 'contract wide' CTMPs for the two demolition contracts will not be required. Individual site specific CTMPs will be prepared for each demolition site.

The CTMPs will be required to comply with the RMS' "Guide to Traffic Control at Worksites" and the Principals General Specification (G10 – Traffic and Transport Management) documentation. All CTMP's will be prepared and implemented having regard to the REMMs documented in Chapter 11 of the Chatswood to Sydenham Submissions and Preferred Infrastructure Report, October 2016. Some of the twenty two construction traffic and transport REMMs include:

T1 - Ongoing consultation would be carried out with (as relevant to the location) the CBD Coordination Office, Roads and Maritime Services, Sydney Trains, NSW Trains, the Port Authority of NSW, Barangaroo Delivery Authority, local councils, emergency services and bus operators in order to minimise traffic and transport impacts during construction.

T2 - Road Safety Audits would be carried out at each construction site. Audits would address vehicular access and egress, and pedestrian, cyclist and public transport safety

T6 - Vehicle access to and from construction sites would be managed to ensure pedestrian, cyclist and motorist safety. Depending on the location, this may require manual supervision, physical barriers, temporary traffic signals and modifications to existing signals or, on occasions, police presence

T13 - Construction site traffic would be managed to minimise movements in the AM and PM peak periods

T18 - During the closure of existing entrances to Martin Place Station, marshalls would be provided during the AM and PM peak periods to direct customers to available access and egress points.

T21 - The potential combined impact of trucks from multiple construction sites would be further considered during the development of Construction Traffic Management Plans.

Contractors will also prepare more detailed site specific Construction Traffic Management Plans (CTMPs) developed for each work site and identifying proposed traffic and parking management measures. These plans will be developed in consultation with the CBD Co-ordination Office, RMS, Sydney Light Rail Team within TfNSW, Barangaroo Delivery Authority and relevant Councils. This consultation can be initiated through the TTLG and TCG meetings.

The site specific CTMPs provide the basis for preparation of the Traffic Control Plans (TCP) and Road Occupancy Licence (ROL) applications. The CTMP provides the plan detailing the potential works and the traffic management and mitigation measures that would be required to be implemented for the proposed works. It would include any relevant correspondence with stakeholders (e.g. bus operators) where applicable. It would also include the Traffic Control Plan (TCP) for the specific works.

2.4.3 Preparation and implementation of Traffic Control Plans

All Traffic Control Plans to be prepared for the construction activities will be developed in accordance with Australian Standard AS1742.3 and RMS' "Guide to Traffic Control at Worksites" by a suitably qualified person.

A TCP must be prepared by a person who has completed and passed the RMS' "Traffic Control at Worksites Manual" training course and whose certification is current, to the required level.

Documents to be referenced in the preparation of TCP's include:

- Australian Standard AS1742.3-2002 – Manual of uniform traffic control devices, Part 3, traffic control devices for works on roads.
- Roads and Maritime Services NSW, Guide to Traffic Control at Worksites.
- Principals General Specification G10 – Traffic and Transport Management.
- Relevant Austroads Guides.
- RMS Supplements to Austroads and Australian Standards.
- SM PS-ST-221 Sydney Metro Principal Contractor Health and Safety Standard

2.4.4 Authorisation

All personnel employed on the Sydney Metro City & Southwest demolition and construction phases will perform their duties in accordance with the requirements of this Plan and in compliance with the manuals and procedures outlined, and any specific Project Plans or instructions.

DRAFT

3 Project Policies and Practices

3.1 General traffic management approach

Sydney Metro Delivery Office is committed to achieving a good performance in relation to the health and safety of workers employed on the construction of the Sydney Metro City & Southwest, and to minimising the impacts of the works on road users and the community. The construction objectives that relate to FCTMP are outlined below.

Table 3.1 – Construction objectives

Key Result Area	Construction Objectives
Transport network	<ul style="list-style-type: none"> • Minimum disruption to pedestrians, cyclists and motorists. • Ensure Sydney Metro City & Southwest construction traffic accesses the arterial network as soon as practicable on route to and immediately after leaving the construction site. • Keeping Sydney moving • Buses run on time with no disruption to routes and stops, where possible. • Minimum of changes to traffic operation and kerbside access. • Minimise disruption to access for adjoining properties. • Minimise construction traffic generation during network peak periods.
Safety	<ul style="list-style-type: none"> • No worker injury accidents during construction. • No injury accidents to members of the public because of construction
Cumulative impacts	<ul style="list-style-type: none"> • Work collaboratively with other stakeholders and major projects to mitigate traffic and transport impacts.

All construction activity to be undertaken or proposed for the construction of the Sydney Metro City & Southwest is to comply with the following principles:

- Safe provision for vehicular and pedestrian traffic must be made at all work sites.
- Delays to traffic in the immediate vicinity of work sites should be minimised as much as practicable.
- Minimise construction traffic generation during network peak periods. It is an RMS operational imperative that the capacity and efficiency of the network is not reduced during peak periods.
- Works should be co-ordinated so that road users do not encounter a series of delays in quick succession and such that the cumulative impact of multiple closures does not lead to unexpected congestion.
- Implement appropriate operational and other measures to ensure the safety of vulnerable road users (refer to **Section 3.12**).
- Access for residents and businesses is to be maintained.
- Road users should be kept informed about:
 - The location of works.

- Forecast travel delays they are likely to experience.
- Suitable alternative routes, if available.
- Timing of any works, including dates and times, to enable informed decisions by the road user regarding times and routes of travel.
- The project should present a professional and helpful interface with road users during all parts of the construction process.
- Consideration of the above for road users should include potential impacts on pedestrians and cyclists.
- Safe provision for cyclists must be made at all work sites. Public transport users should also be kept informed of changes due to construction.

The Sydney Metro City & Southwest project requires demolition and construction work to be undertaken within the Sydney, North Sydney, Willoughby and Inner West Council areas. At all locations it is important that adequate consideration and emphasis is given to the operation of public transport, pedestrian and cyclist management measures, private vehicles and service vehicles to minimise impacts. It is also important that access for residents and businesses is maintained consistent with the SSI approval.

The design and operation of any proposed temporary traffic management measures will require careful planning, co-ordination and implementation.

Pedestrians, cyclist and vehicle drivers expect a high level of safety and service in using the existing road and pedestrian network. This requires efficient, effective and reliable traffic management strategies to be in place which:

- Achieve uniform traffic throughput.
- Minimise changes to pedestrian routes and movement.
- Ensure reliable and consistent travel times.
- Provide clear information to allow drivers and other road users to make appropriate decisions in relation to their journey.

These traffic management goals will be achieved by:

- Understanding the impacts of the works and identifying appropriate methods to mitigate these impacts.
- Strategic advance planning of the traffic management.
- Implementation of an approach to traffic management that minimises traffic disruption
- Ongoing stakeholder engagement and communication

3.2 Traffic management strategy

There is the potential for construction activities associated with the construction of the Sydney Metro City & Southwest to have an impact on the existing surrounding road network. Where possible, these impacts will be minimised through the provision of effective traffic management measures, in accordance with Sydney Metro Delivery Office's objectives and relevant guidelines and standards, in order to achieve the objectives of the project. Development of the traffic management measures would be carried out in consultation with RMS, CCO and other stakeholders in accordance with the SSI approval.

Priority will be given to providing adequate guidance to pedestrians, cyclists, drivers and the community prior to the commencement of any works. Priority is also to be given to responding appropriately to issues and events that may arise during the works. As part of this strategy, some key traffic management measures include:

- The provision of directional signage and line marking to direct and guide drivers and pedestrians past work sites and to suitable alternative routes (if required) on the surrounding road network.
- Notification of proposed changes and duration using newspapers (local or majors), radio, project website, social media and direct community engagement (as required).
- On-going or direct co-ordination with the Transport Management Centre and CCO to mitigate congestion and provide rapid response should incidents or undue congestion occur.
- Management and co-ordination of construction vehicle access to and from the work sites where these access will cross pedestrian paths. The type of traffic management to be employed will be dependent and adjusted accordingly, with regard to the volume of pedestrians, passing traffic and volume of construction vehicle activities for the site. The types of management could include manual supervision, physical barriers, temporary traffic signals (where approved by RMS or Council) or modification to existing traffic signals (where approved by RMS). This may also require NSW Police presence.
- Ensure that access to existing properties is maintained during the period of the works.

3.2.1 Information

The Contractor's Stakeholder and Community Manager will be responsible for ensuring a system is in place to advise the Sydney Metro City & Southwest Project Communications Team, RMS, CBD Co-ordination Office, Councils, other road authorities (Barangaroo Delivery Authority, Property NSW), bus & coach operators, taxi operators, NSW Police, NSW Fire & Rescue, NSW Ambulance Service and other key stakeholders each time proposed changes are to be made to traffic arrangements. Advice will include information about the changes to the traffic operation, anticipated delays to traffic, any changes to the times and duration of the work, and any other potential major disruptions.

Appropriate signposting, whether static or Variable Message Signs (VMS), should be located and installed to provide for the easy and safe passage of vehicles, pedestrians and cyclists. This also includes public transport users accessing facilities such as bus stops.

Any signposting should be placed in accordance with relevant guidelines and standards. Messages should be clear and easily interpreted by drivers, and should not create a safety hazard.

3.3 Hierarchy of access

In identifying the most appropriate form of traffic management for each site, consideration should be given to the priorities of the potential different users. The site specific CTMP's will be required to be developed on the basis of the following hierarchy of access:

- 1) Incidents & emergency services access
- 2) Events (Special and unplanned)
- 3) Pedestrians
- 4) Cycles
- 5) Public transport – buses
- 6) Service vehicles
- 7) Coaches
- 8) Taxis
- 9) Kiss and Ride

10) Private cars (Shoppers/short stay, commuters)

The strategic importance of traffic routes and the existing road hierarchy is as follows:

- Major Arterial/State road
- Sub-arterial or Regional road
- Collector road
- Local road

It should be noted that while most streets within the Sydney CBD are “local roads” they are important traffic routes for circulation around the CBD for public transport and service vehicles.

3.4 Inter-agency and Community Liaison

3.4.1 General Approach

The magnitude of this project requires effective and ongoing interaction between a number of different organisations, key stakeholders and the general public.

Having regard for the need for regular and ongoing discussions and distribution of information, the following groups will be convened to assist in traffic management planning, document review and stakeholder consultation.

- Traffic and Transport Liaison Group (TTLG)
- Traffic Control Group(s) (TCG)

3.4.2 Traffic and Transport Liaison Group

A Traffic and Transport Liaison Group (TTLG) will be convened, in accordance with the SSI approval, to ensure the stakeholders most affected are aware of the proposed construction activities, upcoming works and related traffic and transport implications. The participants in this group will vary depending on the location of the worksite however, representation is anticipated to include:

- Sydney Metro Delivery Office
- Transport for NSW (including Centre for Road Safety; Sydney Light Rail; Metro Bus & Ferry Planning and Development; Freight Strategy & Planning)
- RMS
- TMC
- CBD Co-ordination Office
- Port Authority of NSW
- Barangaroo Delivery Authority (BDA)
- Department of Planning and Environment
- Sydney Motorway Corporation (WestConnex)
- NSW Police
- NSW Fire & Rescue
- NSW Ambulance Service
- Local Council (depending on worksite locations)
 - Lane Cove Council

- Willoughby Council
- North Sydney Council
- City of Sydney Council
- Inner West Council
- State Transit Authority
- Sydney Metro Contractor(s)

The TTLG provides a forum for key stakeholders, contractors and Sydney Metro Delivery Office to discuss matters that could impact on the road network operations around the sites. The TTLG provides a forum through which information on proposed traffic changes is made available to key stakeholders. It will also allow key transport agencies and local councils to inform the development of traffic management plans and construction staging by providing local and specialist knowledge and insights. The TTLG will also:

- maintain good communication between Sydney Metro Delivery Office project team, contractors and other stakeholders.
- plan and review the construction traffic management arrangements for the Sydney Metro City & Southwest works and approvals.
- assist in identification and refinement of potential measures to mitigate the impacts of the Sydney Metro City & Southwest works in an area.
- assist co-ordination of works for Sydney Metro City & Southwest and other projects.
- facilitate in-principle agreement for traffic management arrangements.
- ensure that submitted plans are agreed in a timely manner in accordance with the overall Sydney Metro City & Southwest project programme.

3.4.3 Traffic Control Group

For each Sydney Metro City & Southwest contract, a Traffic Control Group (TCG) will be convened to provide a technical forum for the discussion of proposed works that will impact on the surrounding road network and feedback on proposed TCP's prior to formal submission. This group would meet on regular occasions (weekly or fortnightly) to provide an assessment of the forthcoming program and to ensure that any identified or potential issues are raised and addressed to ensure that works proceed in accordance with the agreed programme. The participants in this group will vary depending on the location of the contract however, representation would be expected to include:

- Sydney Metro Contractor
- Sydney Metro Delivery Office
- Transport for NSW
- RMS
- TMC
- CBD Co-ordination Office
- Local Councils

The TCG would primarily provide a forum for discussion on proposed traffic management measures during the various stages of each of the contracts and to discuss potential impacts on the road network operations around the sites, and how to address or minimise those impacts.

3.4.4 Other organisations

Other organisations may be asked to attend the TTLG and/or receive relevant information depending on the matters under discussion or consideration. This may include:

- NSW Taxi Council
- NSW Taxi Drivers Association
- BusNSW
- Bicycle NSW
- BIKESydney
- BIKEast
- Pedestrian Council of Australia
- Sydney Buses
- Sydney Harbour Foreshore Authority
- Sydney Ports
- Sydney Ferries / Harbour City Ferries and other relevant ferry operator(s)
- Disability Council of NSW
- Transurban
- NRMA
- NSW Trains
- NSW Health Infrastructure
- CSELR Managing Contractor

The Sydney Metro City & Southwest TTLG has been established separate to the Sydney Metro Northwest TTLG which has been meeting since late 2012.

3.5 Communication with Community

All external communication with the community including businesses must follow the guidelines set out in the Sydney Metro City & Southwest Community Communication Strategy.

The community must be notified of any current and upcoming works, temporary works or Contractor's Activities with the potential to impact on stakeholders and the community, prior to them occurring.

An overview of stakeholder and community involvement during construction of the project is provided in the Construction Environmental Management Framework. A Community Communication Strategy will be developed by each Principal Contractor. A key element of this strategy will relate to notification to stakeholders that may be affected by changes to transport, access and local traffic arrangements.

3.5.1 Existing businesses and residents

Owners and operators of potentially affected properties and businesses will be consulted throughout the delivery of the project and notified well in advance of any works that may potentially disrupt access to their property.

Every endeavour is to be made to maintain access at all times to properties for both pedestrians and vehicles. If works will temporarily affect access to a property, consideration should be given to the staging of the works, in order to maintain access and limit the disruption.

Residents, property owners and businesses in the surrounding area will also be notified prior to the start of works.

The proposed works and changes should also be advertised in the public notices section of newspapers (as required).

3.5.2 Notification of traffic changes or disruptive works

Activity specific communications strategies are required to be developed prior to any traffic event. These strategies should include details of the work, impacts and proposed mitigation measures.

In addition to the strategy, activity specific notifications will need to be developed and issued to directly impacted properties prior to works commencing.

Notification of proposed changes should also be included on the project website.

Other communication methods that may be implemented could include, but are not limited to:

- i. Doorknocks
- ii. Letterbox drops
- iii. Advertising (newspapers)
- iv. Social media updates
- v. Radio.

3.6 Approvals

3.6.1 Policy context and legislative backing

Notwithstanding the project Planning Approval being secured under Part 5.1 of the EP&A Act, Sydney Metro Contractors will be required to secure all required statutory approvals prior to the commencement of works.

3.6.2 Stakeholders

The agencies that may have a potential interest in the traffic management measures proposed for each City and Southwest Metro construction site are outlined in **Table 3.2**.

Table 3.2 – Principal Agencies

Station / Site	CCO	BDA	Sydney Trains	RMS	WC	NSC	CoS	IWC	TMC
Chatswood Dive	X		X	X	X				X
Artarmon	X			X	X				X
Crows Nest	X			X		X			X
Victoria Cross (Nth Sydney)	X			X		X			X
Blues Point	X			X		X			X
Barangaroo	X	X		X			X		X
Martin Place	X		X	X			X		X
Pitt Street	X			X			X		X
Central	X		X	X			X		X

Station / Site	CCO	BDA	Sydney Trains	RMS	WC	NSC	CoS	IWC	TMC
Waterloo	X			X			X		X
Marrickville Dive	X		X	X				X	X

Legend:

CCO-CBD Co-ordination Office; **BDA** – Barangaroo Delivery Authority; **RMS** – Roads and Maritime Services; **WC** – Willoughby Council; **NSC** – North Sydney Council; **CoS** – City of Sydney Council; **IWC** – Inner West Council; **TMC** – Transport Management Centre

Note: Other Councils will be consulted as required

3.6.3 Traffic Management Plans Approvals Process

Traffic Management Plans will require approval and consideration by a number of key stakeholders. Contractors should assess the overall required approval times at the beginning of the project in order to provide adequate scheduling of the preparation and submission of the CTMP's. An overview of the approvals process for the City & Southwest Metro project is as follows:

Sydney Metro Delivery Office prepared Framework Construction Traffic Management Plan:

Submitted to CCO and RMS for review.

After CCO and RMS acceptance, RMS approves the Plan.

Then submitted to DP&E for approval in accordance with SSI Planning Approval.

Contract specific CTMPs to be prepared by the Contractor (e.g. 1 CTMP covering all TSE works):

Submitted to CCO for review and comment.

After review and agreed edits, CCO and RMS approve the Plan.

Send copies of Plans to DP&E for information.

Site specific CTMPs to be prepared by the Contractor (e.g. 1 CTMP covering Demolition and Enabling works at Chatswood Dive site): These CTMPs must comprise other plans such as Traffic Staging Plans, Traffic Control Plans, Vehicle Movement Plans, and Pedestrian Movement Plans. It may also include a Parking Management Plan.

Submitted to CCO for review and comments.

After review and agreed edits, CCO and RMS approve the Plan.

Will not be sent to DP&E unless specifically requested for information purposes.

ROL and related applications are submitted by the Contractor to TMC for occupation of roadway (other than approved Work Zones) on classified roads where RMS is the road manager. These plans are approved by TMC.

Application made to TMC

CCO/TMC will consult with RMS prior to approval.

TMC/CCO may consult with other stakeholders including TfNSW (Infrastructure & Services).

Contractors may require Council approval of ROLs/Permits to Stand Plant/Road Openings impacting non classified roads.

The Contractor will be responsible for documenting all stakeholder feedback and comments in a document specific issues register. These comments will be addressed and closed out by the

Contractor in consultation with the relevant stakeholders. RMS and CCO will not be responsible for processing or referring comments on behalf of the Contractor. Applications for scaffolds and hoardings would be to the relevant Council with concurrent notifications to RMS, CCO and TMC.

3.6.4 Road Occupancy Licence Approval Process

Whenever it is proposed to occupy or close a lane or road during the construction program for each of the sites, the approval of the closure will require the Contractor to apply for a Road Occupancy Licence (ROL) from the Transport Management Centre (TMC) for RMS classified roads (State Roads) or locations on unclassified roads within 100m of traffic signals. It should be noted that due to the critical nature of the potential traffic impacts for unclassified streets within the Sydney and North Sydney CBDs that applications for ROLs on streets within these areas will be required to be submitted to TMC.

The requirements are outlined in the RMS Road Occupancy Manual (and in the Principals General Specification G10 – Traffic and Transport Management), available at:

www.rms.nsw.gov.au.

The Contractor must allow a minimum of 10 working days for a response to an application from the relevant Authority.

ROL's will generally be issued for relatively short periods of time and the TMC will require that an approved CTMP for the work to be in place.

3.6.5 Speed Zone Authorisation

An application must be made to RMS for any proposed adjustment of the speed limit on the road network, whether they are proposed as temporary measures for work zones and road occupancies or for longer periods such as the duration of the construction works at a site. A Speed Zone authorisation application usually accompanies a ROL application where a change in speed limit is proposed as part of the road occupancy.

The RMS Speed Zone change process involves the submission of a form, available on-line from the RMS website, which is to be submitted to the TMC's Planned Incident Unit. Depending on the extent of the works and project familiarity the application will be supported by the contract wide and/or site specific CTMP. Short term (multiple years) speed zone changes can be dealt with via the CTMP process. Longer term or permanent changes must be referred to RMS for assessment.

3.6.6 Special Event Co-ordination

There are a number of special events that occur in and around the Sydney CBD and North Sydney. These special events have an impact through increased visitor numbers, road closures and diversion of bus services. The major events such as New Years Eve, Australia Day, Vivid Festival and ANZAC Day all have significant impacts on the CBD with increased visitor numbers and the need to provide additional rail and bus services, and impacts on the road network.

In addition, pedestrian activity in the CBD and shopping centres increases significantly during December and early January, in the lead up to Christmas and the post-Christmas sales. Increased tourist numbers and frequent cruise ship arrivals and departures also occur during this period. City of Sydney has a policy of not permitting works that will cause disruption to the retail core of the city during December. Works that would have a significant impact on pedestrian paths and station accesses should be minimised during these periods and/or additional and increased interface supervision between the site and the adjoining pedestrian network. Class 1 & 2 events are to be facilitated in the planning of work programs.

The RMS special event management guidelines identify four classes of special events. These classes provide direction on the approvals required, timeframes and methods of advertising measures such as road closures and other aspects of the event. The document can be found at http://www.rms.nsw.gov.au/trafficinformation/downloads/special_events_guide_part1.pdf.

The classes of events can be summarised as follows:

- **Class 1:** is an event that impacts major traffic and transport systems and there is significant disruption to the non-event community. For example: an event that affects a principal transport route in Sydney, or one that reduces the capacity of the main highway through a country town.
- **Class 2:** is an event that impacts local traffic and transport systems and there is low scale disruption to the non-event community. For example: an event that blocks off the main street of a town or shopping centre but does not impact a principal transport route or highway.
- **Class 3:** is an event with minimal impact on local roads and negligible impact on the non-event community. For example: an on-street neighbourhood Christmas party.
- **Class 4:** is an event that is conducted entirely under Police control (but is not a protest or demonstration). For example: a small march conducted with a Police escort.

During the project, special consideration and traffic planning will need to be undertaken for each of the sites to address the road user needs during programmed special events. It should also include the response to ad hoc events that may occur with minimal notice, including marches, protests and other public events.

The traffic management requirements of Special Events may require adjustments to times of operation and routes used for haulage or delivery operations as well as varying road occupancy licence (ROL) conditions for Sydney Metro City & Southwest construction. The ROL approval and CTMP approvals will identify any time and day restrictions, taking in to account any known potential conflicts at the time of submission and approval.

Sydney Metro City & Southwest Contractors will be responsible for identifying special events that occur in the area of the worksite, incorporating known special events into the construction program and to detail responses and contingencies in the CTMP for each site. This co-ordination will occur through the CBD Co-ordination Office, approved event registers of Councils, the TCG and the TTLG.

During development of the site CTMP's the proposed traffic management measures should take account of major and regular events such as ANZAC Day and the Vivid Festival, as two examples, to ensure that proposals do not impede or impact on these events.

3.6.7 Traffic Control Plans

All Traffic Control Plans (TCP) to be used for the site works will be developed in accordance with Australian Standard 1742.3 and the RMS "Guide to Traffic Control at Worksites" (<http://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/technical-manuals/tcwsv4i2.pdf>) by a suitably qualified person.

A "suitably qualified person" to prepare TCP's is a person who has undertaken and passed the RMS' "Traffic Control and Worksites Manual" training course and holds a minimum qualification of "Prepare Work Zone Traffic Management Plan" (<http://www.rms.nsw.gov.au/business-industry/partners-suppliers/traffic-control-training/>).

All worksites and related TCP's will be implemented in compliance with the approved ROL and appropriate standards.

3.6.8 Adjustments to traffic signals

Any temporary or permanent works which impact upon the operation or require the reconstruction or adjustments to traffic signals requires RMS approval of the traffic signal design plans, prior to the commencement of any work. This will require entering in to a Works Authorisation Deed (WAD) with RMS.

The Contractor will need to take account of potentially lengthy approval lead times in any works involving traffic signal construction or modifications. Additional time may also be required to facilitate the modification of the electronic hardware, in addition to undertaking any physical changes onsite.

The contractor will be responsible for the preparation of any traffic signal designs and obtaining the necessary approvals, allowing sufficient time in order to maintain the works program. Designs should comply with the RMS Traffic Signal Design Manual (RTA/Pub 08.092). Any works at a traffic signal site shall be carried out by an RMS accredited traffic signal contractor. A list of contractors can be found at <http://www.rms.nsw.gov.au/business-industry/partners-suppliers/tenders-contracts/prequalified-contractors.html>.

3.6.9 Over-dimension or Over-mass vehicle permits

Prior approval for the passage of any proposed oversize or overmass vehicles is required from RMS and Councils where using local roads and, an authorisation permit issued prior to the operation of the vehicle.

3.6.10 Adjustments to bus routes and stops

Any proposed adjustments or relocation of bus stops to facilitate construction works require the prior approval of TfNSW, CCO and affected bus operators in consultation with local councils prior to submitting an ROL application to TMC.

3.6.11 Council traffic committees

Each council is delegated authority by RMS on certain aspects for the control of traffic on regional and local roads. The delegation requires council to seek the advice of the NSW Police and RMS prior to exercising these delegated functions. This is usually done through the establishment and consultation with the Local Traffic Committee.

Councils can sub-delegate the approval of certain traffic control measures e.g. Works Zones, to an appropriate staff member. Where possible, the contractor should endeavour to secure all necessary Council approvals under delegation so as to avoid the need for approvals to be secured through the Local Traffic Committee and Council meetings.

The Local Traffic Committee is a technical committee which considers matters related to prescribed traffic control devices and traffic control facilities for which the Council has delegated authority. It is made up of four formal, or voting, members:

- One representative of Council (may be a Councillor or council officer)
- One representative of the NSW Police
- One representative of RMS
- The local State Member of Parliament or their nominee

Matters that may need to be considered by the Local Traffic Committee include:

- Establishment of a kerbside 'Work Zone' on a local or regional road.
- CTMP's
- Other changes to parking restrictions

- Road closures

3.7 Management of Construction Traffic

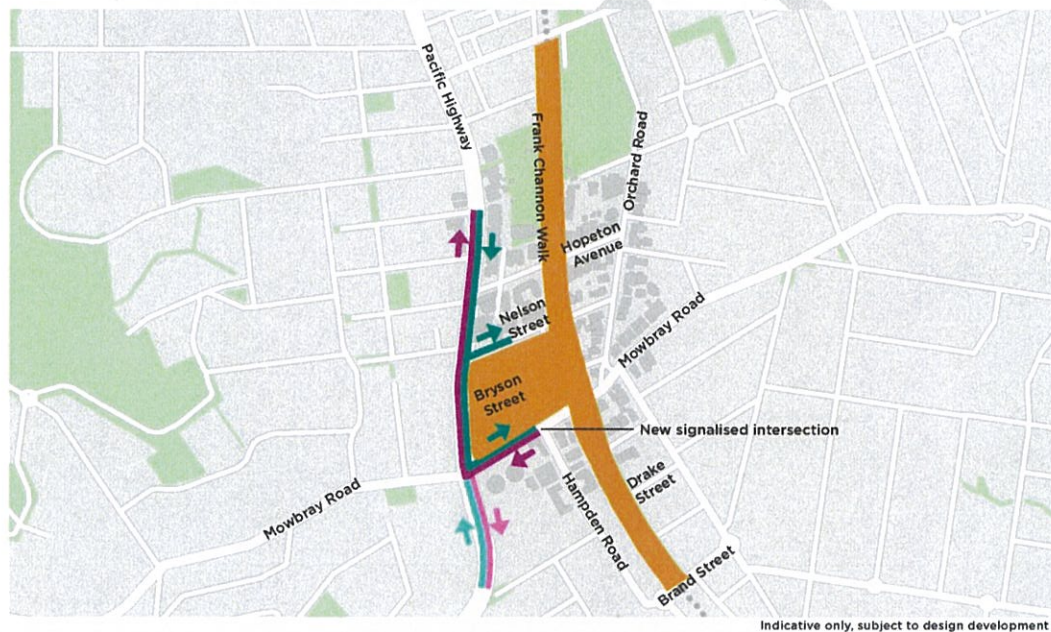
3.7.1 Haulage routes

Designated access routes for heavy vehicle movements during demolition, construction and spoil removal will be along the arterial (State) road network as much as practically possible. Details of any proposed routes for heavy vehicle access will be developed in consultation with the relevant state or local government authority and detailed in the appropriate section of the site specific CTMP.







Current identified haulage routes are shown in **Figure 3.1** to **Figure 3.12**.

Where haulage routes differ from the primary and secondary routes shown in the EIS/Submissions Report/PIR, the Contractor will need to document these in the contract wide and site specific CTMPs.

Figure 3.1 – Chatswood Site Haulage Routes



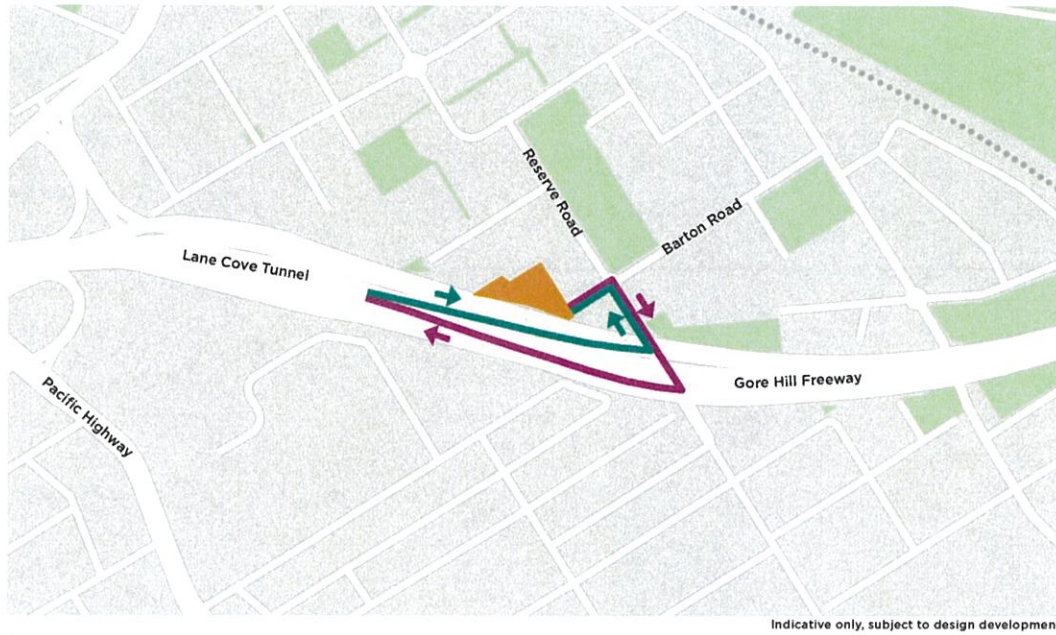
KEY

- | | | |
|---|--|--|
|  Proposed construction site area |  Primary, Inbound |  Existing suburban rail |
|  Primary, Outbound |  Secondary, Inbound | |
|  Secondary, Outbound | | |



Indicative only, subject to design development

Figure 3.2 – Artarmon Site Haulage Routes



Indicative only, subject to design development

KEY

- Proposed construction site area
- Primary, Inbound
- Primary, Outbound
- Existing suburban rail



Figure 3.3 – Crow Nest Site Haulage Routes



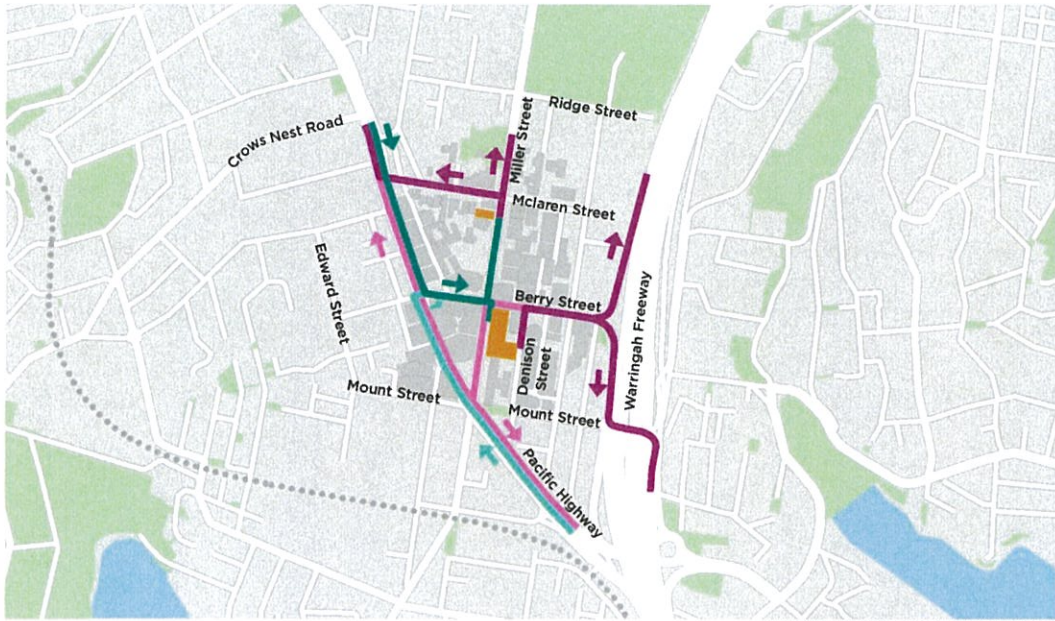
Indicative only, subject to design development

KEY

- Proposed construction site area
- Primary, Inbound
- Primary, Outbound
- Secondary, Inbound
- Secondary, Outbound
- Existing suburban rail



Figure 3.4 – Victoria Cross Site Haulage Routes



Indicative only, subject to design development

KEY

- Proposed construction site area
- Primary, Inbound
- Primary, Outbound
- Secondary, Inbound
- Secondary, Outbound
- Existing suburban rail



Figure 3.5 – Blues Point Site Haulage Routes



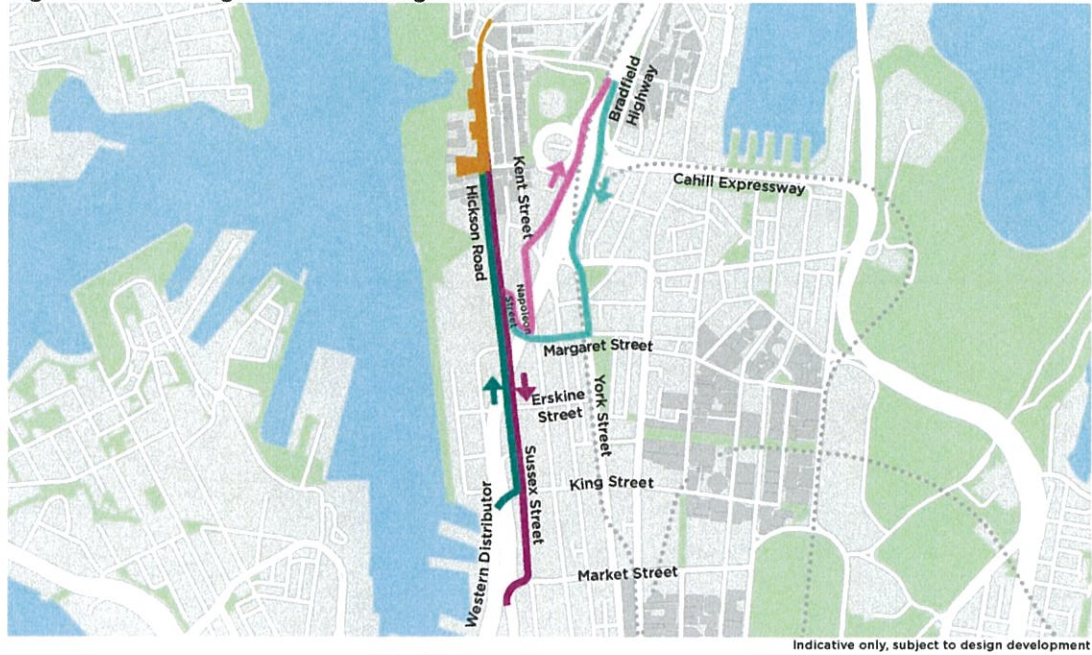
Indicative only, subject to design development

KEY

- Proposed construction site area
- Primary, Inbound
- Primary, Outbound
- Secondary, Inbound
- Secondary, Outbound
- Existing suburban rail



Figure 3.6 – Barangaroo Site Haulage Routes

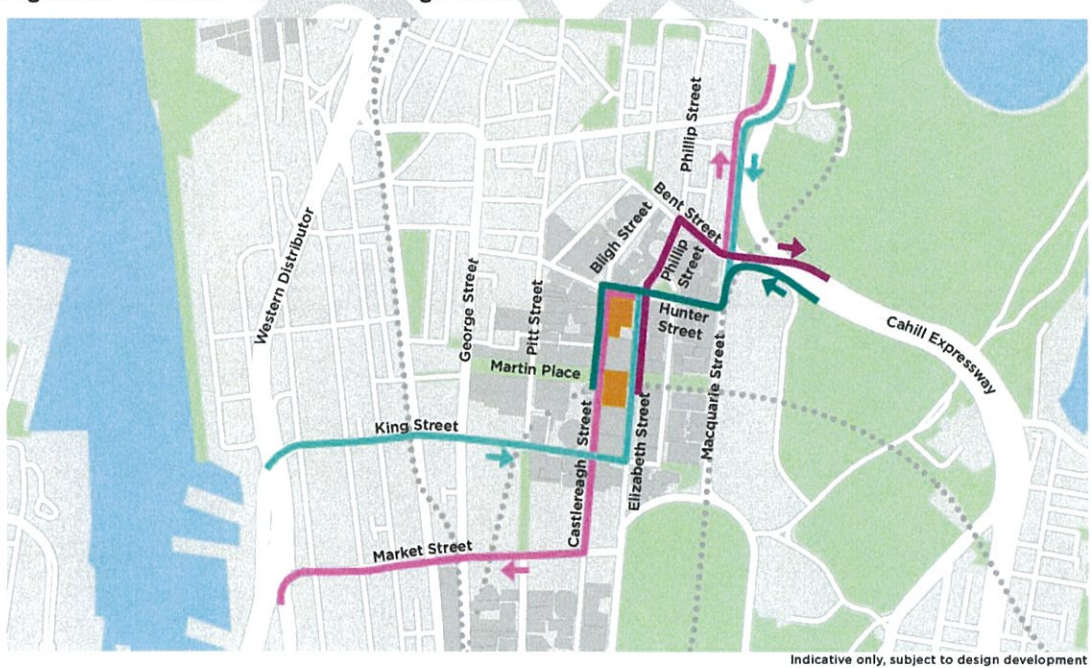


KEY

- Proposed construction site area
- Primary, Inbound
- Primary, Outbound
- Secondary, Inbound
- Secondary, Outbound
- Existing suburban rail



Figure 3.7 – Martin Place Site Haulage Routes

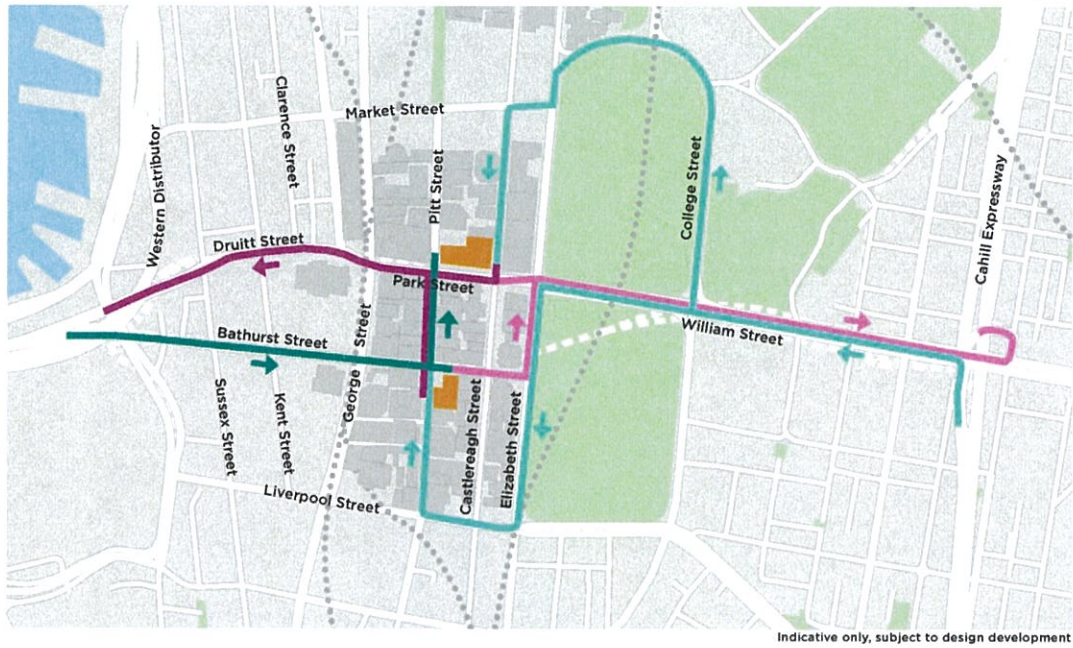


KEY

- Proposed construction site area
- Primary, Inbound
- Primary, Outbound
- Secondary, Inbound
- Secondary, Outbound
- Existing suburban rail



Figure 3.8 – Pitt Street Site Haulage Routes

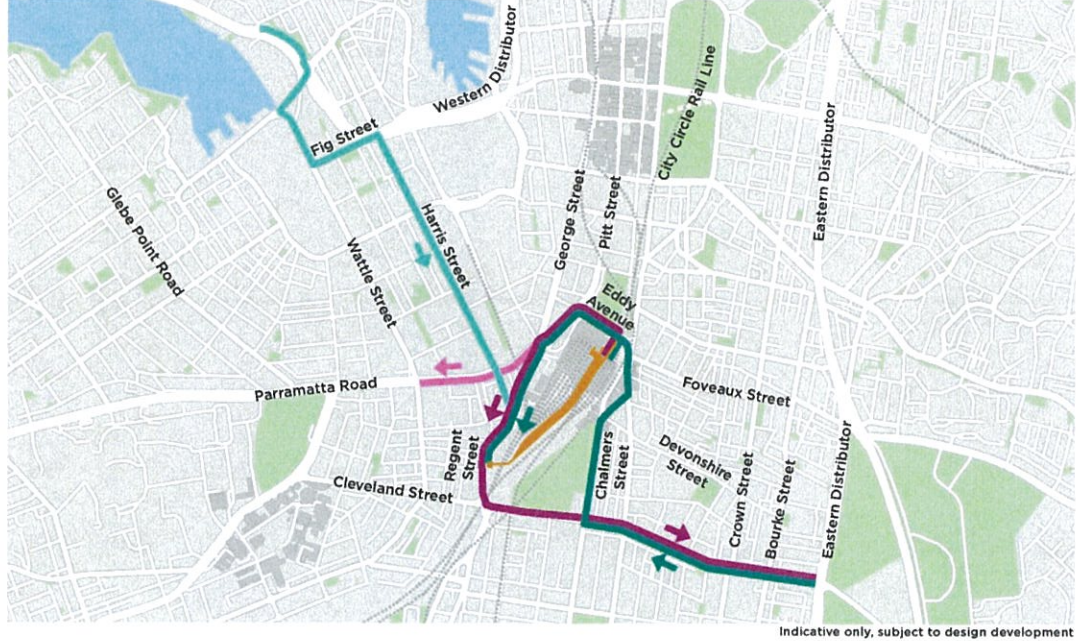


KEY

- Proposed construction site area
- Primary, Inbound
- Primary, Outbound
- Secondary, Inbound
- Secondary, Outbound
- Existing suburban rail



Figure 3.9 – Central Site Haulage Routes

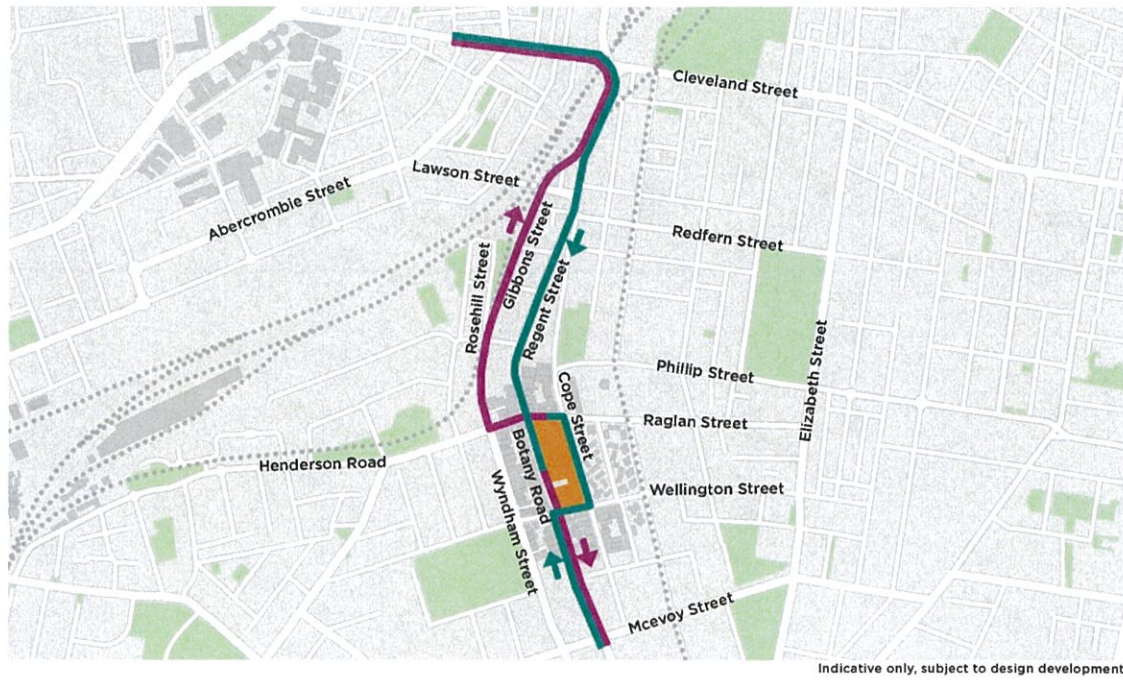


KEY

- Proposed construction site area
- Primary, Inbound
- Primary, Outbound
- Secondary, Inbound
- Secondary, Outbound
- Existing suburban rail



Figure 3.10 – Waterloo Site Haulage Routes

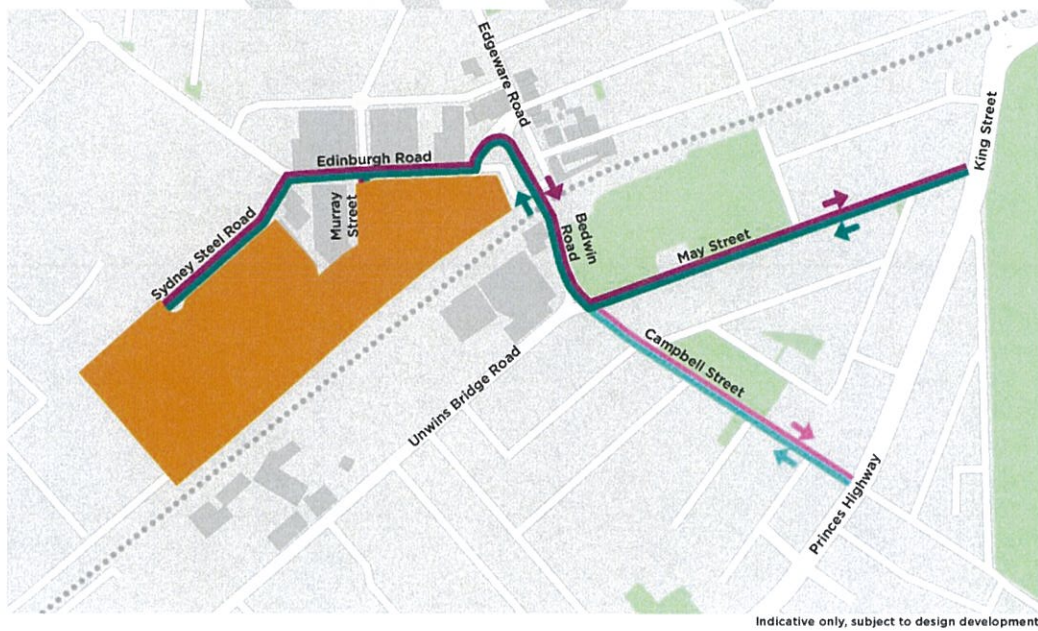


KEY

- Proposed construction site area
- Primary, Inbound
- Primary, Outbound
- Existing suburban rail



Figure 3.11 – Sydenham Site Haulage Routes

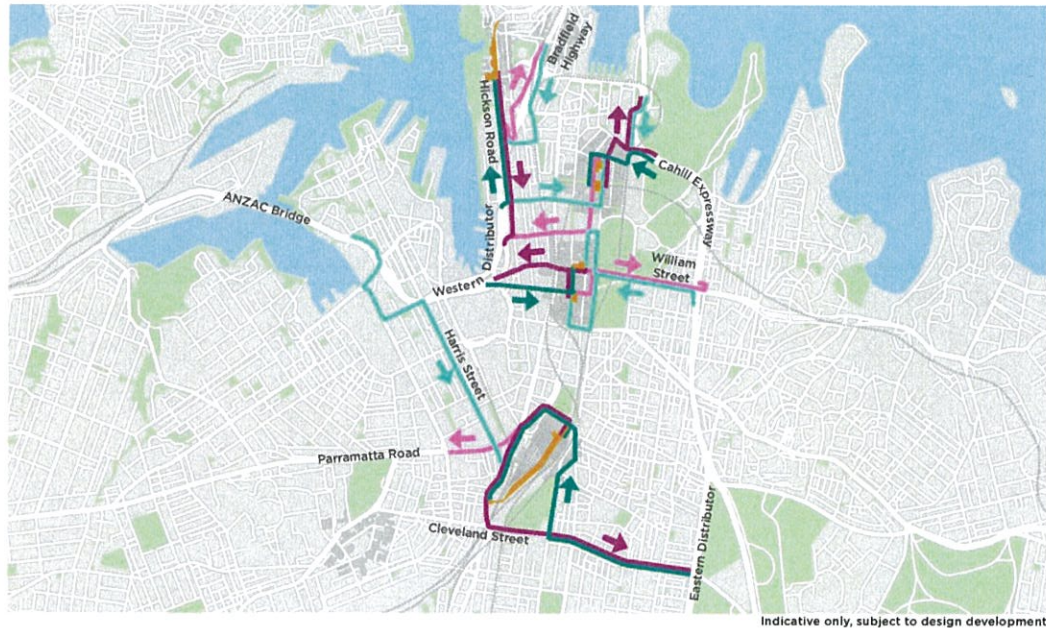


KEY

- Proposed construction site area
- Primary, Inbound
- Primary, Outbound
- Secondary, Inbound
- Secondary, Outbound
- Existing suburban rail



Figure 3.12 – Proposed CBD Haulage Routes combined



Indicative only, subject to design development

KEY

- Proposed construction site area
- Primary, Inbound
- Primary, Outbound
- Secondary, Inbound
- Secondary, Outbound
- Existing suburban rail



In addition, measures should be in place to avoid heavy vehicles queuing on the road network near the worksite. In general, the sites for this project have a very constrained road network surrounding the site and the parking of vehicles on the surrounding road network will not be possible. A suitable off-road truck marshalling area and logistics facility may be required to ensure that heavy vehicle queuing on the road network does not occur within the Sydney and North Sydney CBDs or other locations where the road network is constrained.

In this regard, it will be necessary for the contractor to develop a timetable of arrivals and departures to ensure a consistent and timely arrival and departure of vehicles for the site. This should be communicated to all sub-contractors and operators prior to commencement of works.

3.7.2 Dilapidation surveys

Dilapidation surveys of local and regional roads, where used by worksite traffic, will be required to be undertaken prior to the commencement of contracted works. Monitoring will be carried out to the satisfaction of, and dilapidation report in a format acceptable to the relevant local government authority submitted to the relevant local government authorities. The proponent will be responsible for any necessary repair of deterioration attributable to the impacts of construction activity.

If the selected route is already subject to some heavy vehicle use, this should be surveyed and the information provided as part of the initial assessment of the route.

3.7.3 Chain of Responsibility and Heavy Vehicle National Law

Contractors must have systems in place to ensure compliance with Chain of Responsibility legislation, including the Heavy Vehicle National Law and regulations at all times. All necessary

heavy vehicle approvals and permits (e.g. oversize, over mass, etc.), must be obtained from the relevant road manager. Specific Chain of Responsibility requirements are further outlined in the SM PS-ST-221 Sydney Metro Principal Contractor Health and Safety Standard.

3.7.4 Management of heavy vehicle movements

Vehicle and pedestrian access to each work site, including the locations of entries, exits, turning restrictions, slip lanes, traffic signals, signage and other site management requirements will be established in line with the requirements of the project approvals and in consultation with RMS, CCO, BDA and Councils.

3.7.5 Work zones and heavy vehicle marshalling

During some stages of the works at each of the sites there may be a requirement for making use of kerb space on the adjacent street to enable short term parking or unloading for deliveries to the site. Applications for a 'Works Zone' will be undertaken by the contractor to the relevant authority. The use of a 'Works Zone' should be minimised as much as practicable.

In general, Work Zones will not be permitted within existing Bus Zones and their operating times, unless arrangements have been approved for the relocation of the Bus Zone.

During times of continuous construction traffic activity, such as during excavation works, it is likely that one or more truck marshalling and logistics facilities will be required to assist with construction traffic management and to minimise disruptions to other road users. These facilities will need to be identified and an effective method of heavy vehicle arrivals established.

3.7.6 Construction/demolition vehicle types

In order to minimise the number of heavy vehicle movements on the road network, the largest vehicle possible will be used for removing or delivering material to and from the sites. It is recognised that the Sydney and North Sydney CBD sites will have constraints on access routes, safety considerations and site constraints.

The EIS/Submissions report/PIR acknowledges that single unit tipper trucks (length between 8.8 and 12.5 metres) with a 10m³ capacity would be used at all sites during the day with only Chatswood and Marrickville Dive sites being able to accommodate truck and dog combinations or semi-trailers of about 19 metres in length. Higher mass and longer heavy vehicles may need to transport materials to and from the sites (some under permit) and these would be subject to separate approvals. Daytime use of truck and dog combinations within the Sydney CBD is not supported.

3.7.7 Worker access and parking

The constrained nature of the sites requires that car parking for construction personnel would not be able to be provided at most sites. With the exception of the Chatswood and Marrickville dive sites there may be the opportunity to provide minimal light vehicle parking spaces for engineers and other site management staff use.

The Chatswood and Marrickville Dive sites could provide up to 300 car parking spaces each, within the site. These parking facilities may provide the opportunity to be used as park and ride locations for workers from other sites with shuttle buses operating from the dive sites to other work sites.

The assumption for all site specific CTMP's is that there will be no provision, either on the road or within the work site, for worker parking.

3.7.8 Construction consolidation centre/depot

To mitigate the potential impact of construction traffic the provision of a centralised Project Centre should be considered. This centre could receive deliveries and arrange for combining of loads and materials for distribution to the various work sites. This may be incorporated into the truck marshalling and logistics facility.

This would have the potential to significantly reduce construction traffic movements to the sites, particularly for small loads.

3.7.9 Driver training

Heavy vehicle drivers should be made fully aware by the Contractor of the worksite traffic management arrangements and site access requirements including approach and departure routes, and any heavy vehicle noise management measures required. Driver training should take into account current best practice and information including Cycle Awareness Training.

The Contractor is to ensure that daily briefings are provided to drivers on routes, potential changes and impacts on the routes in the form of toolbox talks.

Contractors must ensure mandatory completion of the Sydney Metro City & Southwest project specific Heavy Vehicle Driver Introduction Training.

3.8 Worksites

Details of the proposed erection and maintenance of hoardings, scaffolds and associated structures shall be documented in the Construction Traffic Management Plans in accordance with the SSI approval. All worksites will be clearly defined with the use of hoardings. The CTMPs will identify the boundaries and detail the footpath and road controls. Activities within the worksite are excluded from the CTMPs except in relation to ensuring the movement of construction traffic in and out of the worksite is physically possible and can be done safely.

Worksites include any gantries, or other structures associated with the site layouts. The site specific CTMPs will consider these interactions and the impacts of gantries, etc. on the road and footpaths.

3.8.1 Hoardings

Hoardings will be required to be erected around the construction sites so as to protect the site and any passing pedestrians and vehicles. These may also need to provide site facilities for the worker's on the site due to the constrained nature of the sites. The erection of hoardings around the sites may require the consideration and approval of the local Council.

In providing any hoarding and gantry structure, consideration will be given to ensuring sight lines for side roads, vehicle accesses, signposting, and traffic signals are maintained. The City of Sydney has published policies on hoardings, accessible on its web site. While the policy document provides guidelines for the presentation of the hoarding, the branding and visual aspects of the hoarding are to be in line with TfNSW/Sydney Metro requirements.

Each Council may specify requirements for the type of hoarding proposed and may require the submission and approval of an application prior to the commencement of the site establishment works. Detailed information should be obtained from the respective Council websites. In some locations, there may also be a requirement for the hoarding to comply with design guidelines. All hoardings around Sydney Metro construction sites should comply with the TfNSW/Sydney Metro branding requirements.

Council is likely to require the submission of an application for the erection of any hoarding or crane on the site. Information that would be required to be submitted with the application can include, but not limited to, the following:

- Plans of the proposed hoarding and/or crane drawn to scale, elevations of hoardings and identifying any Council or other asset that may be impacted.
- An engineer's statement on the proposed hoarding and any facilities to be provided.
- Approval from NSW Police.
- Approval from RMS (for sites located on a State Road or on any road within 100m of traffic signals).
- Structural certificate (for Class B Hoarding)

For North Sydney Council, the Hoarding application form can be found at http://www.northsydney.nsw.gov.au/Council_Meetings/Forms/Building_Development_Forms/Construction_Forms#4.

For Willoughby Council, the Hoarding application form can be found at <http://www.willoughby.nsw.gov.au/About-Council/Forms-Policies---Publications/councilforms/permit-application---hoarding/>.

For City of Sydney Council, the Hoarding application form and other information can be found at <http://www.cityofsydney.nsw.gov.au/development/building-and-construction-approvals/temporary-structures/hoardings-and-scaffolding>.

For Inner West Council, the Hoarding application form can be found at <http://www.marrickville.nsw.gov.au/Templates/Advanced/Bridge/TrimDownload.aspx?TrimDocNum=15221.00>

In addition, some councils may have specific requirements for the type of hoarding and operational requirements. A sample of some of the hoarding requirements of City of Sydney Council is provided below. The contractor should check with Council over any specific requirements.

"The design of hoardings will have an important impact on the success of pedestrian and vehicle management measures. The following considerations will be taken into account in designing hoardings:

- Surfaces are bright
- Smooth surfaces are used which allow pedestrians to brush past without snagging (this reduces shying from the edge)
- Surfaces are regularly cleaned and inspected
- Removal of graffiti and advertisements
- Adequate lighting provided
- Where adjacent to road edge a minimum hoarding offset of 500mm from the road edge with design feature to prevent pedestrians walking alongside the kerb.
- A City of Sydney preference for concertina style driveway gates rather than fixed rigid gates."

The application for permits to erect hoardings may differ between Council's and this will need to be considered for each worksite.

3.9 Site security, site access and Signage

The issues to be considered in determining the location of site accesses are:

- Safety of travelling public.
- Safety of construction workers and equipment.

- Impact on local communities in terms of safety, noise and road damage.
- Ease of access for emergency vehicles.
- Site security.

The worksites will have appropriate arrangements to discourage entry without approval and minimise vandalism. All access points to work sites will have lockable gates.

Appropriate information signs will be provided at work sites to identify the Project and contact persons.

Contractors will be required to develop and prepare Security Management Plans based on the site specific security threats (hazards) identified. Requirements for Security Management Plans are outlined in the SM PS-ST-221 Sydney Metro Principal Contractor Health and Safety Standard.

3.10 Safety Audits

3.10.1 Purpose and benefits

A Road Safety Audit (RSA) *“assesses a road’s safety performance and crash potential at various stages of a road/project’s life cycle”* (Road Safety Audits Fact sheet – RTA 2010).

It is a formal procedure for checking the design, implementation and operation of road works and other traffic measures from a safety perspective. The establishment of quality systems provides the philosophy underpinning the RSA process. The overriding objective of the process is to ensure that all existing road schemes and future routes operate at an acceptable level of safety, with safety being an integral part of the road network development process.

The benefits of a RSA’s are that:

- The likelihood of crashes on the road and the adjacent network can be reduced.
- The severity of crashes can be reduced.
- Road safety is given prominence in the minds of road designers.
- The need for costly remedial work is reduced.
- The total cost of a project to the community, including crashes, disruption and trauma, is reduced.

3.10.2 Stages when Road Safety Audits are undertaken

Road Safety Audits will be undertaken at the following stages:

Detailed Design Stage

At this stage, the geometric design, traffic signage scheme, linemarking plans, lighting plans and landscaping plans are available and will be reviewed in relation to the operation of the road.

Pre-Opening Stage

Prior to the opening of a site, an inspection will be made for all relevant conditions at night and during the day for all likely road users to ensure that the construction has addressed earlier audit concerns and to check for any hazardous conditions that were not apparent at the feasibility or design stages.

Road Safety Audits of Temporary Work/Construction Traffic Management Plans

Sydney Metro City & Southwest and/or its contractors will undertake Road Safety Audits for CTMP’s, to be submitted with the CTMP. Regular safety audits of work zones are also to be

undertaken to ensure all worksite safety arrangements are in place. These audits will be additional to the daily inspections by the site staff. Particular attention will be given to WHS guidelines, work areas adjacent to the road, movement of construction traffic, vehicle speeds and all warning devices or systems.

Road Safety Audit Procedure

All Road Safety Audits will be undertaken in accordance with the RMS 'Guidelines for Road Safety Audit Practices (2011), with reference to current practices outlined in Austroads Guide to Road Safety Part 6 Road Safety Audit (2009) and the Sydney Metro Principal Contractor H&S Standard.

3.11 Pedestrian security/safety/lighting

The consideration of safety and security issues for pedestrians will be considered at all worksites. Any hoardings or other structures on the site boundaries will have lighting in accordance with current standards, particularly where existing street lighting is removed or obscured as a result of the site works. In those locations where this occurs, supplementary lighting is to be provided to meet the current standards.

Discussions will be carried out with the relevant authority if the coverage or otherwise of CCTV cameras is impacted by the works.

3.12 Management of risks to vulnerable road users

The Contractor is to adopt applicable vulnerable road user safety measures as per the SM PS-ST-221 Sydney Metro Principal Contractor Health and Safety Standard to minimise the road safety risks to pedestrians, cyclists and motorcyclists en route to, and in the vicinity of, construction sites. Such measures include, but are not limited to:

- The deployment of speed awareness signs in conjunction with variable message signs;
- Heavy vehicles equipped with systems to improve vehicle safety, visibility and the detection of vulnerable road users;
- Mandatory completion of Sydney Metro City & Southwest project specific Heavy Vehicle Driver Introduction Training; and
- Contractor engagement in shared experience educational events.

Where worksites have an impact on footpaths, consideration will be given to the requirements of all pedestrians and especially vulnerable road users (school children, elderly and mobility impaired).

DDA requirements will be adopted with kerb ramps or other measures provided at road crossings. Footpath widths are required to allow for two way pedestrian traffic allowing for prams/strollers and wheelchairs.

Where high numbers of vulnerable road users are using a footpath, special provision and design consideration may be required to mitigate any impacts.

4 Proposed Work Method

The stations along the proposed Sydney Metro City & Southwest route will be a mixture of mined caverns or cut-and-cover excavations.

A single span mined cavern is proposed for Victoria Cross (North Sydney) with binocular mined caverns proposed for Martin Place and Pitt Street stations. Crows Nest, Barangaroo, Central and Waterloo are proposed to be constructed as cut-and-cover stations.

Tunnel Boring Machines (TBMs) will be used to excavate the twin tunnels. Two machines are proposed to commence at Chatswood and tunnel to Blues Point with a further two TBMs commencing at Sydenham and tunnelling to Barangaroo. A fifth, specialist TBM for operations in soft soils will be used to tunnel the section from Barangaroo to Blues Point and under the harbour.

A primary worksite will be established at the surface to support the station construction. Secondary worksites will be required to support tunnelling, power supply and station excavations. While site constraints at the surface level for the stations are significant and will impact on pedestrian and vehicular traffic for the period of construction, it is an RMS operational imperative that the capacity and efficiency of the network is not reduced during peak periods.

Station shafts will be excavated using conventional excavation methods and the station caverns will be excavated using roadheaders and rock breakers. Cavern excavation would be completed prior to the arrival of the TBM which will be excavating the main tunnels. The TBM's will be pulled through the station cavern and prepared for the tunnelling excavation to the next station. A range of activities will be required at the primary worksite to support this process.

The main heavy vehicle generating activity will be associated with spoil removal from the tunnelling excavation and the excavation of the stations, entrances/surface connections, emergency egress and ventilation shafts. Other activities that would be supported by heavy vehicle activities include:

- Enabling works including building demolition works, power, water and other utilities, and site establishment of the station worksites.
- Ground support and lining works for stations with plant and materials delivered to the station sites from the surface.
- Delivery of tunnel linings from the pre-cast yard at the Marrickville dive site to other tunnel boring machine launch sites at Chatswood dive site and Barangaroo.
- Structural concrete works for station entrances, emergency egress and ventilation shafts, with internal building works and station architectural fit-out.
- Specialised installation works associated with station platforms, concourses, accommodation and circulation areas, services and other amenities, station entry/exit gates, platform screens and doors and barrier installation.
- Mechanical and electrical fitout of station services and communication systems.
- Testing and commissioning station and train systems.

4.1 Traffic Management Considerations

4.1.1 Site Specific Issues

The individual CTMPs for each of the sites will provide details on the various construction and traffic related issues, and measures to mitigate those issues (where possible). **Table 4.1** summarises some of the issues identified for each of the worksites

Table 4.1 – Site issues

Station/Worksite	Key Issues
Chatswood Dive Site	<ul style="list-style-type: none"> • Closure of Nelson Street • Introduction of traffic signals at the Mowbray Road / Hampden Road intersection to accommodate construction traffic • Pedestrian and cyclist safety • Access to Mowbray Road • Residential access (Nelson Street) • Gordon Avenue site access
Artarmon Services Facility	<ul style="list-style-type: none"> • Load limit on sections of Reserve Road • Business access
Crows Nest Station	<ul style="list-style-type: none"> • Pedestrian and cyclist safety • Closure of Hume Street • Pedestrian activity on Pacific Highway • Relocation of bus stops • Business and residential access
Victoria Cross Station	<ul style="list-style-type: none"> • Pedestrian and cyclist safety • Pedestrian activity on Miller Street, Berry Street, Denison Avenue • Impact on bus stops and bus operations • Impact of heavy vehicle movements on sensitive receivers (residents, schools) • Business and residential access
Blues Point	<ul style="list-style-type: none"> • Community / resident amenity • Adjacent residential buildings • Steep grade on approach and departure to site • Impact on parking and reserve • Impact of heavy vehicle movements on sensitive receivers (residents, businesses, schools) • Impact on bus stop and bus services

Station/Worksite	Key Issues
Barangaroo	<ul style="list-style-type: none"> • Impact on parking • Impact on Hickson Road carriageway • Pedestrian and cyclist safety • Impact on service vehicle access to OPT • Adjacent construction activity • Sensitive community • Construction traffic from other developments.
Martin Place	<ul style="list-style-type: none"> • Pedestrian and cyclist safety • Pedestrian activity in Martin Place, Castlereagh Street, Elizabeth Street, Hunter Street • Impact on bus stops and bus operations • Impact on service vehicle parking and car parking • Construction traffic from other developments.
Pitt Street	<ul style="list-style-type: none"> • Pedestrian activity in Pitt Street, Castlereagh Street, Bathurst Street and Park Street. • Pedestrian and cyclist safety • Impact on bus stops and bus operations in Park Street. • Impact on service vehicle parking. • Construction traffic from other developments.
Central	<ul style="list-style-type: none"> • Pedestrian activity in the Central Station precinct and Eddy Avenue. • Pedestrian and cyclist safety • Bus and coach operations. • Light rail construction and operation in Eddy Avenue and Chalmers Street. • General precinct traffic congestion • Impact of heavy vehicle movements on sensitive receivers (residents, schools) • Residential and business access • Construction traffic from other developments.
Waterloo	<ul style="list-style-type: none"> • Nearby residential development • Pedestrian and cyclist safety • Impact on parking and traffic movements on Botany Road
Marrickville Dive Site	<ul style="list-style-type: none"> • Access to Bedwin Road and Edgeware Road. • Pedestrian and cyclist safety • Traffic activity for Marrickville Metro shopping centre and surrounding commercial uses.

5 Operational Requirements

5.1 Traffic control at worksites

5.1.1 Policy and responsibilities

Work zones provide for the safe operation of road workers and the safe passage of vehicular and pedestrian traffic. Traffic control devices are provided to warn, instruct and guide road users safely through, around or past work sites on roads and footpaths.

An important aspect is for the planning and staging of the works to ensure that any workers required to work on or near the road are separated from traffic as much as possible. Traffic control at worksites is to be provided in accordance with the latest edition of the RMS' "Guide to Traffic Control at Work Sites" manual and the Sydney Metro Principal Contractor Health and Safety Standard. Australian Standard AS 1742.3 "Manual of uniform traffic control devices – Traffic control for works on roads" is also to be referenced when determining traffic controls and signposting.

It is the responsibility of all personnel engaged on the project and at worksites to ensure that any works carried out on the road are done so in a safe and efficient manner. The contractor will prepare specific Traffic Control Plans (TCP) for all work which will impact on the road and traffic.

TCP's are required to be prepared by a suitably qualified person who holds a current RMS certificate to "Prepare Work Zone Traffic Management Plan".

When temporary or construction speed limits are required, the contractor will be required to make the necessary application to either RMS for classified roads or the local council for unclassified roads. This application will need to be submitted prior to the proposed implementation time to allow for processing and authorisation.

5.1.2 Traffic Control Techniques

There are a number of traffic control methods that can be used at worksites that must be selected in accordance with the hierarchy of controls to ensure safety risks to workers (including traffic controllers) and the public are minimised So Far As Is Reasonably Practicable (SFAIRP). These include:

- Temporary road deviations.
- Linemarking with raised pavement markers to delineate proposed diversion.
- The use of traffic cones, water filled barriers or other physical devices to delineate the required route.
- Directional and information signposting to direct or advise drivers. This can include Variable Message Signs (VMS), directional arrows or static signs.
- Portable traffic signals to control traffic flows if lane closures are required.
- Other traffic control devices as provided in the RMS' Traffic Control at Work Sites manual.

Refer also to the Sydney Metro Principal Contractor Health and Safety Standard.

For longer term works, where traffic management devices are in place for an extended length of time, regular inspections are to be carried out by the Contractor's Construction Manager. This is to ensure that the controls in place continue to provide safe traffic management. All controls are to comply with the current RMS guidelines.

5.1.3 Approved clothing for work personnel

Any worker working near traffic will be required to wear clothing in accordance with the requirements of Australian Standard AS1742.3 and Sydney Metro Principal Contractor Health and Safety Standard.

5.1.4 Plant and equipment

Any plant used and working near traffic or pedestrians is to be suitably highlighted with physical protection and appropriate warning signs provided to ensure public safety. Refer also to the plant section of the Sydney Metro Principal Contractor Health and Safety Standard.

5.2 Frequency of inspections

For long term, i.e. longer than one shift, traffic management road inspections will be carried out regularly to ensure the safe movement of traffic and the protection of persons and property through and/or around the work site. The required inspections of all temporary traffic control devices are detailed in **Section 5.2.1**.

Inspections will ensure that all signs and devices are properly located, oriented and maintained in an effective condition, and that the layout is satisfactory and not confusing to motorists or pedestrians. Records will be maintained by the contractor of all traffic guidance facilities and any adjustments or changes made to such facilities, together with dates and times the facilities were installed, varied and removed. Inspection reports recording dates and times of inspections of the traffic management facilities are to be recorded on a suitable proforma and made available for inspection.

Incidents are to be reported, investigated and actioned in accordance with the Sydney Metro Principal Contractor Health and Safety Standard.

5.2.1 Inspections of roadwork traffic management schemes

The requirement to undertake inspections of traffic control measures is outlined in Section 6.1 of the RMS' "Traffic Control at Work Sites" manual and Appendix A of Australian Standard AS 1742.3 "Manual of uniform traffic control devices – Traffic control for works on roads". There are three main types of inspections to be carried out:

- Pre-start and pre-close down inspections of short term traffic control.
- Weekly inspections of long term traffic control.
- Night inspections of long term traffic control.

Appendix E of the "Traffic Control at Work Sites" manual provides inspection check lists and forms that can be used for all of the inspections whether short term, long term or night. The responsibility and frequency of the inspections required is provided in Section 6.1 of the "Traffic Control at Work Sites" manual.

5.3 Emergency Incident Planning

Incident management planning must be carried out in accordance with the Sydney Metro Principal Contractor Health and Safety Standard, and must include incidents that could occur on roads. An Incident Management Plan for on-road incidents, or incidents that impact on the public transport network should be submitted to the TMC Emergency Transport Operation section for review and comment.

Examples of incidents could include the following:

- Traffic crashes
- Hazardous material spillage

- Power failure
- Terrorist attack
- Flooding
- Fire
- Structural damage to a rail line, building, road tunnel or bridge.

The Incident Management Plan should include procedures such as:

- Duties of workers attending the site
- Procedures for contacting Police, emergency services, back-up assistance from the relevant road authority
- Equipment that is to be ready at all times on potential call-out vehicles¹

All details of incidents that occur within the area of an approved ROL are to be recorded by the contractor and reported and investigated in accordance with the requirements of the Sydney Metro Principal Contractor Health and Safety Standard.

5.3.1 Accidents/incidents and complaints

The contractor's ROL register will maintain records of traffic accidents and incidents reported at work sites. Any complaints received regarding traffic delays at work sites should be referred to the Principal. The contractor will be required to table the register, upon request, at TCG meetings.

The person in charge of the work site will continue to be responsible for dealing with complaints regarding safety issues. Where action is considered necessary to address the matters of complaint, an appropriate recommendation will be forwarded to the Principal.

5.3.2 Chemical spills and leaks

Information on procedures to be followed and properties of hazardous chemicals are detailed in:

- NSW Environmental Protection Authority
(<http://www.epa.nsw.gov.au/licensing/Dutytonotify.htm>)
- Safe Work NSW codes of practice
- RMS Policy Procedure – "Procedure for Managing Hazardous Chemicals"
- Our Contractors' Construction Environmental Management Plans

NSW Fire and Rescue is primarily responsible for rendering safe, and cleaning up after, incidents involving flammable or hazardous substances, vapours, gases or liquid spillage, as well as an actual fire or explosion.

NSW Fire and Rescue holds detailed information on dangerous goods and hazardous chemicals. Sydney Metro City & Southwest staff and contractors are to be instructed not to approach such spills until NSW Fire and Rescue have declared the site safe. In such cases the contractor will close the roadway at a safe distance until Fire and Rescue arrives and issues appropriate instructions.

¹ AS1742.3 Appendix B

5.4 Traffic controllers and temporary traffic signals

The use of traffic controllers and/or temporary traffic signals to control traffic at worksites is to be in accordance with the RMS' Traffic Control at Work Sites Manual and the Sydney Metro Principal Contractor Health and Safety Standard.

Variable Message Signs (VMS) will be used to inform drivers, where necessary, to avoid particular roads or areas where activities associated with Sydney Metro City & Southwest construction would cause disruption. Where these are used it is to be in accordance with documented RMS procedures and guidance.

The placement of temporary VMS is to consider pedestrian safety and disabled access needs when placed on footpaths. A ROL may be required when a portable VMS is proposed to be located in a parking or loading bay.

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6 Consultation

Consultation has been carried out on an ongoing basis with CBD Co-ordination Office, RMS and TfNSW in the preparation of this Framework document. A summary of the comments and responses is provided in Appendix B.

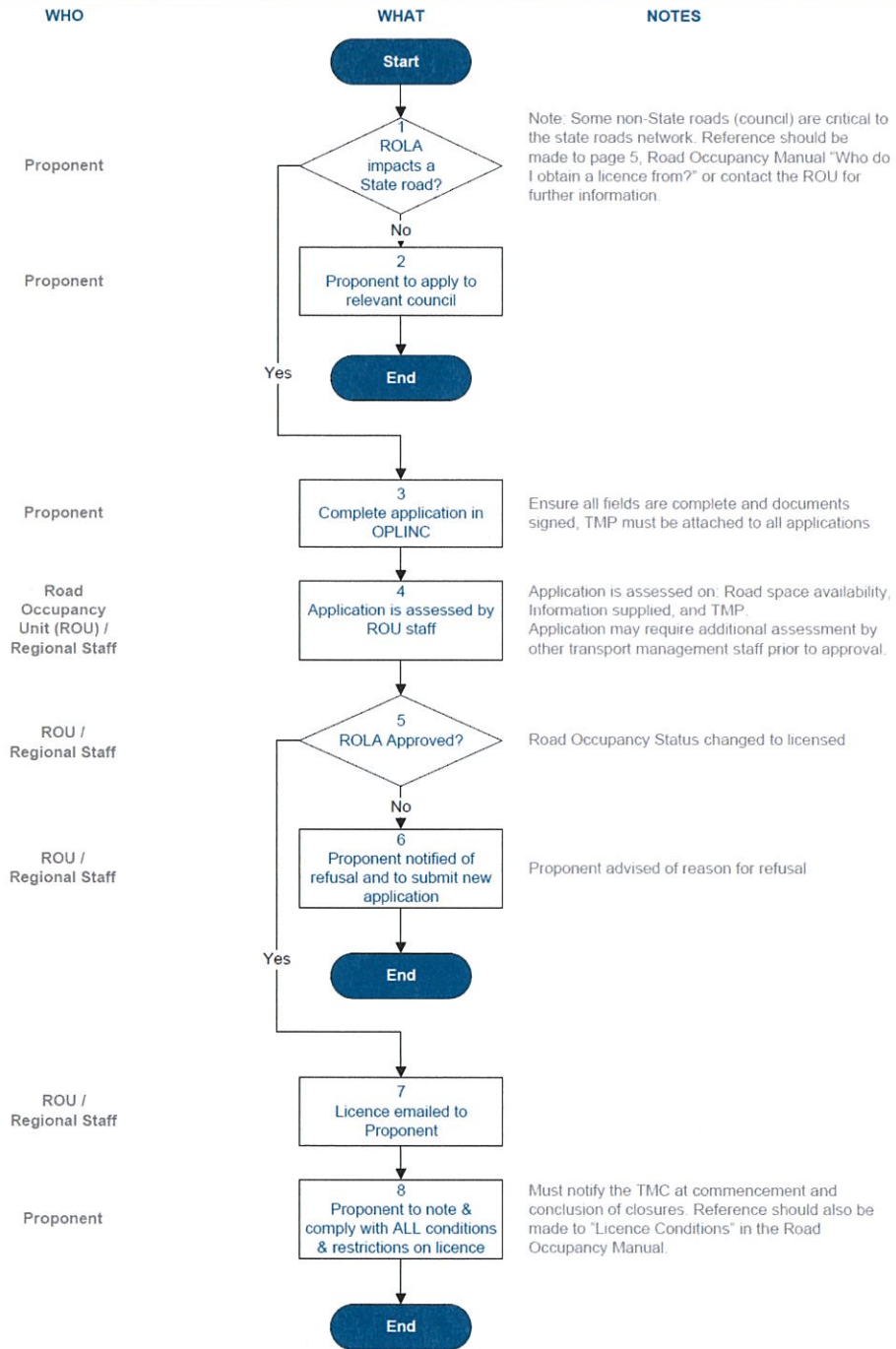
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Appendix A

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The Road Occupancy Licensing Process

Road Occupancy Manual - Flow Chart



Appendix B

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COMMENTS REGISTER

Report Name:		Framework Construction Traffic Management Plan	
Author:		Sydney Metro	
Version:		2.1	
Date:		October 2016	
Section	Issue	Stakeholder Comment	Response
CBD Co-ordination Office			
1.6	Definitions	Construction Traffic Management Plan condition should be renamed to Construction Pedestrian and Traffic Management Plan. All references to CTMP should be amended to read CPTMP. The definition should be amended to state that it is a plan showing how traffic and pedestrians will be managed when construction works are being carried out.	We have adopted the term Construction Traffic Management Plan (CTMP) across the project documentation and would prefer to retain that terminology. The CTMP definition and requirements under G10 specify pedestrian and multi modal considerations throughout.
2.3	Project delivery packages	It is not clear which package the new station box and fitout will be delivered under. It's also unclear which package the surface interchange infrastructure works will be delivered under. It may be worth including a line for each package describing the works to be undertaken.	Figure 2.2 is colour coded to indicate the different stages although may not be in the final document. It is also included in the dot points although could be further clarified. Will review and adjust as necessary.
3.1	Construction Traffic Generation	The CBD Co-ordination Office may restrict heavy vehicle movements to outside the network peak periods.	Subject to further consultation.

Section	Issue	Stakeholder Comment	Response
3.1	Construction Objections	Buses run on time with no disruption to routes or stops, where possible.	Noted –amended
3.1	Construction Objections	Delete Where reasonable and feasible , minimise construction traffic generation during network peak periods.	Noted –amended
3.1	Construction Objections	Traffic flow should be renamed transport network	Noted –amended
3.1	Principles	Safe provision for cyclists must be made at all work sites. Public transport users should also be kept informed of changes due to construction.	Noted –included in paragraph under table 3.1
3.1	Work co-ordination	Works should be co-ordinated so that road users do not encounter a series of delays in quick succession and such that the cumulative impact of multiple closures do not lead to unexpected congestion.	Noted –included in dot point 4, p. 16
3.2	Co-ordination	Co-ordination with the Transport Management Centre and CBD Coordination Office should incidents or undue congestion occur.	Noted –included at dot point 3, p. 17
3.3	Hierarchy of Access	Where did this list come from, why is public transport so low?	TfNSW hierarchy of access to stations
3.4.3 & 3.4.5	Traffic Co-ordination Group/Traffic Control Group Meeting.	What is the difference between these two groups / meetings? In any case the local council would be represented at this meeting.	Effectively the same group. Text amended to combine as Traffic Control Group. These are meetings between the contractor and TfNSW stakeholders.
Table 3.2	Principal Agencies	As per announcement by the TfNSW Secretary dated 14/10/16, The CBD Co-ordination office will be involved in all sites/stations within the CBD and Southwest Metro.	Noted – text amended.
3.4.2	TTLG representation	Some private bus operators may need to be included in the TTLG if impacts to NightRide services are considered. Also, builders of private developments under construction with the immediate vicinity of the project should be represented.	Other bus operators covered in 3.4.4. Private developers could be invited to TTLG as required.

Section	Issue	Stakeholder Comment	Response
3.6.3	Traffic Management Approvals Process	<p>It should be noted that the RMS may still elect to review and provide comment on the FCTMP and any draft CTMP's produced. CCO could coordinate comments and send to Sydney Metro to make changes. CCO will approve the final plans.</p> <p>CCO will need to review and approve all sites, including dive, sub-station and Crows Nest sites.</p>	<p>Noted – methodology reviewed to incorporate CCO co-ordination and approval role. e.g. CCO for approval and CCO consults with RMS. Remove methodology for these sites.</p>
3.6.3	Traffic Management Approvals Process	Point 5 – ROL Applications. It is the responsibility of the contactor to consult with other stakeholders including but not limited too public transport service operators before the ROL's are applied for.	Initially done as part of TTLG and TCG prior to formal submission.
3.6.3	Traffic Management Approvals Process	Point 6 – as per announcement by the TfNSW Secretary dated 14/10/16, The CBD Co-ordination office will be involved in all sites/stations within the CBD and Southwest Metro.	Noted
3.6.4	ROL approval process	Note that TMC does not guarantee approve within 10 working days, only a response to the application.	Noted –amended.
3.6.4	ROL approval process	All ROL's that would not be considered business as usual at the location in question should be raised with the CCO before the application is submitted.	Further clarification required regarding meaning of 'business as usual'. An ROL would be made for tasks that do not comply with the normal road operation.
3.6.10	Adjustments to bus routes and stops	These changes should be raised with the CCO along with TfNSW I&S, and service operators. A number of bus stops close to the construction areas in question form part of emergency transport plans.	Noted – now includes CCO
3.7	Management of Construction Traffic	The CBD Co-ordination Office may restrict heavy vehicle movements to outside the network peak periods.	Subject to further consultation
Section	Issue	Stakeholder Comment	Response

3.7	Management of Construction Traffic	The CBD Co-ordination office may restrict heavy vehicle travel on particular corridors to outside peak network periods. Specifically major public transport corridors.	Subject to further consultation.
3.7.1	Martin Place Pedestrian Tunnel	The haulage routes for the construction of the Martin Place Metro Station pedestrian tunnel should be included. This would also require an update of Figure 3.12.	Haulage routes would be as shown in Figure 3.7
3.7.5	Work Zones	Where a work zone overlaps with a bus zones, the operating time of the work zone would be restricted to outside of its use by buses, unless approval has already been provided for the bus zone to be temporarily relocated during the project's construction.	Noted, however, Sydney Metro contractor may secure agency agreement to bus stop relocations and/or bus zone timing changes.
4.1	Site Specific Issues	Barangaroo, Martin PI, Pitt St and Central all have the common key issue of cumulative heavy vehicle volumes generated by both public and private development creating congestion with in the CBD.	Noted, now includes additional point <ul style="list-style-type: none"> • Construction traffic from other developments
5.3	Emergency Incident Planning	Any incident management plan relating to on road incidents, or incidents that impact the transport network should be submitted to the TMC Emergency Transport Operation section for review and comment.	Noted –included at paragraph 1.
Appendix A	The road occupancy licensing process	The flow chart provided has been updated, current procedure can be found at http://www.rms.nsw.gov.au/documents/about/forms/road_occupancy_manual.pdf	Noted – updated flow chart inserted.

General	CPTMP requirements	<p>CCO's requirement for CPTMPs should be included:</p> <ul style="list-style-type: none"> • Prepare a Construction Pedestrian and Traffic Management Plan (CPTMP) in consultation with the CBD Coordination Office and the Sydney Light Rail Team within TfNSW. The CPTMP needs to specify, but not limited to, the following: <ul style="list-style-type: none"> ○ Location of the proposed work zones and hours of operation; ○ Haulage routes; ○ Construction vehicle access arrangements; ○ Proposed construction hours; ○ Estimated number of construction vehicle movements; ○ Construction program; ○ Consultation strategy for liaison with surrounding stakeholders; ○ Any potential impacts to general traffic, cyclists, pedestrians and bus services within the vicinity of the site from construction vehicles during the construction of the proposed works; ○ Cumulative construction impacts of projects including Sydney Light Rail Project. Existing CPTMPs for developments within or around the development site should be referenced in the CPTMP to ensure that coordination of work activities are managed to minimise impacts on the road network; and ○ Should any impacts be identified, the duration of the impacts and measures proposed to mitigate any associated general traffic, public transport, pedestrian and cyclist impacts should be clearly identified and included in the CPTMP. • Submit a copy of the final plan to the Coordinator General, CBD Coordination Office for endorsement, prior to the commencement of work. 	<p>This is different to the Principals General Specification G10 -Traffic and Transport Management document that has been developed in consultation with CCO (extract below). Some of these matters will be addressed in the Conditions of Consent provided for the project and the rest addressed in the Principals General Specification G10 - Traffic and Transport Management document.</p>
Section	Issue	Stakeholder Comment	Response
RMS			

3.2	Traffic Management Strategy	Page 17, - suggestion "on-going or direct" co-ordination with the TMC to mitigate undue congestion and provided rapid response, should incidents occur.	Noted and added
3.2	Traffic Management Strategy	Page 17 & 3.7.1 Heavy Vehicle routes second paragraph page 32, - should this include layovers for HV's (outside of congested areas) with a call up process controlled by site management?	Information regarding site traffic management has been included in Section 3.7.1.
3.2.1	Information	Should this also include "other road authorities? i.e. Barangaroo Delivery Authority BDA, Property NSW (formally SHFA).	Noted and information added
3.5.1	Existing businesses and residents	Access should be maintained at ALL times.	Noted and included.
3.5.2	Notification of traffic changes or disruptive works	Should this have a point v. letterbox drops of notices to residents in a XXX metre catchment of the works? This advises precinct residents that may travel through the affected area/s.	It is considered that notification to precinct residents, where not directly impacted, would be advised through newspapers/social media updates and VMS signs placed as part of a TMP (Sect. 5.4).
3.6.8	Adjustment to traffic signals	Depending on the extent of the adjustments/changes, this may also require a WAD agreement with RMS.	Noted and comment added
4.1.1	Site specific issues	Blues Point – include impact on STA services.	Noted and information added.
4.1.1	Site specific issues	Waterloo – what is meant by "impact on traffic movements on Botany Road".	Comment provided to highlight that the CTMP is to mitigate any impact on traffic movements on Botany Road.
Section	Issue	Stakeholder Comment	Response

5.1.1	Policy and responsibilities	RMS is responsible for speed limits on all roads. Check whether this includes temporary/construction speed limits. CSELR needed RMS concurrence for work zone limits.	<p>The RMS 'Traffic Control at Worksites Manual' indicates that roadworks speed limits on unclassified roads are authorised by the respective council with notification to RMS and Police.</p> <p>It is understood that CSELR would have required RMS approval as RMS was the roads authority along the light rail corridor. If the same determination is made for the Sydney Metro corridor then it would include the same requirement. Further advice will be sought.</p>
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G10 extract as follows:

Construction Traffic Management Plan

At least four (4) weeks before proposing to undertake work which affects traffic conditions, the Contractor must submit to the Principal's Representative a Construction Traffic Management Plan that complies with, and addresses, the following requirements:

- (a) RMS Traffic Control at Worksites Manual;
- (b) AS 1742.3 Manual of uniform traffic control devices Part 3: Traffic control for works on roads;
- (c) Relevant Austroads Guides; and
- (d) RMS Supplements to Australian Standards and Austroads.

The Contractor must revise the Construction Traffic Management Plan and implement more appropriate procedures if the original pedestrian, cyclist, public transport service and road traffic management practices prove not to be fully effective.

The CTMP must include the following elements, unless otherwise agreed in writing with the Principal's Representative:

- (a) Details of any traffic staging arrangements associated with each proposed construction stage, including Traffic Staging Plans, and the time periods during which each stage will be in operation.

- (b) Traffic Control Plans (TCP), including provision for cyclists, and any specific traffic control arrangements associated with the conditions of approval of the ROL. The TCP sets out the specific traffic and transport management arrangements to be implemented at specific locations during the construction of the Project Works and Temporary Works.
- (c) Vehicle Movement Plans (VMP) showing the preferred travel paths for vehicles to enter, leave or cross the through traffic stream. A VMP is a diagram showing the preferred travel paths for vehicles associated with a work site entering, leaving or crossing the through traffic stream. A VMP may be combined with or superimposed on a TCP.
- (d) Pedestrian Movement Plans (PMP) showing the allocated travel paths for workers or pedestrians around or through the work site. A PMP may be combined with or superimposed on a TCP.
- (e) Parking Management Plans (PMP) that identify parking requirements and on and offsite parking arrangements and associated impacts; remote parking arrangements and associated access between sites and public transport nodes; alternate parking arrangements for displaced parking, and communication and parking management measures. For any proposed kerbside use impacts in the CBD a proposal for relocation of impacted users is required.
- (f) Provision of access to adjoining properties and side roads affected by the construction.
- (g) Copies of any ROL and approvals from other relevant authorities obtained;
- (h) Design drawings for any temporary roadways and detours, including alignment and surface levels, pavement widths, pavement cross-sections and drainage.
- (i) Names and contact details of nominated personnel responsible for attendance at traffic incidents where required to do so by the Police and emergency services, and for maintenance of traffic control devices and temporary roadways outside normal working hours. Provide confirmation that these details have been provided to the Police.