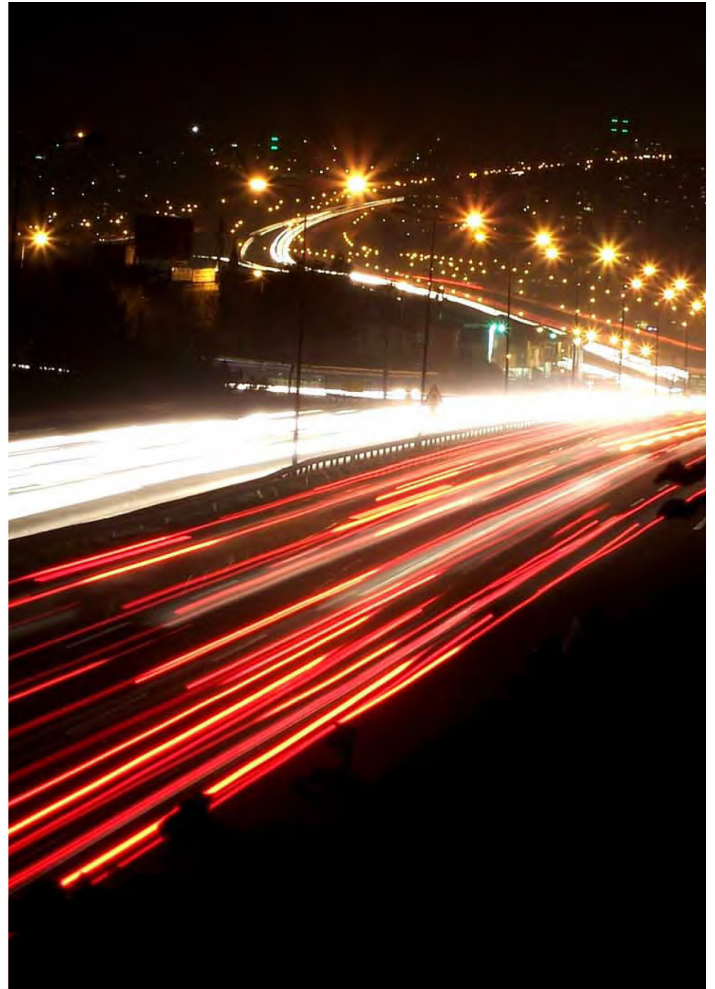




THE UNIVERSITY OF  
**SYDNEY**

**The Henry  
Halloran Trust**

A Blue-sky  
Report



## **Assessing environmental impacts of major transport infrastructure projects: Where does human health fit?**

*Patrick Harris, Emily Riley,  
Peter Sainsbury, Jennifer Kent, Fran  
Baum and Anna Lane*

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# Assessing environmental impacts of major transport infrastructure projects: *where does human health fit?*

A REPORT FOR THE HENRY HALLORAN  
TRUST AT SYDNEY UNIVERSITY

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## Glossary of terms

Term	Meaning
CBD	Central business district
CEMP	Construction Environmental Management Plan. A site specific plan developed for the construction phase of the project to ensure that all contractors and sub-contractors comply with the environmental conditions of approval for the project and that the environmental risks are properly managed.
Concept design	Initial functional layout of a road/road system or other infrastructure. Used to facilitate understanding of a project, establish feasibility and provide basis for estimating and to determine further investigations needed for detailed design
Cumulative impacts	Impacts that, when considered together, have different and/or more substantial impacts than a single impact considered alone.
Detailed design	The stage of design where project elements are designed in detail, suitable for construction.
DGRs	Director-General's requirements. Now Secretary's Environmental Assessment Requirements (SEARs).
DP&E	NSW Department of Planning and Environment
DPT&I	SA Department for Planning, Transport and Infrastructure
DTE&I	SA Department for Transport, Energy and Infrastructure
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPA	NSW Environment Protection Authority
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i> (NSW)
HHRA	Human Health Risk Assessment
HIA	Health Impact Assessment
Impact	Influence or effect exerted by a project or other activity on the natural, built and community environment.
LEP	Local Environmental Plan
M4 and Parramatta Road corridor	The M4 and Parramatta Road Corridor is the area from Parramatta CBD to Sydney CBD, generally between the Main Western Rail Line in the south and the Parramatta River to the north.
NSW	New South Wales
PM	Particulate matter
PM10	Particulate matter of up to 10 micrometres
PM2.5	Particulate matter of up to 2.5 micrometres
PPP	Public-Private Partnership
Preferred design	The design that is the subject of this environmental impact statement.
Proponent	The person or organisation that proposes to carry out the project or activity.
Roads and Maritime	NSW Roads and Maritime Services
SA	South Australia
SEARs	Secretary's Environmental Assessment Requirements and specifications for an environmental assessment (NSW).
SEPP	State Environmental Planning Policy
SIA	Social Impact Assessment
Transport Master Plan	<i>NSW Long Term Transport Master Plan (Transport for NSW 2012a)</i>
WDA	WestConnex Delivery Authority
WHO	World Health Organisation

## Executive summary

This report details an investigation of four cases of major transport infrastructure environmental assessments to determine the extent to which they include health issues.

Sound infrastructure planning is crucial to ensure that investment achieves the maximum benefit and minimal risk to society. The sheer size and scale of transport infrastructure projects, often billions of dollars, means these investments have considerable influence on the health and wellbeing of current and future populations. Transport infrastructure impacts public health in various ways including occupational health and safety, mental health, traffic injuries, noise and vibration, air quality, opportunities for physical activity, and the creation or exacerbation of existing spatial or geographic inequalities.

Environmental Assessments (EAs) provide a crucial, often regulated, decision making point within the policy and planning process for infrastructure to consider health and wellbeing impacts of projects. Research to date, however, has shown that such use is limited. That research has focused on the content of EAs, usually Environmental Impact Statement (EISs), and has demonstrated that the principle of focus is environmental exposures, with human health issues or outcomes rarely considered explicitly, and the broader social determinants of health not considered at all. This body of research has not, however, systematically investigated the influence of institutional conditions surrounding EA practice and how these influence the inclusion or exclusion of health issues. The research reported here focusses both on a comprehensive documentary analysis of the content of four EISs, and then, through interviews with stakeholders, the wider institutional influences on that content.

The research addresses the following research question:

*'How, why, and to what extent, is human health considered in environmental assessments of major transport infrastructure projects?'*

We investigated and compared four Australian cases of major transport infrastructure project EAs. In New South Wales, NorthConnex and WestConnex M4 East were compared as road projects that required health issues to be considered. The third NSW case was the Sydney CBD and South East Light Rail that did not require, but nevertheless included, health issues. The fourth was the Darlington Upgrade, a road project in South Australia that was exempt from an EA under legislation but that included health in the environmental report.

### **Documentary analysis**

We developed and applied a comprehensive content analysis framework to scrutinise the four EISs and combined this with additional discourse analysis. Overall, against this framework we found that the EISs partially considered health issues. The findings were as follows.

### ***The EISs tended to assess health as it was framed in the requirements or templates that guide the EIS content***

The EISs differed in the extent to which they considered health. This inclusion was tied to the requirements or templates developed to define the content of EISs of the three road proposals,

but not the light rail. NorthConnex and WestConnex M4 East EISs had a requirement for health issued by the NSW Department of Planning to proponents and consequently contained a detailed health assessment as a standalone section. The WestConnex M4 East required more detail and this EIS went on to produce the most comprehensive information about health of the four cases. Health was not included in the template to guide the environmental report developed by the South Australian Department of Planning, Transport and Infrastructure. Health was given the least coverage in this case. The light rail EIS included health as part of the social impact assessment and to a lesser extent the economic impact assessment, although this was not detailed in the requirements issued.

### ***A mix of health issues were considered***

The road EISs health assessments emphasised the health risks of air quality and to a lesser extent noise. The Darlington report was less detailed concerning health although health was considered as part of the assessments on air and noise (but explicit foci on health endpoints or outcomes were not included). The cases also demonstrated that wider, less direct, health impacts associated with changes to the social environment from projects can be assessed and included as risks and benefits of the projects. The WestConnex M4 East EIS included social issues, although these were covered in less detail, and the light rail demonstrated that health can be a crucial issue to consider as a social benefit of light rail projects. Further, the WestConnex M4 East and to some extent the light rail demonstrate that health equity can be a useful consideration for EISs based on distribution of population characteristics (e.g. the elderly, children with asthma) in addition to the physical position of the project in relation to 'sensitive receiver' buildings or services. Across the cases mental health, for example through changes to the local environment and property acquisition, was either absent or under-considered.

### ***A focus on human health risk assessment***

The NorthConnex and WestConnex M4 East EISs assessed human health within a risk assessment framework supported by national guidance documents. This was generally of a high quality and favoured, where possible, quantifying exposures and outcomes from the project. This quantitative risk assessment was most often in terms of air quality (for example exposure to PM10 and its outcomes on mortality and morbidity). Other exposures and risks, including from noise, tended to be qualitative. Where social issues were considered these were less detailed and with less emphasis on health endpoints or outcomes. The other chapters of the EISs had a much wider variety of assessment methods including cost benefit analysis, stakeholder analysis and field surveys.

### ***Questions over assumptions and data***

The human health assessments were very closely tied to the corresponding chapters in the EIS. Questions were, however, raised in submissions about relying on the modelling from other technical assessments – notably air but also noise and traffic. This reliance may be a necessary part of human health risk assessment but leaves questions remaining as to why and whether this is sufficient. The EISs also had a total absence of local health baseline data which raised

questions about the assumptions and certainties around local impacts (extrapolating from larger populations to locally impacted communities is noted as being problematic). Even if it were used, there were suggestions about the adequacy of these data to make a causal argument about health impacts because of small sample sizes.

### ***The EIS is a snapshot of a broader EA process***

Our analysis also showed that the EIS is a static document that presents a particular snapshot in time rather than a process of deliberation to arrive at a project design that is of minimal health risk. The road EISs for example often stated the project will have negligible impact or be beneficial, and often it appeared that mitigation measures were incorporated into these conclusions. This analysis however appeared to miss detail about the process of arriving at these final figures and conclusions.

Further, in each case there were instances when mitigations could not be developed in the absence of more detailed designs. This was notably uniform across cases about noise mitigation measures but also other impacts. It was unclear at what point in the process these design details will be available. 'Additional community engagement' was presented, also uniformly across the cases, as the mechanism to deal with these uncertainties. We judged this to be insufficient.

### ***The unsupportive regulatory, statutory and strategic context for considering health as an issue***

The legislative and strategic drivers behind the EAs, as detailed in the EISs, do not support the inclusion of health in the EA and EIS processes. The EISs each contained sections on the broader policy context that clearly articulated higher level policy decisions about infrastructure, but not human health (although connectivity and liveability were included). The development of options and business cases, and even the design and construction tenders, are crucial opportunities for health related (including costs and benefits) arguments that are currently not included. The light rail business case was mentioned as providing a health benefit to the project in terms of dollars, but how this was done was not detailed.

### ***The responsibility for providing additional health promoting infrastructure***

There are also questions that can be asked of state and federal governments concerning the parameters of each project for long term health benefits. The role of the government in each case was as proponent (as well as regulator). Providing additional health-promoting infrastructure surrounding the projects, such as provision of new public transport options or cycleways, has been shown to be cost effective in the long term. However for WestConnex M4East and NorthConnex, provision of such additional infrastructure was explicitly articulated in the EIS as being outside the responsibility of that project, and was not included in the conditions of approval. The light rail is a pertinent comparison case: the EIS not only demonstrates the health benefits of light rail as a transport infrastructure option but commits the project to providing new health promoting infrastructure surrounding the project itself.

Similarly the Darlington study commits to providing a high quality cycling and walking environment through on and off road facilities.

## **Interviews**

The interviews expanded upon and deepened explanations for many of the documentary analysis findings. We took an institutional approach to the analysis that unpacked what informants discussed in terms of the structures (rules and norms governing practice), ideas (content), actors and networks (stakeholders) and the procedures (methods and processes) surrounding how health was considered in the specific cases and in EA more generally. This approach developed, in the words of one informant, a ‘multi-layered’ account of health in EA. This has not previously been articulated in EA research.

### ***The EA process within broader government decisions***

The EA process was characterised broadly as the process through which projects are approved, and within this the EIS provides the technical assessment of issues. The EA process is necessarily captured by earlier and broader decisions which governments make about infrastructure projects. The technically focused EIS can only influence the scope of the project within these broader parameters (size, positioning, road, tunnel etc.) but not the parameters themselves. Human health is not on the infrastructure agenda of the NSW Government. There are also concerns over what is being committed to in terms of issues to include in the EIS, as these may lead to costly delays and even litigation. There was uniform support for earlier engagement about human health issues in strategic government infrastructure decisions. This was, however, tempered with the need to connect health within decisions about economic growth.

### ***Points in the EA process to influence content***

There are crucial points for influence during the EA process. The Department of Health is the agency that is brought in, especially in the setting of EIS requirements under legislation – as an advisor rather than with regulatory authority. These include developing the content of the EIS requirements, being involved in the adequacy test of an early draft of the EIS, involvement in public consultations, and commenting on the EIS when it is on public exhibition. The back and forth process between the Department of Health, the technical consultant and the proponents and coordinating consultants in developing the health risk assessment analysis was confirmed in the interviews.

### ***The content of the EIS***

The interviews suggested that there is a necessary requirement to assess risks in EAs. This comes about principally through community concern with the perceived potential negative impacts of proposals. It was also noted how projects can and should include benefits. A major task of an EA is to manage and present trade-offs in health impacts. These trade-offs occur at multiple levels of the population where there is usually a regional benefit being traded off against negative impacts on local communities or smaller populations within those communities. The EA and EIS processes, as discussed by informants, could better manage



these localised risks for potential ‘losers’ of projects and better engage with affected communities.

A wider range of impacts were identified in the interviews than those associated with the traditional environmental exposures to air quality and noise. These mostly concerned the stress and mental health issues associated with compulsory property acquisitions and negative changes to local amenity associated with this. While, according to informants, these social issues were attended to better in WestConnex M4 East than NorthConnex, more time and better focus on these issues was felt to be required.

### ***Risk assessment methodology***

There was a preference, from most but not all informants, for undertaking human health risk assessments in EISs. Those informants mostly were involved in the road projects and saw risk assessment as a necessary and increasingly recognised practice because of community fears about health risks.

There were, however, noted methodological issues associated with assessing incremental risk from the project over and above existing background exposures related to air quality in particular. Despite the inability of these risk assessments to point to projects as the ultimate cause of health impacts, the risk assessment process was identified as providing a transparent overview of the lack of risk to health from the project. A preference was also expressed for quantitative measurement of risks to ensure that this presentation of risk is as rigorous and objective as possible when it is provided to the community or Department of Planning to make their approval decisions. A counter example to this came from the light rail that demonstrated how health can transparently, rigorously and qualitatively be included in social impact assessments.

Concerns about using the modelling and assumptions of other assessments, such as the air quality and traffic modelling, to inform the health risk assessment was also discussed. Supporting the suggestion from the documentary analysis, the interviews confirmed that the health assessment is often used to change or revise the information presented within those other assessments such that the final EIS report states there is negligible or no risk. Further, and directly countering community concerns about assumptions behind the data presented, informants explained that the modelling that informs the technical assessments in the EIS is based on standardised guidance and methods.

The interviews confirmed that health impact assessment is not well known outside the Department of Health and within it is not well supported. Strategic level assessments were identified as an opportunity to include health at earlier decision points in planning projects but that this is not, currently, a consideration. The importance of guidance was emphasised as influencing the requirements to include health and also EA practice itself.

### ***The importance of stakeholder positions and values***

Stakeholders’ values and positions have a real influence on how health is either included or excluded. The perception of the risks or benefits of the project to the community lies at the

centre of this. The community informants interviewed were concerned about health as a technical issue both in terms of risks to health from environmental triggers such as air quality but also changes to amenity and mental health. These technical concerns were, however, subsumed under distrust about the role of government as the proponent of projects and how this unduly influences the EA process. Community backlash appeared as an expected part of the EA process, but informants also suggested more can be done to improve communication with the community.

Government plays several roles in the process: regulators, technical advisers and proponent. As regulators the Department of Planning has a gatekeeper influence on the EA process. The Environmental Protection Agency plays an important regulatory role advising and developing guidance for the air and noise modelling that health risk assessments in EAs are subsequently based on.

The Department of Health currently plays a technical advisory role and is invited to participate, currently in an ad hoc manner, by the Department of Planning. The Department of Health was seen as having an important influence on the setting of the requirements and also the engagement of technical consultants. Currently the Department of Health preferences human health risk assessment. This is in part because the point of contact concerning EAs is the environmental health branch or equivalent, whose functions largely concern protecting community health. This preference is also because the parameters of the project at the EA/EIS stage suggest that health risk assessment is the necessary process to assess health and mitigate risks to inform the final approvals decisions.

The consultants engaged in the EIS process have a crucial influence both as coordinators of the EA process and a technical role in relation to health and other specific issues.

There was notably limited knowledge among other agencies than the Department of Health about what human health means for EA and how to assess this. It was felt that the EA process would be facilitated by an inclusion of health within the planning legislation, where the Department of Health is a statutory agency to develop policy guidance to ensure the adequate coverage of health in EA.

### **Overall conclusions**

*We conclude that EA is necessary to support major infrastructure project decisions to fully promote and protect human health, but as currently practiced is underdeveloped.* The current focus on human health risks is necessary such that these are clearly developed and presented in the EIS. However, the focus on health risks posed by environmental triggers is insufficient. Health benefits are also important to consider. Perhaps even more vital is the need for a much improved process for assessing the health impacts of stress and mental health associated with changes to local amenity and property acquisition.

Overall the interview data indicates that the inclusion of health in EA is a relatively novel development. Perhaps because of this there seems to be a lack of understanding among non-health agencies or disciplines, concerning what health is how to assess it. Including health

within NSW land use planning legislation would provide a much needed institutional mandate to improve the practice of including health in EA.

Culture and organisational capacity are key influences. The culture of the Department of Health leans toward risk assessment, and this is important. However, a fuller response from the health system would also include a broad population health agenda that focused on how infrastructure projects promote health and wellbeing as well as mitigating the risks of the projects.

There is also work to do outside the Department of Health. Guidance on health risk assessment is practiced effectively in EA given the parameters set within the requirements issued to proponents to assess environmental triggers such as air, noise and soil contamination. There are, however, opportunities for developing the practice of health impact assessment and / or the embedding of health in the assessment of other issues ranging from traffic to urban design and amenity.

Above all, in EAs and earlier decisions, recognition from health advocates that health is one of a great many issues to consider in infrastructure planning and investment would be helpful. Currently health is not considered in the crucial early decisions that then go on to surround the parameters of the EA process. More work is required to strengthen the voice of health advocates within these decisions, and also to ensure that health is included as part of the trade-offs between economic growth, sustainability and community costs and benefits.

## **Recommendations**

### **Policy and legislation**

- Insert a healthy planning objective into Environmental Planning and Assessment legislation
- Insert a healthy planning policy to govern strategic planning or plan making from state to local levels or equivalent
- Make human health an assessment criteria for State Significant Infrastructure
- Develop national 'health and transport planning' guidance or equivalent, endorsed by relevant national bodies such as the National Health and Medical Research Council or the Council of Australian Governments
- Revise the 2001 National Health Impact Assessment guidance and connect this to the 2012 Human Health Risk Assessment Guidance
- Ensure Environmental Assessment is a statutory requirement in each state and territory (and federally)
- Incorporate population health concerns, including benefits and risks to community health and potential health care costs or savings, in developing business cases and options appraisal for major infrastructure projects
- Government ensure that projects are required to include new additional infrastructure that allows for a greater choice of transport options within the parameters of new major road projects design.

### **EA / EIS**

- Departments of Planning / Transport or equivalent to develop guidance for including health in EIS requirements, focussing on
  - Triggers for engaging the Department of Health (size, risk and benefit of project)
  - Health risks
  - Health benefits
  - Wider determinants of health
  - Stress and mental health related to changes in local amenity and property acquisition; and
  - Linking to updated Health Risk Assessment and Health Impact Assessment best practice models
- Department of Health to develop a population health approach to providing input into EIS requirements
- Develop training course on the EA and EIS process for population health staff
- Engage with principle consultancy agencies about the opportunities for and guidance concerning the inclusion of health issues in EA processes (including as part of tendering)
- Provide communities opportunities for understanding the broad health ramifications of projects at multiple stages of the EA process, and the iterative nature of the decisions that are presented in the EIS
- Develop and provide risk communication training to consultants and government agencies engaged in the EA process.

# 1. Introduction

## 1.1. Background

Investment in infrastructure is a critical public policy issue in Australia as it is globally [1]. Infrastructure planning is crucial to ensure that investment achieves the maximum benefit and minimal risk to society. Transport infrastructure impacts public health through occupational health and safety, traffic injuries, noise and air quality, and the creation or exacerbation of spatial or geographic inequalities [2]. ‘Healthy’ transport infrastructure has been shown to provide opportunities for healthy behavioural choices (for example related to active transport) to reduce the population burden of chronic disease [3]. At the most basic level, the sheer size and scale of transport infrastructure projects – one of the cases investigated here, WestConnex M4 East, now has a budget estimate of +Aus\$16 billion – underscores the implications of these investments for the health and wellbeing of current and future populations. However, procedures to incorporate public health issues within infrastructure planning are not well known within the public health sector, and are underutilised for improving public health within the Planning sector.

One such procedure conducted in Australia and elsewhere is Environmental Impact Assessment (EIA). EIA is the regulatory process within 190 of 193 member states of the United Nations to prevent and mitigate the potential environmental impacts of industry development projects before these occur [4]. EIA refers to the process of identifying, predicting, assessing and mitigating the potential effects of development projects on the environment [5, 6]. The aim is to provide decision-makers with a systematic examination of the environmental implications of a proposed action before a decision is taken [5, 6]. The principal output of an EIA, usually an environmental impact statement (EIS), is information that allows the public, proponents including industry, and regulators to understand and comment on the potential impacts of a proposal [5, 6]. EIA is recognised as a ‘globally significant decision tool’ [7] providing information and analysis that allows the public, proponents such as private or national industries, and regulators to understand, and have a dialogue about, the potential impacts of a project.

Human health is increasingly recognized as a central issue to consider in EIA. Many EIA systems are built on the original 1969 National Environmental Protection Act (NEPA) in the United States, which explicitly included the words ‘human health’. The European Union has recently produced an EIA directive that explicitly emphasises protecting human health as a core objective<sup>1</sup>. The consideration of health in EIA has now been adopted by a wide range of agencies, including the World Bank Group [8, 9], the International Council on Mining and Minerals [10] and the private sector as part of the Equator Principles [11], which are financial industry benchmarks for major project lending and have been adopted by Westpac and ANZ banks in Australia and NZ. The World Health Organisation is currently producing guidance for incorporating health into the EIA process [12]. Despite this overwhelming recognition,

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<sup>1</sup> ‘The effects of a project on the environment should be assessed in order to take account of concerns to protect human health’ [http://ec.europa.eu/environment/eia/pdf/EIA\\_Directive\\_informal.pdf](http://ec.europa.eu/environment/eia/pdf/EIA_Directive_informal.pdf)

influencing the actual functioning of these systems, including under NEPA [13], to comprehensively incorporate health has proven challenging [14, 15].

In Australia an EIS is required under legislation within a broader process called an Environmental Assessment (EA). The focus here is on four EAs of large scale, government funded, transport infrastructure projects in Australia, specifically New South Wales (NSW) and South Australia. In NSW for example these EAs are required under legislation once a project is designated 'state significant infrastructure' (SSI). The NSW government has identified certain types of development that are SSI (including rail and road infrastructure) over a certain size, located in a sensitive area, or would exceed a specific capital investment<sup>2</sup>. Similarly in South Australia the Minister for Planning can declare a proposed development a Major Development if it is of major economic, social or environmental importance to the state<sup>3</sup> - although transport infrastructure is often exempt but can nevertheless proceed through an EA process, as in the case investigated here. A graphic illustration of the generic process of EAs for these types of projects is shown in Appendix 1.

The focus of this research is initially on the EIS as the principal output of the EA process, although we also considered the requirements issued prior to the EIS, the submissions in response to the EIS, and the available conditions of approvals documentation issued for each project.

## **1.2. Existing knowledge about considering Health within EA**

The concept of health for EIA has a particular history globally. Since the 1970s there has been a shift in the definition of the 'environment' to one that considers socio-economic impacts concurrently [5, 16]. There has been a similar shift in the definition of 'public health' from a focus on disease to one that incorporates health and the social, economic and environmental determinants of health and disease [17]. At the same time, health advocates have long proposed that health becomes an explicit outcome of 'environment', 'social', and 'economic' sustainability priority areas [18].

Research investigating the inclusion of human health in EAs has tended to focus on the technical quality and health considerations in EISs (for an historical overview see [19]). Crucially these content focused studies intentionally focus in on the word 'health' and rarely investigate the detail in the EISs for either the quality of that coverage or why health may or may not have been included. There are clear consistencies about content internationally however.

Environmental health concerns associated with changes to the bio-physical environment like air, soil and water quality have always been considered in EA [20, 21]. In this approach health is conceptualised 'tightly', favouring quantification and precision, where environmental factors

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<sup>2</sup> <http://www.planning.nsw.gov.au/Assess-and-Regulate/Development-Assessment/Systems/State-Significant-Infrastructure>

<sup>3</sup> <https://www.sa.gov.au/topics/housing-property-and-land/building-and-development/building-and-development-applications/major-development-applications-and-assessments>

are assessed as toxicological hazards to which populations are exposed [22-25]. However, the link between these changes and health outcomes may be implied but is not explicitly included or calculated [26, 27]. Usually the assessment focusses on public health/environmental health regulatory thresholds i.e. are the air, water and soil quality changes brought about by a project above or below regulation-defined air, soil and water pollution levels [8,9]. Health as a broader issue, for example as associated with socio-economic impacts or 'determinants of health' such as lifestyle, personal circumstances, social influences, availability and access to services and wider economic conditions [10] - is included rarely [2,8,10]. Further, EAs are unlikely to use local epidemiological health or hospital data, develop causal pathways between an environmental trigger and health outcomes, or assess the potential for projects to influence health inequalities [13, 21, 28].

### 1.3. Considering health within transport planning <sup>4</sup>

Moving out from EIA to the known links between transport planning and health provides an important overview of the potential issues to consider in decision making about transport infrastructure. The transport planning and health literature covers a mix of issues ranging from 'broad concepts', 'issue specific themes', and 'processes and procedures'.

'Broad concepts' relate to higher order issues for transport planning, potential policy objectives or drivers for decision making. As 'issues' they concern cost arguments, sustainability, equity and integrated decision making. Concerning costs, providing a mix of diverse transport options has been shown to have positive health benefits that translate into positive monetary savings [29]. While sustainability is viewed as important to health focused transport planning [2, 30-32] this is often as a criticism that sustainability has yet to be fully considered. The equity impacts of transport decisions are seen as crucial [33]. Often the people who experience the most negative effects from transport decisions are those who are disadvantaged in many other ways in society and with the least voice concerning major infrastructure decisions affecting them: women; children; the elderly, ill or disabled; those on low incomes or belonging to a disadvantaged ethnic minority [34]. Transport planning for health also requires integrative decision making across sectors and disciplines (and between research and policy) [35].

'Issue specific themes' described throughout the literature are air quality, physical activity/active transport, traffic collision/injury, noise and vibration, and social interaction/severance/access to services. The direct effects of air pollution such as impacts on cardio-respiratory health are considered to be of great importance [34, 36]. However there are many overlooked impacts relating to air quality such as policies that make driving more convenient [2]. Some links between transport and health are widely documented, such as

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<sup>4</sup> To inform the research, we conducted a literature review to understand how the peer reviewed literature positions health in transport planning and policy. The search terms for the literature review were 'health impacts' AND 'transport' AND 'Plan' AND 'Policy' OR 'Impact assessment' AND 'Review'. This returned 379 results. After reviewing titles and then the abstracts for relevance we narrowed this down to 37 relevant articles and reviews.

active travel, physical (in)activity, air quality and injuries. Others links are less apparent and appear less often including social exclusion, social capital, social cohesion and social networks [34]. Access to services and facilities are a health impact tied closely to transport [37].

Throughout the literature is reference to an assortment of processes, procedures and tools for including health in transport planning policy. The EIA process is suggested as by and large effective in considering and assessing environmental health issues such as air quality and noise pollution, although other health issues such as levels of physical activity, mental well-being and health equity are seldom considered [31]. EIA is notably mostly criticized as not taking a holistic approach that preferences quantitative prediction of environmental risks rather than social impacts, and failing to facilitate stakeholder participation [30]. Health Impact Assessment (HIA) is often cited as a solution to the limitations of EIA [32] but there is institutional resistance to adding HIA within existing regulatory EIA processes [38]. Both Cost Benefit Analysis (CBA) and Multi-Criteria Analysis (MCA) are referred to in the literature, though far less often. For example equity considerations fall into the category of indirect or wider effects of transport infrastructure projects which are difficult to evaluate by a conventional CBA [33]. MCA was suggested as an alternative to CBA as this emphasises the values and judgments of the decision maker by setting appropriate objectives, criteria, and importance weights and to a certain extent by judging the contribution of each option towards each performance criterion [33].

#### **1.4. Investigating institutional influences**

Research to date has not systematically unpacked the broader institutional conditions and mechanisms surrounding the technical inclusion of health in EIAs. This knowledge is however crucial if there is to be greater understanding about how to include human health [15, 39]. Research into EIA, though not health focused, has demonstrated that EIAs are nested within complex political decisions and processes [40]. Further, the content of EIAs is tied to a range of broader legislative requirements, policy and political decision making involving diverse stakeholders – government agencies, proponents of projects, consultants, and affected communities - with potentially conflicting agendas [41].

There is a strong tradition in social science research that allows unpacking and explaining the complex institutional conditions surrounding policy processes like EIA [for an overview see 42]. This focusses attention both on the technical conduct of specific processes like EA and broader, more encompassing knowledge about why or why not these processes are taken up. EIA research, outside the health arena, has a long history of using institutionalist approaches [43-46] and methodologies [7, 40, 47]. There has also been recent interest of this type of analysis for the built environment and urban planning more generally [48].

#### **1.5. Research objectives and questions**

Following this broad knowledge base, this research addresses the following research question:

*'How, why, and to what extent, is human health considered in environmental assessments of major transport infrastructure projects?'*



Within this question, the objectives of the research were to:

- Advance knowledge about the conditions and requirements which influence the consideration of human health in environmental assessment and project approvals for major transport infrastructure.
- Further develop methods to audit the way health is framed in major infrastructure projects.
- Apply these methods to environmental assessment and decision making processes for four major transport projects in two Australian states.
- Explain conditions and mechanisms which either allow for health to be included (in various forms) or not in these four cases.
- Develop recommendations for ways the human health imperative might be used to influence future regulation and policy making practices for infrastructure planning.
- Foster national research collaborations to progress knowledge about the inclusion of health in infrastructure planning and decision making processes.

## **2. Methods**

This section briefly outlines our methodology including analytic framework and case study approach. We also introduce the cases as well as the data sources for the research.

### **2.1. Methodology**

This project was designed around two particular focus areas. The first was to identify the extent, nature and quality of health considerations in EISs as part of major transport infrastructure EAs. The second was to explore the institutional influences on why this occurred and how practice could be improved. The primary social science methods for the project were documentary analysis and key informant interviews for four major transport infrastructure projects. These data sets were developed and then further examined using a framework developed from political science [49] and realist research [50, 51] that stratifies the data against 'structures' (institutional rules and norms), 'ideas' (the content of the EAs), 'actors/networks' (the stakeholders involved, their values and positions) and procedures (the processes within an EA) [42].

Both these methodological approaches were employed within a multiple case study design following Yin [52]. Multiple explanatory case studies focus on how and why phenomena occur, where each case demonstrates or uncovers specific findings which are then either replicated or not in other cases [16]. Importantly within such a design, 'every case should serve a specific purpose within the overall scope of inquiry' (51; p. 47). Each case was developed and then compared for replication purposes in terms of similarities and differences. This meant it was important to include cases which offered similar as well as different conditions influencing how health was included or not (see case sampling below).

### **2.2. Cases**

We had planned for two contextually similar cases to be developed initially, NorthConnex in late 2014 followed by WestConnex M4 East in early 2015, as health was noted in the

supporting documentation for each<sup>5</sup>. However, the WestConnex M4 East EIS did not become publicly available until September 2015, at which point we commenced work on this as the 4<sup>th</sup> case. During early 2015 we decided therefore to include the Sydney CBD and South East Light Rail (CSELR) as the second case. The EIS for this public transport (as opposed to road) project had been produced and had considered health issues.

The Darlington Transport Study 'Environmental Report' (October 2010) was chosen as a comparative case. While a road, the project took place in a different Australian State – South Australia – which provides a different context including different regulations and requirements. Notably the Environmental Report was the only relatively recent publicly available EA – at the time - to include the word health. This covered a large area of a major road development, and although consideration of health was not required we felt this would be useful to include in the absence of any other publicly available study. However, once we had analysed the document and made initial contact with participants the Darlington upgrade was taken off the public table for re-design and a new study. This meant we were unable to speak with any informants about the study.

A descriptive summary of the cases and their broader context is included in Appendix 2.

### **2.3. Data sources**

Documentary data collection centred on the EIS reports and where possible wider documentation surrounding the reports and stakeholder interviews. We collected the publicly available EISs from relevant government web portals (<http://majorprojects.planning.nsw.gov.au/> and <http://www.infrastructure.sa.gov.au/nsc>). We also analysed, for the NSW cases, the requirements issued to proponents by the Department of Planning that outline the issues the EIS needs to address. We also included publicly available 'submissions reports' developed by the Department of Planning for the NSW cases taken from the same website (we were unable to find the equivalent for Darlington).

We then conducted a series of stakeholder interviews with 15 informants sourced from government, proponents, consultants and affected community members (see table one). We identified 'professional' contacts initially through the EIS report or submissions made. We initially sent an email if the contact was provided, then followed this up with a phone call or message. Community members were contacted for NorthConnex and WestConnex M4 East through local contacts and via web searches for organized community groups and approached informants by email with a follow up phone call.

#### ***Table one: Interview Informants***

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<sup>5</sup> The available requirements for NorthConnex stated that an assessment of the health risks of air quality was required. The community information sheet for WestConnex M4 East stated that a health impact assessment would be conducted.

<i>Cases</i>	<i>Role</i>	<i>Contacted via</i>	<i>Interview date</i>
<b>Northconnex</b>	Community rep	Environmental Defenders Office	May-15
	Consultancy	EIS report	May-15
	Consultant project manager	Snowball	Jul-15
	EIS project manager	Snowball	Jul-15
	Health	Snowball	Jul-15
	Health	Snowball	Aug-15
<b>CBD SES Light Rail</b>	Consultant (2 at interview)	EIS report	Jul-15
	Health (2 at interview)	Submissions	Oct-15
<b>WestConnex</b>	Consultant (2 at interview)	EIS report	Nov-15
	Consultant	EIS report	Nov-15
	Health	Snowball	Nov-15
	Community rep	Community group suggested	Dec-15

Upon initial contact we provided each participant with an overview of questions to be covered. The interviews themselves were conversations [53] where informants were allowed space to develop their own ideas while we explicitly tested emerging ideas and occasionally referring back to the initial questions. Interviews were recorded and transcripts were professionally transcribed.

Data analysis was conducted using NVIVO software.

#### 2.4. Documentary analysis

We developed and applied a comprehensive content analysis framework to scrutinise the four EISs (see appendix three). This combined work undertaken previously by the team to analyse the content of EISs for health issues [19], currently unpublished work with the World Health Organisation to assess best practice considerations of health in EIAs [12], and to interrogate policy documents for their inclusion of the social determinants of health [54]. We also included a limited<sup>6</sup> discourse analysis [56] to add to the content analysis focusing on wider regulatory and strategic context, social relations as represented in the text (who did what for who), language in terms of what was represented and clarity, pre-suppositions behind the content, and intent and purpose (what was being committed to):

Analysis of the ‘submissions reports’ was done by searching for the term ‘health’ as well as noting the sections of the respective tables of contents that referred to health. Instances of ‘health’ and health-related sections were then coded and further analysed based on the specific issues and concerns (e.g. air quality, mental health and uncertainty) that were raised in submissions, as described by the report. We also searched the conditions of approval documentation for the word ‘health’ and its substantive inclusion.

We analysed the interview data initially against the a priori core units of analysis: ideas, actors, structures, and procedures. Within these codes additional findings and a multi-layered framework emerged (see interview findings section).

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<sup>6</sup> Notably this was not a full ‘critical discourse analysis’ because we have not (yet) focused, in this project, on a full analysis of the data using critical theoretical approaches see 55

## 3. Findings

### 3.1. Documentary analysis

Table one below provides a summary of the content analysis across the cases. Across the detailed analysis of each case and using our content analysis framework we were able to see whether the EIS included each category ('yes') and if this was 'extensive' or 'partial' or excluded them ('not at all'). This analysis *shows that overall health was partially considered across the cases with some cases demonstrating more detail than others*. Notably, our analysis of the conditions of approval, which are the ultimate point of influence of the EA process on the project, showed that these approvals focussed exclusively on health as related to land contamination and tunnel air quality<sup>7</sup>.

We present the findings from the content analysis case by case as the research progressed, recalling that our purpose with later cases was to compare and refine the findings developed from earlier cases. To facilitate this we conclude each case analysis with core findings to further test in the next case. We conclude this section of the report by first comparing the content analysis and then the discourse analysis across the cases.

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<sup>7</sup> Reference to health is made but this is not substantive, i.e. there is no 'health' section and reference concerns notifying or consulting with the Ministry of Health concerning soil contamination or in-tunnel air quality.

**Table one: comparisons of EISs from documentary analysis**

	NorthConnex	CSELR	Darlington	WestConnex M4 East
Health part of requirements for EIS	Yes	No	No	Yes <sup>8</sup>
Consultation with NSW Health as part of requirements for EIS	Yes	Yes	n/a	Yes
Method used to assess health	Risk Assessment	As part of Social Impact Assessment	Health referred to in regards to risk and health protection	Risk Assessment
Evidence of a broad understanding of health	Yes	Yes	Yes	Yes
Community health baseline/profile (incl the existing distribution of mortality, morbidity and health status of affected communities and vulnerable/sensitive sub-groups.)	Partially	Partially	Partially	Partially
Discussion of the potential associations and causal pathways from a ‘project aspect’ (project process or activity) leading to a possible change in one or more health determinants that are likely to cause a change in one or more health outcomes	Partially. Exposure-response relationship noted but focused on specific environmental triggers.	Partially. Only in terms of health benefits.	Not at all	Partially. Exposure-response relationship noted across a range of environmental triggers, but emphasizing air quality and not fully developing causal pathways for social impacts.
Health data and evidence: Use of health impact research evidence, qualitative and quantitative, to identify causal pathways and the significance of a health impact.	Partially. Exposure-response relationship noted but not quite causal pathways.	Partially	Not at all	Partially. Exposure-response relationship noted but not full causal pathways.
Health equity: Discussion of the possible interactions between project aspects, health determinants, health outcomes and health equity.	Partially	Partially	Not at all	Partially
Discussion of the distribution of health impacts across vulnerable/sensitive groups e.g. lower socio-economic groups, women, children, etc.	Partially	Partially	Partially	Partially

<sup>8</sup> Rather than health being required under the ‘Air Quality’ heading of the requirements as was the case in NorthConnex, health was given its own heading ‘Human Health’ in the requirements for WestConnex M4 East.

### 3.2. Content analysis by case

For each case we provide findings from the core documents analysed: the requirements issued to proponents, the EIS itself – which provides the bulk of the analysis – and then the ‘submissions reports’ developed from submissions made about the EIS. We break this down into the explicit health coverage then additional detail where health was or could have been implicit. We then focus on methods used, and from this infer the quality of the technical assessment. Attention then turns to mitigation and impact management. We conclude with a summary of the findings from each case that we then test and further refine in the analysis of the other cases.

#### 3.2.1. NorthConnex

##### Requirements

The requirements issued to proponents<sup>9</sup> required that health be considered in three ways. Firstly as part of the ‘Air Quality’ assessment, specifically considering national guidance for Environmental Risk Assessment. Second, under the ‘soil and water’ assessment it was specified that the assessment of water quality impacts have reference to public health criteria. Third, the proponent was required to consult with the state health agency (NSW Health).

##### EIS

Health was referred to throughout the EIS, primarily in regards to air quality. Health was identified as a ‘key issue’ in the EIS. The subsequent health section was directly informed by an appendix titled ‘technical working paper - human health risk assessment’. In terms of detail, health was rarely referred to in isolation of environmental hazards.

##### Health explicit

The term ‘health’ was used explicitly a large number of times throughout the document. In the ‘major issues’ section the term was used 221 times (see table three below).

*Table three: Instances that health was explicitly referred to across the sections of the EIS*

Topic or Section	No. times ‘health’ used
Traffic	0
Noise & Vibration	2
Air Quality	24
Health	150
Urban Design	2
Biodiversity	0

<sup>9</sup> The NSW Roads and Maritime Services in a public private partnership with a company, TransUrban

Social & Economic	6
Hydrology & Soils	3
Surface Water	2
Non-Aboriginal Heritage	0
Aboriginal Heritage	0
Land use & Property	0
Hazards & Risk	15
Resources & waste	2
Greenhouse Gas & Climate Change	5
Summary of Environmental Management measures	9
Environmental Risk Analysis	1

### **Additional detail**

Equity was also considered in a number of ways. The term sensitive receivers was used to refer to physical spaces where at-risk populations may reside such as aged care facilities, childcare centres, schools and hospitals. ‘Sensitive receivers’ were included in the modelling, specifically those within 20 km of the northern and southern interchanges. Children with asthma were identified as a particularly at risk group and correspondingly the technical report provides a summary of existing NSW data about asthma in children. Further, the additional literature included in the technical report included groups with pre-existing conditions, elderly people, and socially disadvantaged groups.

Health was implicitly mentioned but not explicitly detailed in the following summaries. Traffic included improvements to conditions, road safety and reliability for motorists, public transport and cyclists; improved local conditions, and improving the road network regionally. Noise and vibration suggested there may be some impacts from construction and operation that can be managed through mitigation. Air quality mirrored the health assessment but without naming health outcomes (which we return to). Further away from health as an outcome, urban design focussed on some visual impacts from construction and operation and design features to minimise these. The social and economic section outlined the 44 property acquisitions required, economic loss offset with generation of employment, and the acquisition of five businesses.

Overall the assessment asserts the project to be positive or pose negligible risks to health. For example the quantitative assessment predicts there will be a ‘net benefit’ to the community from existing conditions in terms of air quality, and a ‘net decrease in the annual incidence for the whole population of the assessed health outcomes’. Secondary health indicators (mortality) calculated for the local populations were identified as being *‘within the lower range of*

*acceptable (i.e. closer to being negligible' or (regarding diesel particulate matter and links to cancer) 'within and toward the lower range of acceptable risks'.*

The qualitative assessment is similarly positive. The asthma assessment concludes that 'an overall decrease in the number of days of bronchodilator use by children is predicted'. Similarly the in-tunnel air quality exposure assessment concludes that

*'all concentrations of individual compounds (and all components together) are below acute guidelines. Hence no adverse health effects are expected on the basis of exposures to volatile organic compounds within the main alignment tunnels'*

### **Method used**

The principal method used to assess health was human health risk assessment. This is a crucial finding because other sections in the EIS (such as surface water, biodiversity and heritage) used multiple methodologies, including cost benefit analysis, stakeholder analysis, field surveys and inspections. Chapters such as air, noise and traffic used primary modelling whereas the human health risk assessment was based on secondary analysis of the modelling from these other chapters.

However, within the paradigm of health risk assessment the analysis is of high quality. The assessment of the potential health impacts of the project, as required, used the guidance developed and recommended by the Commonwealth committee for environmental health protection matters to assess the potential health risks of air quality, and noise and vibration.

There are several other dimensions that explain the quality of the risk assessment. Over eighty additional literature sources were included ranging from primary research studies, reviews and guidance. Detailed community profile data and baseline health data were included and central to the risk analyses. Notably however the technical working paper acknowledges several important caveats to this data. The first was that *'There are few health statistics that are reported for the smaller local government areas relevant to this project.'* The profile data used is from larger areas and is *'assumed to be representative of the smaller population located in the vicinity ... given the similarity of the demographics of these populations to Greater Sydney'*. The second was the recognition that the complexities of the health of a community meant it was not possible or appropriate to identify the project as a causal source of health outcomes in the area.

The risk assessment for air quality was both quantitative and qualitative – and was highly detailed and technical. Essentially, the quantitative assessment concentrated on outcomes of exposure to PM 2.5 (mortality and morbidity) in the long and short term and PM 10 in the short term (mortality). These were broken down into acceptable and calculated incidence risk levels associated with the operation of the project and *'all changes to air quality along the ... road corridor'*. The data developed were compared against national and international thresholds. Risks were then calculated along a continuum from *'negligible'* to *'unacceptable'* (the categories are explained in detail as being conservative and thresholds are provided).

### **Management and mitigation measures**



Across all this analysis risk management (mitigation) measures are included. These range from actions to be taken by potentially affected individuals to structural changes to be made by project proponents. For example, at an individual level:

*‘Drivers who regularly use tunnels or drive in congested traffic in Sydney can minimise exposure to vehicle emissions by keeping windows up and air conditioning on recirculation’*

And structurally:

*‘There are some properties where additional mitigation measures (that include the use of low noise road pavement, replacement and improvement of noise barriers and implementation of architectural treatments on individual homes) are required...’*

There was also the recommendation that community consultation occur with those impacted individual properties where architectural treatment <sup>10</sup> is required. There was then the identification of the need for a ‘noise and vibration management plan’ for the

*‘number of individual homes ... where noise impacts in excess of the health based guidance adopted, have been identified’.*

However the details of this plan’s mitigations are recommended to be

*‘confirmed when assessed against the detailed design’.*

This suggests that further detail is required to fully understand the impact of the noise of operations on residents that are beyond that provided in the data which informed the noise assessment.

The ‘summary of environmental management measures’ section is more problematic from a health perspective. Searching for the term health here reveals limited reference to health risks (although this could reflect the assessed lack of risk). Notably, identified mitigation measures are not immediately apparent. Rather there is a section which references back to the previous section:

*‘impacts and improvements to noise and air quality / and human health risks are discussed in Section 7.2 (Noise and vibration), Section 7.3 (Air quality) and Section 7.4 (Human health) respectively.’*

### **Excluded health issues reappearing**

Two health impacts previously excluded from the human health risk assessment reappeared in the EIS. One is OH&S which was noted as being out of scope of the health assessment because of legislative requirements to assess this separately. However, there is another section under ‘workplace hazards’ on asbestos. As well as an OH&S issues, this also concerns a waste that was excluded from the human health risk assessment due to the same legislative

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<sup>10</sup> *“For properties where exceedances are up to 10 dB(A), fresh air ventilation, sealing of wall vents and upgraded window and door seals are generally considered appropriate (Architectural treatment type 1). Where exceedances are over 10 dB(A) additional upgrade of windows and doors may be considered (Architectural treatment type 2).”*

caveat. This suggests that more effort may have been warranted to consider these issues or provide more detail articulating why these were out of scope from the risk assessment.

#### Analysis of submissions report's reference to 'Health'

The responses from stakeholders to the EIS as detailed in the submissions report <sup>11</sup> provide important insight to the inclusion of health and the response to this by stakeholders including organisations (including NSW Health) and affected communities. Health impacts are noted as one of the (six) issues most frequently raised. Recalling that we focused on the word health in our analysis, the main issues across the submissions concerned air quality, especially modelling, and wider concerns around assumptions behind the analysis presented in the EIS.

NSW Health raised specific issues about air quality. The emphasis was on in-tunnel air quality exposures and also wider dispersion modelling and the consequences for health. Other submissions from individuals and community groups also mainly concerned air quality; the ventilation system and selection of ventilation outlets, and the assumptions and methods behind both the air quality assessment and the human health risk assessment. The responses to each issue invariably suggest that the assessment was done against best practice criteria and the assessment is '*robust and realistic*'.

Local level health baseline data was also raised in relation to a particular group of residents, although this then focused on measuring PM10 – specifically that '*The community should be provided with the baseline incidence rates for certain health effects*'. The response focusses on the requirements as the driver of content and then emphasises the importance of 'robust' causal arguments. The issue of local data is presented as not being meaningful, despite this being raised in the technical report and issues section of the EIS itself. The local study identified in the submission is then detailed in terms of its positive finding, and the expert input from NSW Health is argued to support no further action being taken.

There were also concerns raised about the breadth of the health assessment and questions why mental health was not considered in relation to property acquisition and community disruption. The response was that the project team have, are and will engage with the community about these issues.

#### Summary

In summary, our content analysis has shown that the NorthConnex EIS presents a human health risk assessment that is of good quality. With a view to air quality and noise the risk assessment is in line with best practice guidance on risk assessments and the technical inclusion of these risks within a health impact assessment. This focus on air and noise corresponds – particularly air – to the preferred 'health' issue by stakeholders in submissions to the EIS. Thus the focus on air quality appears to be valid and the assessment as robust as

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<sup>11</sup> Submissions are prepared by consultants on behalf of proponents in response to the Environmental Impact Statement (EIS) were accepted by the Department of Planning and Environment during the public exhibition period (a period of 60 days from 15 July 2014 to 12 September 2014). A total of 1,518 submissions were received in response to the EIS.

possible. Specifically, within the human health risk assessment community profiles are used, causal pathways developed, health data and evidence is used and presented, and the distribution of impacts on different groups is included. However, there are questions about why social issues are not connected to health, particularly mental health, in the requirements (and subsequently the analysis presented), and similarly there are major gaps concerning health in the transport section. A notable absence from the EIS is a focus on health impact assessment as a broader approach than risk assessment and, within the risk assessment, the inclusion of wider health issues beyond risks from air and noise. The other chapters demonstrate the ability to include wider methods to assess impacts than those included in the risk assessment.

That the risk assessment is based on the modelling of other technical chapters is clear and subsequently becomes a focus of submissions. This leads to questions, also raised in submissions, about whether local health baseline data would be useful for the EIS and specifically monitoring over time. This local data was however not available and the quality of this data was rebuffed in the submissions responses.

The human health risk assessment clearly meets the requirements provided to the proponent. The guidance that the proponent is required to refer to is also included in the EIS, although the notable focus is on the human health risk assessment guidance with the health impact assessment guidance seemingly not used. The conclusions presented invariably argue that the project (sometimes indicating that additional mitigation is required) will not impact on health. Notably, these calculations often seem to incorporate mitigation measures. There are some instances where mitigations cannot be developed until the detailed design is finalised (noise, for example), which begs the question about the timing of the EIS in relation to these crucial design issues.

Core findings from NorthConnex EIS content analysis to subsequently compare other cases against

The content of the requirements concerning the coverage of health issues drives the content of the EIS related to health.
Air quality is the principle health issue of concern in the requirements, the EIS, and the submissions.
If the requirements exclude wider health issues such as mental health then these are not included in the health assessment.
Equity is considered under the rubric of 'sensitive receivers'
The method of human health risk assessment that is principally quantitative, and where necessary qualitative.
Health impact assessment is not conducted.
The health risk assessment is based on modelling from the other chapters, particularly the air quality chapter.
The human health risk assessment is of high quality concerning use of guidance, robustness of analysis and arguments presented, and the development of mitigation measures.
Causal pathways from specified environmental exposures (air, noise) to outcomes are developed
There are some instances when the analysis and mitigations are limited by the timing of the

EIS within the broader EA process, such that further assessment may be required at a later point beyond the EIS.
Local health baseline data is not available, and inferences are required from non-specific health and hospital data sets. Local health baseline data may not provide a robust causal argument for a health impact anyway.
The EIS mostly concludes that the project is of no risk, negligible risk, or positive for the health of the community
Health issues are a major concern in submissions in response to the EIS

### 3.2.2. Central and South Eastern Light Rail

#### Requirements

The requirements issued concerning the Central and South Eastern Light Rail project (CSELR) mention health once, in relation to ‘Soil, Water and Waste’. Specifically this concerns land contamination. Additionally, consultation with the Ministry of Health is required, importantly including ‘Health Infrastructure’. There is an implicit health emphasis on pedestrian and cycle networks and safety in the ‘traffic impacts’ section. There is also a focus, in the ‘Social and Economic’ impact requirements, on the social and economic benefit of the project for residents, visitors and businesses.

This relative absence of health issues in the requirements, as well as the project being public transport, immediately establishes the CSELR as a divergent case of environmental assessment to NorthConnex.

#### EIS

##### Health explicit

Despite the relative absence of health in the requirements, health is referred to 275 times throughout the EIS. Unlike the NorthConnex EIS there was no explicit health section or technical working paper. However, ‘health and wellbeing’ was included in the social impact assessment as a ‘category of impact’. Health was also mentioned as one of the themes of the sustainability section. Of the 275 references to health, 99 are in relation to health facilities, with most of these instances being the Randwick health precinct. The remaining instances are predominantly a combination of references to ‘health benefits’ (26 references), ‘health risks’ (16 references), ‘health effects’ (12 references), and ‘occupational health and safety’ (12 references). These other references to health are often quite generic and limited in terms of detail. For example, as an example of ‘health benefits’:

*“Environmental and health benefits in some areas, such as reduced noise and emissions.”*

As an example of ‘health effects’ under the noise assessment, the measurement of noise impacts across different precincts affected by the project is detailed. ‘Sleep disturbance’ is used as the core criterion for this, but health outcomes of sleep disturbance are not mentioned. However, when the reference to health and wellbeing comes in at the end of this assessment this explains that:

*'The second conclusion suggests that one or two noise events per night with maximum external noise levels of 75 dBA to 80 dBA are not likely to affect health and wellbeing significantly'*

Despite this lack of detail there is evidence of a more broad understanding of the term 'health'. For example the conceptualisation of social impacts includes health and wellbeing.

Wellbeing is referred to 61 times throughout the document. This was often as a title or heading, and in some cases rather than referring to 'health' the document would refer to either 'health and wellbeing' or 'community health, wellbeing and safety'.

Despite there being many generic statements, there were more thorough instances:

*'The reduction in bus and vehicle congestion that would result upon operation of the CSELR would have associated benefits for health and wellbeing. Improved pedestrian amenity in the City Centre would also increase walking, and the increased physical activity would also have positive impacts on health and wellbeing. Construction would result in potential health issues from noise and dust along the route. These issues would be of greater concern where construction takes place close to residences or other sensitive receivers such as health and medical practices.'*

#### **Additional detail**

The layout of the CSELR EIS differs to the NorthConnex EIS, and covers various spatial aspects of the project rather than an analysis of all the impacts forming the core section. Health was considered in most detail in the social impact assessment (SIA). Health was considered in the technical economic assessment report but this did not translate the body of the EIS – which only makes reference to health buildings and health workers.

#### *The SIA and Health*

In the SIA health was included in a number of ways. A range of health focused agencies were identified as stakeholders. Health and wellbeing were included in the assessment matrix, which forms the core of the chapter, in terms of either being 'positive or negative'. There are several sections that focus on the social and health benefits of the proposal. Indeed the conclusion to the SIA is couched almost entirely in terms of health benefits of the proposal:

*'There are also significant health and social wellbeing benefits from the proposal. Some of these wider health and social benefits are:*

- *Enhancing people's health and social wellbeing [through health precincts]*
- *Improved road safety from reduced traffic congestion.*
- *Health benefits from enhanced active travel opportunities from cycling and walking.*
- *Improvements in air quality, with attendant health benefits.*
- *Health and social wellbeing benefits by providing people with access to greater employment opportunities.*
- *Health and social wellbeing benefits from increased mobility and social interaction,*

*particularly for elderly and disabled persons.'*

Equity is considered, as in the NorthConnex EA, in terms of 'sensitive receivers' (these are also referred to in the requirements). However the SIA makes a pertinent definition of sensitive receivers not only in terms of their physical proximity to the proposed project but also to their characteristics and sensitivity to impacts.

*'Sensitive receivers are defined as individuals or groups and particular land uses that may be especially sensitive to certain types of impacts. This is a term borrowed from environmental impact assessment and is not used in its conventional manner. Sensitive receivers are not defined by proximity to the proposed project but simply by reference to characteristics that may make them more susceptible to certain negative effects of a project.'*

Medical facilities are considered in this grouping as a sensitive receiver in the SIA.

#### *The economic impact assessment and health*

Health is considered in various ways in the technical report that supported the economic impact assessment. These references to health from the literature do not however translate into the body of the economic assessment matrix used to make the assessment.

The first health related section in this technical report concerns health facilities – 'hospital and health clusters', outlining the name, services, beds provided and admissions. The main section where health is then detailed is in the international literature review. The first reference included here connects health with land values with references to 'health and planning' studies in public health journals.

There is then a section explicitly linking the light rail with 'its effect on health outcomes'. This works linking the project to obesity (the reference is to an article promoting health impact assessment for public policy) through the economic costs of obesity and the role of light rail in decreasing these costs. There is then a section on the links between light rail and walking (citing 6 journal articles).

Health is then included as part of the economic assessment's review of local policy documents. This section of the EIS is tellingly more detailed in terms of specific content of the 'Draft Sydney Metropolitan Strategy' than the overview of this document in the NorthConnex EIS. The quote from the strategy is that 'active transport choices like walking and cycling... have environmental and health benefits and contribute to more attractive vibrant communities'

#### **Method used / best practice**

The principal method for considering health is considered through in the EIS is the SIA. This is done according to SIA guidance, and covers a scoping exercise, a community profile, a review of relevant policy and planning documents, an assessment of social impacts, social impact management and monitoring, and conclusions in terms of the overall impact of the project. This demonstrates a high quality example of how to insert health into an SIA as a core aspect of an EA. Against our best practice criteria, the SIA includes community baseline data, does not fully develop causal pathways to specific health outcomes, does not use health data

(although the economic assessment does reference some health data) and does consider equity. That causal pathways and health data are not utilised is unsurprising given the SIA was not directed to focus on health or use health data. Further, and different to NorthConnex, health is *not* referred to in terms of ‘quantitative’ or ‘qualitative’ approaches to measuring impacts. Rather it is considered as one criteria and set of judgments used to inform an assessment of social impacts across a range of ‘significance’ criteria ranging from ‘significantly negative’ through ‘neutral’ to ‘significantly positive’.

### **Mitigation measures**

The SIA included a table that displays the ‘rating and effect’ of potential impacts followed by the ‘rating with mitigation or enhancement’. The SIA included tables for each of the precincts to be affected. For example, in the Surry Hills precinct health and wellbeing during the construction phase is described as being ‘moderately negative’ in the ‘rating and effect’ column with ‘possible health issues from noise and dust from some activities during construction’ and as ‘slightly negative’ within the ‘rating with mitigation or enhancement’ column, also adding that

*‘the CEMP is to identify risks to health and wellbeing on a site-by-site basis and would include appropriate mitigation measures. Health impacts would be addressed as part of the CEMP, including watering exposed areas to minimize dust impacts, using non-tonal reversing indicators, and fitting construction machinery with appropriate muffling devices.’*

This wording is then reproduced in the actual Construction Environmental Management Plan (CEMP) section of the EIS.

Analysis of submissions report’s reference to ‘Health’

The ‘submissions report’<sup>12</sup> states the most common issues raised were proposal alternatives, traffic, transport and access and proposal design.

Health related organisations that made submissions included Sydney LHD, Northern Sydney LHD and Health Infrastructure NSW. Issues raised included conducting a health impact assessment, bicycle access and parking, the overall positive effect of the project on health and wellbeing, and measure and mitigations for noise and displacement of vulnerable persons in the community. The ‘Health Infrastructure’ submission entirely focused on the Randwick Health Precinct, specifically future growth and travel demand, facilities and issues for those connected to the precinct, traffic management and access, noise and vibration, and construction impacts on hospital operations.

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<sup>12</sup> A submissions report was provided by Transport for NSW with the EIS. A total of 487 submissions were received, comprising 13 submissions from government and agencies and 474 ‘community’ submissions (where ‘community’ includes businesses, special interest groups, peak bodies, community action groups and project partners that are not government agencies).

The community submissions were split into 26 'key issues'. None of these issues included the term health, however headings did include 'air quality', 'noise and vibration', 'socio-economic', and 'hazards and risk'.

### Summary

Despite not being required health is considered in the SIA where it plays a central role in the analysis and is at the core of conclusions about the benefits of the project (there is some reference to negative construction impacts). The CSELR EIS provides a useful counter to the NorthConnex EIS in that health protection issues are relatively under-considered, perhaps because these were not required. The SIA is of good quality. However, and expected due to the lack of a health requirement, health data is not used and causal pathways are not fully developed to health outcomes. Equity is notably considered, referring explicitly to population characteristics than the standard EA approach of geographically close and physical 'sensitive receivers'. In the economic assessment technical appendix, health is considered from the wider literature on evidence of economic impacts of public transport and light rail, but this does not translate into the main document.



Core findings from CSELR EIS content analysis to compare and develop against other cases

The content of the EIS is not necessarily tied to the requirements.
The perceived essential characteristics of the project drive the issues that are viewed as important in the EIS.
If the requirements exclude issues (either health protecting or health promoting) then they are less likely to be included in the EIS.
Equity is considered in terms of population characteristics
Health can be considered as part of other impact assessment chapters and not as risk assessments. Quantitative and qualitative descriptors are not necessary where the focus is on transparent development of criteria for decisions.
Health impact assessment is not conducted
Assessments of health impacts can be embedded in other chapters.
The assessment of health in the SIA is of high quality using guidance, robust and transparent analysis and arguments, and the development of mitigation measures.
Causal pathways from exposures to outcomes are not developed
There are some instances when the analysis and mitigations are limited by the timing of the EIS within the broader EA process, such that further assessment may be required at a later point beyond the EIS.
Local health data is not required
The EIS mostly concludes the project has health benefits
Health issues are not reported as a major concern in submissions

### 3.2.3. *Darlington Upgrade*

#### **Requirements**

There were no requirements issued for the environmental report.

There is however a section in the report that explains the Environmental Assessment process. This suggests there is an internal process that the proponent - the (then named) Department for Transport, Energy and Infrastructure - has developed. Our analysis of this template<sup>13</sup> shows that considering health is not included.

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<sup>13</sup> <http://www.dpti.sa.gov.au/standards/environment>

## Health explicit

The report did not contain a specific chapter or section describing the effects of the proposal on human health.

In addition to a small number of references in the introductory section (4 references to health facilities and one in a table overviewing local government documents), the word 'health' is included explicitly 26 times in the technical assessments '*Environmental effects of the proposal on the social, cultural and economic environment*' and '*Environmental effects of the proposal on the physical and biological environment*'. Wellbeing was not mentioned in these sections 'Health' was used most frequently in relation to *health facilities or services* (13 times), which was because the study area encompasses Flinders University the Flinders Medical Centre.

Health was also considered in the environmental management section. This was in relation to Air quality (10 times): 'protecting human health' and 'increased risks to human health' from pollutants (i.e. dust, odour, fuel combustion emissions), especially during the project construction phase. Health also appeared in Drainage and flooding (twice) in relation to public health and safety (Somewhat surprisingly, health was not explicit in the section of the report that deals with water quality); and in Site contamination (once) in relation to the development of a health and safety plan to lessen human exposures to contaminants during construction.

The following terms were not used in the report: community health, health endpoints, health impacts, health outcomes, health indicators, health benefits, health risk assessment, and health-based guidelines.

Health was not considered in any other sections.

## Additional detail

During the analysis we concentrated on a particular section that was revealing in terms of the potential for health to be included in the technical assessments. The 'outcomes for the community' identified were actually planning outcomes focused on aspects of the built environment such as a transport interchange rather than outcomes for impacted communities (such as their health).

Health was implicit in several of the project-specific objectives, for example

- *Achieve sustainable transport outcomes incorporating integrated land use and transport that encourages an increase in public transport usage, walking and cycling; and travel behaviour that is less dependent on single occupant vehicles, and social living requiring less travel by motorised vehicles.*
- *achieve safe and efficient movement of people and goods, including for freight traffic*
- *integrate communities and social cohesion*

Health was also implicit in the sections on landscape, visual amenity, and urban design, vibration and noise. The report notes that visual changes to the landscape are likely to affect humans and that people tend to place a high level of importance on visually attractive and usable environment[s]. However, the link between an aesthetically pleasing and usable environment and mental health and wellbeing was not expounded. The report does though identify annoyance effects arising from human exposures to vibration and noise.

In the socio-economic section a number of issues relevant to health were discussed including community severance, regional connectivity, safety and accessibility. The implications for human health were not however discussed. Nor was health explicit in the proposed cycling and walking plan within the traffic and transportation section.

There is also a section on community consultation (with stakeholders, residents and businesses). Health is not reported as being raised as an issue. Accessibility, visibility, local business generators, car parking, possible relocation, and future expansion are reported as the main issues arose. Further 'general' issues cover improved connectivity, improvement and extension of transport options, current noise levels, open space, car parking, safe access for cyclists and pedestrians, and an emphasis on mixed use density.

### **Method used**

The limited inclusion of health as an assessment topic (either separately or as part of other issues) meant we could not analyse the report against the best practice categories for including health in EA. Health in the Darlington Transport Study environmental report was discussed in terms of risk and protection from environmental pollutants as per the commonwealth and state legislation, standards, and guidelines for assessing and managing environmental pollutants (e.g., dust, odour, noise, vibration). The models used to assess potential changes in air quality and thus infer levels of risk to human health, were developed and/or approved by reputable organisations (e.g., CSIRO, AusRoads, US EPA), and used data (quantitative only) inputs from multiple sources. Based on the modelling, it was predicted that the DTS transport proposals would have a limited effect on air quality. Measures to minimise any 'nuisance' or detrimental health effects from dust during the construction phase were proposed in the context of 'good management practices'. Crucially, in the air quality assessment health is the principle 'effect' but these 'outcomes' are not detailed in the same way as they are in the two NSW road project EISs.

Aside from crash related mortality and injury data, which was used to assess the safety performance of the current road system, there was no other evidence that health-related statistics were used in the environmental assessment.

The section which considered the impacts of the transport proposals on existing socio-economic conditions in the study area described the demographic profile of the area. Although data describing the health of the population in the study area is available, it was not considered in this section.

Equity is referred to under 'sensitive receivers', and appears to be the standard approach to defining physical points close to the project.

## Mitigation measures

Mitigation measures are detailed in each of the relevant sections and a detailed environmental management plan is provided for construction and operation. This contains ‘management objectives, Actions, and Timing’ for each of the impact areas. Similar to NorthConnex, some of the mitigations involved ‘extensive consultation with [affected] stakeholders to determine appropriate mitigation measures...’ Some mitigation measures appear unachievable in relation to guidance, however. For example

*‘The proposed mitigation measures may not necessarily meet construction noise goals specified by Operational Instruction 21.7 at all times. However, they should reduce noise to levels that most noise sensitive receivers would find acceptable.’*

## Submissions report

This was not available for analysis as of February 2016.

### Summary

The environmental report, while not required under legislation (see Appendix X), is similar in structure and substantive detail to the other EISs analysed. However, where health is included this principally concerns risks, with little depth of analysis when compared to the other cases. A pertinent example is the inclusion of health as an ‘effect’ of changes to air quality but where an assessment of health outcomes is not then made. Sensitive receivers, geographically defined, are paid attention to. Mitigation measures suggest that the study occurs at a single point in time that may not fully capture the complexity of local issues when the project begins. This is likely to be because health was not required or did not form part of the standard business of EA for the government proponent.

### Core findings from Darlington content analysis to compare and develop against other cases

While exempt from requirements, when health is not tied to a best practice template health issues will not be considered
Air quality is the principal health issue of concern in the EIS.
If the best practice template excludes wider health issues such as mental health then these are not included in the health assessment.
Equity is considered under the rubric of ‘sensitive receivers’
Health does not have enough attention to warrant a method.
Assessments of health impacts can be embedded in other chapters.
The assessment of health is not considered in sufficient detail to assess quality.
Causal pathways are not considered
There are some instances when the analysis and mitigations are limited by the timing of the environmental study within the broader EA process, such that further assessment may be required at a later point beyond the environmental study.
Local health data is not required but is available.

There are no conclusions concerning health outcomes. The environmental report does state that the project will have limited effect on air quality.

(Submissions not available)

### 3.2.4. WestConnex M4 East

#### Requirements

The requirements (amended in June 2015<sup>14</sup>) issued to proponents (The NSW Roads and Maritime Services) required a specific ‘Human Health’ chapter. This was required to assess human health focusing on minimizing adverse health impacts, the operation of the tunnel, health risks and costs associated with air, noise, and social impacts, and use of health risk assessment guidelines. Additionally consultation was required to include NSW Health including Local Health Districts.

#### EIS

#### Health explicit

Throughout the WestConnex M4 East EIS the term ‘health’ was referred to 686 times (the most of the four cases). There is a specific human health chapter – supported by a technical human health risk assessment appendix - which is split into subheadings: assessment methodology, existing environment, assessment of construction impacts, assessment of operational impacts, assessment of social impacts on health, changes in noise, changes in community, assessment of cumulative impacts and management of impacts. In the ‘major issues’ section the term was used 249 times (see table \* below).

Topic or Section	No. times ‘health’ used
Traffic	0
Air Quality	22
Noise & Vibration	2
Human Health	159
Property and land use	2
Urban design and visual amenity	0
Social & Economic	20
Soil and water quality	5
Contamination	13

<sup>14</sup> The requirements that were issued in January 2014 had the health risk assessment under the heading ‘Air Quality’. These requirements were amended in June 2015 and health was given its own heading.

Flooding and drainage	0
Groundwater	7
Non-Aboriginal heritage	0
Biodiversity	3
Greenhouse gas	0
Aboriginal heritage	0
Resource use and waste minimisation	3
Climate change risk and adaptation	1
Hazards and risk	6
Cumulative impacts	0
Sustainability	3
Environmental risk analysis	3

Overall, compared to the other cases, health is considered as a broad concept covering a range of other issues as determinants of health. The following demonstrate this:

*‘The assessment of health should include both the traditional/medical definition that focuses on illness and disease as well as the more broad social definition that includes the general health and wellbeing of a population.’*

Notably there are statements that qualify health as ‘directly’ and ‘indirectly’ connected to health and wellbeing of the community as well as equity in terms of differential distribution of impacts in the community against population characteristics.

These definitions lead to, dissimilar to the other cases, the inclusion of the section titled ‘Assessment of social impacts on health’. This section is noticeably smaller in size than other parts of the Human Health chapter and broad statements are often made with little follow up or connection to health outcomes. The chapter is split into four sections: changes in traffic (including public transport and pedestrian and cycle access), changes in air quality, changes in noise, and changes in community (including property acquisition and access). For example, the ‘changes in community’ section of the HHRA includes property acquisition and access as well as visual changes to the environment. This section refers to the Social Impact Assessment (SIA) and states that social impacts will be a ‘major short term impact...’ for those who can relocate, but ‘may involve an extended recovery time’ for those who are unable to relocate. This is then explicitly linked to health through a statement about increased levels of stress and anxiety.

The emphasis of the health assessment is on air quality, connected very closely back to the air quality chapter and is similar in approach and detail to NorthConnex.

## **Additional detail**

Equity is considered throughout the document. Straddling sensitive receivers and population characteristics, the term 'community receivers' is used to describe locations in the local community where more sensitive members of the population may spend a significant period of time. These locations include hospitals, child care facilities, schools and aged care homes/facilities. The human health chapter also identifies the potential for greater vulnerability of certain groups of people and when referring to the stress of relocating houses. The chapter also goes on, supported by guidance, to identify asthmatics, children and the elderly as being particularly sensitive when it comes to exposure to nitrogen dioxide.

Both public transport and active travel are referred to frequently throughout the document (48 and 227 times respectively). Indeed one of the ten objectives listed for the project is to 'create opportunities for urban revitalisation, improved liveability, and public and active transport (walking and cycling) improvements along and around Parramatta Road.' Despite this though, these dimensions are not core features of the proposed new infrastructure, but are described as benefits and as potential opportunities with the assumption that the project will result in less traffic and congestion on Parramatta road.

Amenity is featured in relation to health (indirectly but 'strongly').

## **Method used**

Like NorthConnex, the assessment method for the WestConnex M4 East is linked back to the national guidance on Health risk assessment (2012) and Health Impact Assessment (2001). The detailed technical assessment which informs the human health chapter is provided in an Appendix which is given the title 'Human Health Risk Assessment'. Also like NorthConnex it was notable that the other technical assessments - biodiversity, groundwater and economic and social impacts - used a wider selection of methods including cost-benefit analysis, stakeholder analysis and field surveys.

The health risk assessment appears to be technically robust using our criteria. There is use of health data and information, consultation with NSW health, use of community baseline data, and regular references of the exposure-response relationship between air pollution, noise and vibration, and health. Guidance was used to evaluate the health impacts of the project both in the construction and operational phases and relate to changes in air quality around the tunnel, changes in the noise environment and changes in the social environment.

Baseline health data is included via a detailed 'study area' and then 'existing environment', presented with a profile of the community including the location of 'community receivers', the existing health of the population, as well as health indicators. There is a section which details baseline and then local monitoring of environmental triggers both for air quality and noise. There was some local data for local government areas concerning psychological distress. However similar to that of NorthConnex, the lack of local data is noted in the report by the following (that also questions its reliability):

*‘For the assessment of potential health impacts from the project, where specific health statistics for the smaller populations within the project area is not available (and not reliable due to the small size of the population), adopting health statistics from the whole of NSW is considered to provide a representative, if not cautious (e.g. over estimating existing health issues), summary of the existing health of the population of interest.’*

Almost identically to NorthConnex the HHRA acknowledges that the complexities of the health of a community mean ‘it is not possible or appropriate to identify the project as a causal source of health outcomes in the area’.

The social / air quality analysis also uses data from the 2011 Census to focus on socio-economically disadvantaged suburbs, concluding that the proposal will not adversely affect these communities.

Also similar to NorthConnex the noise and vibration assessment is less detailed than the air quality assessment. This part of the HHRA looks at existing noise levels, background noise levels and health outcomes relevant to noise. Guidance from statutory agencies such as the EPA is referred to both in relation to the construction and operation of the project.

Cumulative health impacts are also included, with the human health chapter. Referring to the analysis presented technical appendix this brief section concludes with the observation that:

*‘no single element or determinant acts in isolation. Health and wellbeing in the urban environment depends on the sum of the total interactions between many factors. Where negative impacts have been identified, these impacts are either short- term (during construction only) and/or appropriate mitigation or management measures have been identified which would minimise impacts on the community.’*

Turning to the appendix, these cumulative impacts are assessed against detailed modelling over 30 years in relation to air and noise. The conclusion about air is that there will be some benefit to the local community although there may be ‘local incremental impacts’ (mortality and morbidity). The cumulative health impacts from noise are less detailed, finding that:

*‘As there is a more detailed design phase still to occur for this project the noise assessment has developed exceedance categories and guidance to be applied to manage cumulative noise.’*

### **Mitigation and management measures**

Like NorthConnex mitigation and management measures range from actions to be taken by potentially affected individuals to structural changes to be made by project proponents. An example at the individual level mitigation is the suggestion that noise and vibration effects will be mitigated by keeping ‘external windows and doors shut and have minimal use of outdoor areas.’ Structurally, the project includes the construction of noise barriers to minimise road noise impacts, and provision of low noise pavement for new and modified sections of the existing M4.



The overall assessment that suggests that in relation to air, and noise and vibration the impacts of the project will be negligible is reliant on the suggested mitigation measures being in place. For example there is acknowledgement that

*‘significant mitigation of noise and vibration impacts is required to be implemented during the construction phase of the project to ensure there are no impacts on the health and wellbeing of the local community.’*

However, like NorthConnex, the noise and vibration section of the HHRA states that the full extent of mitigation measures is dependent on ‘future detailed design works for the project’.

#### Analysis of submissions

The ‘submissions report’<sup>15</sup> states that human health was one of the 10 most common topics raised in submissions. NSW Health raised issues across air quality (including validation of the model), noise and vibration (including potential construction and traffic noise) and socio-economic impacts (including population projections used in modelling). Across the other submissions when the term health was raised, several interesting or overarching themes became apparent. These include a general concern with measuring risks and the uncertainties underpinning this.

Incremental risk is another point raised in relation to the assumptions underpinning the human health risk assessment. This is a very technical issue but relates to the human health assessment not using the correct short term exposure data (the charge was that annual exposure data was used). The response was that the ‘checked’ methodology calculated ‘the risk for every short term change and summed these up over a year for specific receptor’, as presented in the EIS. Also concerning incremental risk another submission zeroed in on the issues with modelling impacts from the project against existing background data. This, it was argued, compromises the dispersion modelling (on which the human health risk assessment is based). The response refers to the uncertainties that are inherent in model predictions, suggesting that this is the current state of knowledge.

Uncertainty over the estimation of risk was also raised, especially concerning air quality (but also noise in other submissions), with the preference of quantifying risks made on the basis of modelling in other chapters. The response acknowledges that uncertainties do exist in modelling in EISs, and refers back to the requirements not asking for a quantitative assessment and the EIS providing as comprehensive overview of management measures.

The issue of incremental risk in relation to air quality is also raised in another submission which asks for clarity over the air modelling methodology. The response suggests other combustion sources are the cause of the PM 2.5 as agreed by NSW Health under the NorthConnex EIS.

One novel suggestion was that the health assessment should move up a level away from the project and back to the design options phase that occurs before this to focus on alternate

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<sup>15</sup> A total of 4,903 submissions were received by the Department of Planning and Environment. Nine submissions were from government agencies and seven from local councils.

exposure scenarios to the ones presented in the EIS. The response ignores the question about options and refers the other issues to the technical detail provided in the EIS.

Public and active transport facilities were noted as being absent from the EIS. Supporting our analysis above the response was that there are some facilities are included where existing infrastructure is impacted on by the project and that the project will link into additional activities by the NSW Government.

The absence of an assessment of mental health impacts was also raised. The response is couched in terminology about the complex indirect relationships between the project and health, and that appropriate mitigation measures have been offered.

Equity is also specified in a submission focusing on vulnerable individuals, with the need for tailored mitigation measures identified. The response suggests that further community engagement is necessary.

### Summary

The WestConnex M4 East EIS is the most detailed of the four cases concerning health issues. The assessment of air quality and noise and vibration is similar in detail to NorthConnex. Noticeably this is the only case to have explicitly assessed health and social issues. While the detail for these sections is not as developed as the detail in the air or noise sections, this suggests that this type of broad assessment of health is possible and valuable for an EIS and EA more broadly. Equity via distribution across population characteristics similarly demonstrates that this type of assessment has utility for EA.

The EIS notably contrasts the assessment of direct effects on health from air and noise with indirect social and equity focused assessments (which include the differential environmental exposures to air and noise and property acquisition and amenity). This indirect analysis is also the reason given for not including mental health issues to the extent requested in submissions. The problem here is that this is a contradiction that suggests that it is possible to conduct a broader health assessment than risks under air and noise (both direct and indirect through social disadvantage) but the methods are not yet well understood or employed.

The risk assessment under air and noise is of high quality against our content analysis criteria. That there were questions over the modelling and assumptions in submissions do however suggest greater clarity may be required concerning the links between the health assessment and those inputs.

There are also similar questions as with the other cases concerning the timing of the EIS in relation to some mitigation measures – particularly around noise and vibration - that can only be detailed when the more detailed design is produced.

References to active transport (cycling, buses) are more prominent than in NorthConnex. However these are emphasised as only being relevant in terms of actions where they are impacted upon by the project. Other additions supporting infrastructure is explicitly noted as being the responsibility of the NSW government away from, but connected to, the functioning of the project. Like NorthConnex this seems to be a missed opportunity to connect the

parameters of the project to infrastructure that has known and documented health benefits (as in the CSELR EIS case).

Core findings from WestConnex M4 East EIS to compare and develop against other cases

The content of the requirements concerning the coverage of health issues drives the content of the EIS related to health.
A broad range of health issues are the concern of the EIS and considered in the human health chapter.
If the requirements exclude wider health issues such as mental health then these are not included in the health assessment.
Equity is partially considered in terms of sensitive receivers and population characteristics
The method of focus is human health risk assessment that is principally quantitative, and where necessary qualitative.
Health impact assessment is not conducted
The health risk assessment is based on modelling from the other chapters
The human health risk assessment is of high quality concerning use of guidance, robustness of analysis and arguments presented, and the development of mitigation measures.
Causal pathways from exposures to outcomes are partially included
There are some instances when the analysis and mitigations are limited by the timing of the EIS within the broader EA process, such that further assessment may be required at a later point beyond the EIS.
Local health baseline data is not available, and inferences are required from regional health and hospital data sets.
The EIS mostly concludes that the project is of no risk, negligible risk, or positive for the health of the community
Health issues are a major concern in submissions in response to the EIS

### 3.3. Cross-case comparison

#### Content analysis comparison

This section of the analysis has unpacked the content of the EISs from each of the four cases. Our summary observations across this analysis are presented here, in line with the core findings that have been emerging case by case.

Overall the content analysis shows a shift in the practice of including health in EISs across the cases. This was clearly tied to the requirements that drive the EIS in the cases of the road proposals, but less so with the light rail. NorthConnex and WestConnex M4 East EISs were the two cases that had a requirement for health issued. The latter was the only EIS required to have a detailed health assessment as a standalone section. That WestConnex M4 East went on to produce the most comprehensive information about health both in terms of direct and indirect impacts suggests that these requirements play a crucial role. The issue of mental

health, and its absence from analysis in the EISs, suggests that where such issues are excluded from the requirements they are also likely to be excluded from the EIS itself. There is, therefore, something important that requires further exploration concerning the requirements. The requirements, fortunately, were a major point of discussion in the interviews and we are therefore able to explore the making of and the influence of these in that section.

The emphasis across the road EISs focussed on or emphasised the health risks of air quality and to a lesser extent noise. The human health risk assessments conducted in NSW for this assessment are of high quality, and in that sense fulfil the requirements. However, the other technical chapters and the socially oriented assessments in the WestConnex M4 East EIS, coupled with the SIA and Economic Impact Assessment sections in the CSELR EIS demonstrate that health can be more broadly considered to bring in both social issues and positive impacts to do with active transport. Further, the two road projects and to some extent the CSELR demonstrate that health equity can be a useful consideration for EISs where sensitive receivers are defined based on population characteristics rather than solely physical locations such as buildings or services. Notably we concluded that despite the inclusion of these social and equity issues in the three NSW EISs, this was still 'partial' because the analysis was not as detailed as it could be in terms of using health data to develop causal pathways between exposures and particular population groups.

The evidence suggests that health was assessed within a risk assessment framework that is necessary, but not sufficient, to comprehensively explore all of the health impacts of large scale transport infrastructure projects. The emphasis on qualitative assessments as a secondary choice was also noticeable. The default towards using national guidance on human health risk assessment rather than health impact assessment is similarly telling and suggests there is some wider institutional preference for this focus. Health impact assessment and health risk assessment are related but not the same [57]. Health impact assessment frameworks incorporate quantitative and qualitative risk assessment methodologies at their centre while allowing for a greater scope of issues to be put on the table at earlier points and with wider boundaries than risk. That the national guidance documents for both health risk and health impact assessment are used in the requirements for the proponent to base the assessments on suggests there is power in these documents to influence practice. However, the national guidelines for health impact assessment have not been updated since 2001 whereas the human health risk assessment guidelines were developed in 2012. This suggests there is lack of federal interest in updating these health impact assessment guidelines which is unnecessarily limiting the scope of health related issues to be assessed in EAs.

There are also questions about relying on the modelling from other technical assessments – notably air but also noise and traffic. This may be a necessary part of human health risk assessment but leaves questions remaining as to why this is the case and is this sufficient. The EISs also had a total absence of local health baseline data which challenged some of the assumptions and certainties around local impacts (extrapolating from larger populations is noted as being problematic). There were also suggestions about the adequacy of this data to ascertain a causal argument even if it were used, however.

The analysis also suggests that the EIS is a static document that presents a particular snapshot in time rather than a process of deliberation to arrive at a project design that is of minimal risk. Firstly was that the EISs often stated the project will have negligible impact or be beneficial, and often it appeared that mitigation measures were incorporated into these conclusions. Secondly, across each case there were some mitigation and management points made that depend on a more detailed design or additional community engagement. Given the intent of an EA (see below) is to detail the design aspects of the project for closer scrutiny, more could be made of the process of arriving at negligible health risks.

Finally, the submissions to the two NSW road projects clearly emphasised health as a core concern (recalling we were unable to access the submissions report from Darlington. The CSELR submissions did not appear to raise health explicitly, although as noted socioeconomic and air quality issues were raised. Overall, these submissions suggest that health should be considered in detail in EAs.

#### Discourse analysis across cases

We conducted the discourse analysis for each case. However there were very close similarities across cases which negated the need for a case by case discourse analysis. Here we detail the findings against each discourse analysis area: the regulatory and strategic and business case context, social relations, language and clarity of presentation, pre-suppositions (conceptual drivers), and the intent in terms of what is being committed to in the EIS. We summarise our findings from each to conclude that despite the EISs being fit for purpose in terms of presentation of information and evidence, the wider context is currently limiting the inclusion of health issues.

#### **Regulatory, strategic and business case context**

Each NSW EIS, bearing in mind Darlington was exempt from regulation, refers back to the regulatory context for the proposal (see Appendix 2). Of crucial importance however is that the environmental planning legislation referred to as the stated regulatory driver for the EAs does not refer to human health.

Other State and Commonwealth relevant legislation is also introduced, none relating to health.

Each case additionally refers back to state planning policies. While it is noted that these policies do not apply to this type of project, there is the statement that 'consistent with good practice EA' various provisions within these were considered. Health does not feature these policies.

There are however clear overlaps in all cases between strategic planning policies and health. For example the NSW cases refer to the draft 'Metropolitan Strategy for Sydney' which has 'strong, healthy and well connected communities' as one of four goals. This however minimally referred to in the EISs. All cases rather appear to preference the terms 'liveability' and 'connectivity' and in some instances 'sustainability'. These terms pepper the language used in relation to the other strategic policy drivers (for example Darlington refers to the NSW

Transport Infrastructure Plan and the South Australian Strategic Plan and 30 year plan for Adelaide).

Local environmental plans <sup>16</sup> from relevant local councils are treated similarly. Human health is not mentioned.

Each EIS contains sections on the history of the proposal in terms of its 'strategic assessment', usually encompassing a business case and options development. This is a crucial finding that suggests the EA process incorporates these economic oriented decision making processes that then determine the project and then the EIS. Health is not mentioned in any of these sections of the EIS reports, suggesting this is currently not a point at which health is considered in the EA process. Various decision making processes are identified. For example in the CSELR case 'Multi-criteria analysis' was conducted using qualitative and quantitative indicators and 'rapid economic appraisal' (economic costs and benefits) methods are described as being used to assess 26 light rail routes developed. In most of the cases the actual indicators used in these process is not detailed. However, in the CSELR it is reported that during the economic appraisal a 'benefit-cost ratio' that included 'health benefits' was conducted that resulted in approximate benefits of the project being Aus \$4 Billion.

Going back even further, the tender process for designing and constructing the project itself may be an opportunity for health issues to be considered in EA. In NorthConnex for example the tender process (which was the first unsolicited bid in NSW history) is detailed as being a closed, rather than open and publicly available, process. However the EIS states that three tenders were considered and systematically compared, where the preferred tenderer was chosen based on a 'balanced consideration of engineering design requirements, project cost (including upfront capital expenditure and ongoing operational expenditure), and environmental and social impacts'. 'Air quality and health' was a sub-category of the environmental and social evaluation.

### **Social relations – who did what and for whom?**

The EISs represented a particular action - to assess the impacts of a proposal - which in turn was based on various relations between the government, the proponents, and consultants employed to undertake the EA and write the EIS. Each EIS was written by a particular consulting agency, AECOM in the case of the road projects and Parsons Brinckerhoff for the CSELR, for the 'sole use' (in copyright terms) of the proponent. These coordinating consultants conduct the work following a competitive tender process. The requirements for the EIS are issued by the Department of Planning or, in the case of Darlington fit with the proponent's own template. Crucially the proponent in each case was a government agency, through a mix of state and federal government funding. In one case, NorthConnex, the proponent was made up of a public private partnership. Additional consultants were commissioned by the proponent and the coordinating consultants to undertake specific aspects of the EA to inform the EIS, the human health risk assessment being one example. The EIS is then provided by the proponent to the planning authority and Minister for approval.

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<sup>16</sup> Noting that the NSW EISs point that the minister *may*, but is not required to, take these into account

The EIS process necessarily means that stakeholders including government agencies and affected communities are consulted as part of the process. These consultations occur across the EA including the tender stage, exhibition of the preferred design, and the content presented in the EIS and detailed in a particular chapter about consultation. Exactly who was consulted varies in terms of transparency. For example the wider community in the Darlington study was reported as being 20 businesses that focused on the impacts on local business.

### **Language: What is represented / Clarity of assumptions, analysis, conclusions**

The language used differs slightly but consistently across the EISs and was generally of a high quality in terms of transparency and provision of informational detail and data analysis. The executive summary and introduction sections were clearly written in plain language to provide an objective overview of the main aspects of the project history behind the project, and details of the EIS process itself, links to legislation and then key issues (including health where this is considered). These early sections made it clear, using the language from the later technical sections, that the project will result in negligible impacts or be beneficial.

The language shifted in the section detailing key issues. Here it became a presentation of technical information and scientific writing. As noted the reference to health is more or less generic in these sections depending on the case and the focus of the analysis (air quality being more detailed than noise being more detailed than social issues). There were mostly high levels of detail about the modelling used as well as the assumptions, and uncertainties, inherent in the analyses.

### **Pre-suppositions – what were the policy and other assumptions that drove the content of the EIS?**

Across all the cases the pre-suppositions driving the projects were a mix of striving for economic growth above all but balancing this with sustainability, liveability and the impact on local communities. Indeed this balancing became the purpose of the EIS. There was substantial evidence of these pre-suppositions throughout the introductory detail supporting the rationale and detail of the projects.

A notable conceptual presupposition is that an ‘outcome’ may be considered differently to planners (or development assessors) than health professionals. For example the Darlington study characterizing the ‘Overall benefits of the DTS transport proposals’ as changes to the physical area (integrating a major transport hub, higher density redevelopment in adjacent areas’). These are then connected to ‘planning outcomes’ in the next paragraph, which noticeably did not shift toward a consideration of outcomes in terms of communities:

*‘Land use patterns designed to effectively accommodate public transport have a fundamental effect on how well public transport services can be delivered and utilised. Improving connections between transport modes, increasing efficiency of service and reducing local congestion would help deliver these outcomes in addition to providing broader network benefits that improve freight efficiency and connectivity between the north and south of metropolitan Adelaide.’*

## **Intent / purpose: what was being committed to in the EIS?**

The EISs are very clear on the intent and purpose of the project (and the purpose of EIS within this). As noted several sections focus on the various policy options and alternatives that led to the project parameters in terms of geographic positioning and design. Design refinements are then detailed focusing on the physical features of the proposals in great detail across various chapters. Overall the EISs are committing the detail of the proposal to scrutiny as well as providing an overview of the risks and potential benefits to the community.

There is one notable element given the knowledge about the connections between health and active transport. This concerns the commitments made by the proponent (recalling this is the government) to upgrading or including new infrastructure. The two NSW road project are particularly problematic examples here.

In the NorthConnex EIS there was a section detailing the current situation and future public transport improvements and the ways the project provides an improved environment for public transport locally and regionally. However, this section concludes with the statement:

*‘These potential public transport improvements do not form part of this project and would be subject to separate planning processes and approvals as appropriate.’*

This comment (also highlighting the comment above about the project encouraging greater use of existing infrastructure) is particularly noteworthy when the section on ‘existing environment’ is scrutinised. A table is provided that outlines ‘existing key intersection arrangements’ where, at two of the three intersections the comment is made that ‘no dedicated cyclist facilities are provided’.

The WestConnex M4 East EIS provides, like the other cases, a very detailed description of the project supported with maps and other visual details. As part of this description, and in contrast to NorthConnex, there are a number of ‘healthy infrastructure – cycling and walking and public transport’ commitments made. However, upon further scrutiny, the EIS suggests that the project will only upgrade infrastructure that is impacted upon by the immediate boundaries of the project (i.e. no new infrastructure will be provided)<sup>17</sup>. Further, the suggestion is made that the NSW government is currently taking responsibility for this infrastructure through other projects:

*‘Public transport and rail freight options are seen as complementary services supporting the project and the broader WestConnex scheme, and the NSW Government is currently implementing a number of public transport and rail freight projects.’*

The light rail is a pertinent comparison case: the EIS not only demonstrates the health benefits of light rail as a transport infrastructure option but commits the project to providing new health

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<sup>17</sup> The project approval conditions for WestConnex M4 East confirm that only existing infrastructure impacted upon by the project will be upgraded [http://www.planning.nsw.gov.au/News/2016/WestConnex M4 East-M4-East-project-approved](http://www.planning.nsw.gov.au/News/2016/WestConnex%20M4%20East-M4-East-project-approved)



promoting infrastructure surrounding the project itself. Similarly the Darlington study commits to providing a high quality cycling and walking environment through on and off road facilities.

#### Summary findings from the discourse analysis

The regulatory and statutory context behind these EAs does not support the inclusion of health in the EA and EIS processes. There are however clear connections to human health with the regular reference to liveability and connectivity, and this seems to be a conceptual entry point from a healthy planning perspective. Similarly the development of the options and business cases, and even the design and construction tenders, are crucial opportunities for input into the EA that are currently underutilised.

A concluding observation from the social relations analysis is that the government is the principle proponent behind the project and EISs. This opens up some scrutiny to the EIS process in relation to the focus of government related to projects and their benefit or cost to the community. Further, the limited number of coordinating consultancy agencies suggests that, despite a competitive tender process, the market for these agencies may be small. These consulting firms, then, appear a useful vehicle to connect with about human health issues in EAs. The Department of Planning has a regulatory role in setting requirements and determining approval for the project which suggests this government agency is also a core institutional point for influence.

The way the EISs presented information fulfils their purpose as an explicit overview of the proposal for wider scrutiny by stakeholders including the community. The mix of information provision and technical detail is commendable, even though this makes for extremely long (up to 7,000 pages) documents. The major suggested caveat is that the EISs appeared to represent one process within a longer stream of activity with this not adequately captured as a process.

Our analysis of the pre-suppositions suggests that health could quite easily have been inserted as a core aspect of decisions driving all the cases. This could have been done both as an aspect of economic growth and the balance of this with liveability and its principle mechanism, connectedness through improved transport infrastructure. That health is not included in this manner, as with the other cases, leads to questions about whether health is recognised or understood as a core value underpinning these goals that can then morph into a useful technical addition to the assessments.

#### Conclusion

In conclusion, the EISs are very clearly and competently fulfilling their purpose as transparent documents that allow public scrutiny of the projects being proposed. Over time it is entirely possible that EISs can weave strong technical health assessments (in the same manner as the health risk assessments) either into specific chapters or within other technical assessments. This would bring a shift towards people-focussed outcomes as well as the focus on various environmental exposures and built environment 'outcomes' that currently characterise the main emphasis in EISs.

The EISs also clearly articulated higher level policy decisions about infrastructure that would benefit from a health argument or health evidence being included. The CSELR demonstrates that there is a health cost (benefit) argument that can be made at these earlier decisions, although this was underdeveloped for that project. The apparent cherry picking of issues taken from various strategic policy documents to support the need for the project and then its parameters became clear through the discourse analysis across the cases. Broad health arguments are, perhaps, oriented to supporting investment in public transport rather than roads and this may be the ultimate institutional barrier to having health considered broadly either at these earlier points or at the requirements stage.

There are also questions that can be asked of government – state and federal - concerning the parameters of the projects. The emphasis on the asset appears to be the only issue of interest for each of the road projects, with additional infrastructure being outside the responsibility of that project. It is of concern that tempering these major investments that clearly have major implications for health and wellbeing – as detailed in the EISs – are not required to provide or upgrade existing infrastructure surrounding the project.

Finally, there are some issues with focussing solely on the content of the EIS. These documents appear to be a snapshot in time when the reality of planning, and the broader EA process as part of this, appear to be less ‘fixed’ and more flexible. The EISs present a very favourable picture about the projects and their impacts on health, usually stating that these will be negligible. Digging deeper however, the text usually explains that this is based either on the modelling provided as it links to health outcomes and / or because mitigation measures have been incorporated into the analysis. This presentation seems to be missing some detail about the process of arriving at those final figures and conclusions about health. Further, there are instances when mitigations cannot be developed in the absence of more detailed designs. This seems to leave the assessment hanging in limbo when there are likely to be negative local impacts that require mitigation (noise during construction for example). It is unclear at what point this design will be available and the default to focus on community engagement as the mechanism to deal with these uncertainties seems insufficient. Overall, there appears to be a flexibility in the EA process over time that is not adequately represented in the EISs.

This detailed textual analysis of the content of EISs has identified core issues surrounding the inclusion of health in EA. There remain a host of questions about institutional mechanisms and conditions that led to health being treated the way that it was in these EISs. These were discussed in detail in the interviews, and some resolution provided. It is to those interviews that we now turn.

#### **4. Interview Findings**

This next section of the report details findings from the stakeholder interviews. The documentary analysis has demonstrated that the extent health was included in the EISs was ‘partial’. The focus of the interviews provides valuable stakeholder insight into this, while focusing attention to the EA process as a whole. The interviews provided a rich source of data concerning why health was included partially and framed in the way that it was. We have,

however, focused on a cross-case analysis of this data for reasons of parsimony. We incorporate findings for specific cases as required but have a broader focus across the cases. As introduced the purpose of the interviews was to unpack the institutional complexities surrounding the inclusion of health in each case and EA more generally.

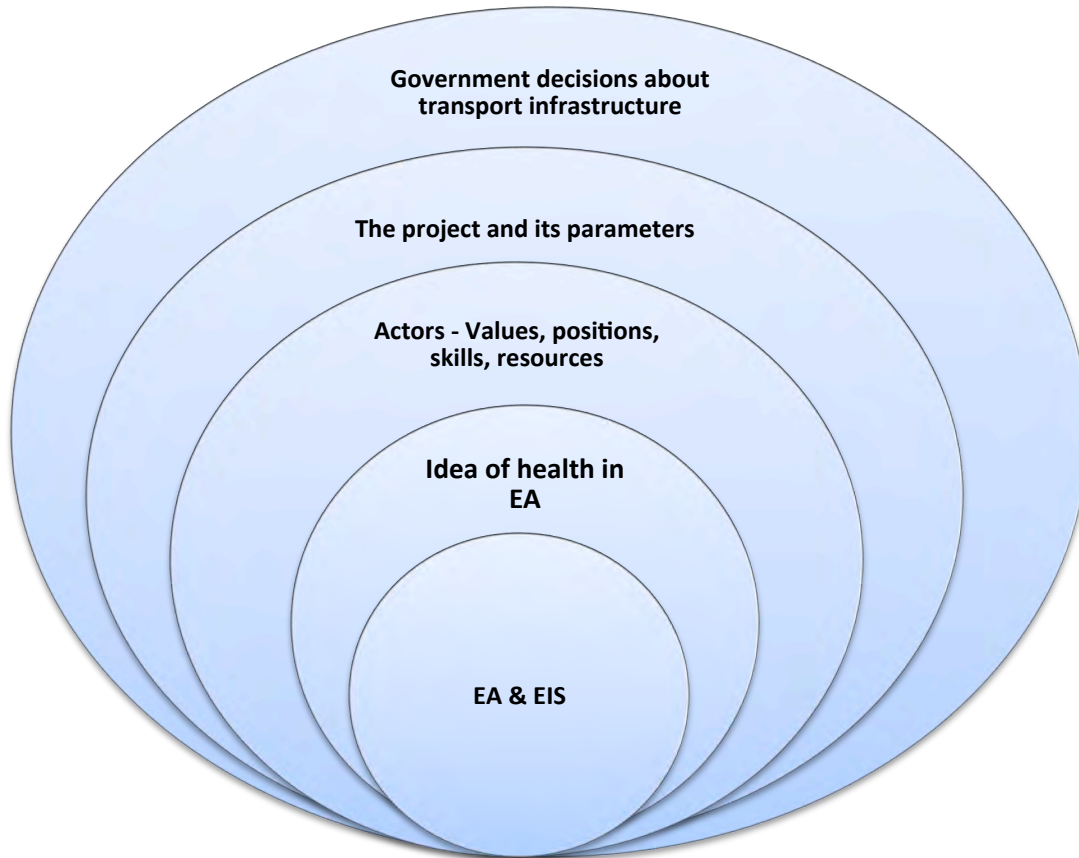
The complexity was confirmed across the interviews. In the words of one informant, the answer to why health is or is not included in EAs of large transport infrastructure projects: *'is multi-layered'*.

Reflecting this, while we initially used the 'structures, ideas, and actors' framework we ended up moving the findings into a multi-layered framework (see Figure 1). This forms the structure of this section. We first cover how stakeholders viewed the EA process and the EIS within this. This, it became apparent, was necessarily surrounded by the broader influence of government business and decisions. We then focus back on the idea of health within EA, and how health was framed, and why, in the cases. The procedures used to assess health are then discussed. The analysis of actors and particularly their values forms the final section. We conclude by returning to our propositions and refining these using the interview data, before turning to the final section where we present the overall findings (which expand the framework in figure 1 next page).

Crucially, the 12 interviews (15 informants) across the cases were often divergent and in some instances contradictory. There was also a clear interplay of values based on people's positions with respect to the project, and contradictions as well as similarities.

A major caveat to the analysis is that the interviews were only held with NSW based informants as we were unable to interview informants in South Australia. There are however, lessons for practice in South Australia from the NSW experience (recalling health was given the least attention in the South Australian EIS).

Figure 1: Multi-layered framework for the analysis of interview data.



#### 4.1. The EA and EIS process and wider infrastructure decisions

Unpacking what the EA process is, and the EIS within this, became an essential concern during the interviews. Informants characterised EAs broadly as the process of project approvals. Within this the purpose of an EIS is to influence the approvals process by outlining the dimensions, required under legislation, of the project design, construction and operation. The interviews support a crucial finding from the documentary analysis. This was the downward political and agency pressure from earlier decisions about infrastructure investment and options (an emphasis on roads in particular geographic areas for example) on the scope of the EIS. Once they are set, EIS must conform to these pressures. Our analysis focusses on the EIS first (where most attention was spent) then out to wider government decisions, then back to the requirements and their influence on the EIS process.

#### **The EIS as a process of engagement about technical issues**

In essence, and explaining the finding from the documentary analysis that suggested this, informants discussed how the EIS as a document presents the results of back and forth iterations between various stakeholders and the proponent about the technical assessment of issues. These issues are defined within the requirements issued to proponents under legislation. Informants explained how health is similarly positioned as influencing and being

influenced by the assumptions and modelling of the other technical chapters. In effect, the process itself whittles down the modelling and data about the project such that the EIS is presenting the 'worst case' scenario that the proponent must then construct and implement the project against.

*... it's common when you do these things that you use lots of really conservative assumptions and there's kind of a chain of things that you do. So if everyone is conservative when you get to the end, sometimes it can look really bad but it's not necessarily really bad ... but it's that sort of worst case. And we like to see those kind of worst case things worked through.*

Health informant

One of the challenges for the EIS is that the to and fro process is not adequately understood by stakeholders, especially the community, when they see the document.

*I think to some extent it would be useful for [the community] to understand we just don't go away into a dark room and come up with something. It's actually quite a detailed process...when they do the first pass it actually may not be okay. And we will tell [the proponents] it's not okay.*

Technical health consultant

Tensions underpinned the negotiations between the health stakeholders and the consultancy agency responsible for coordinating the respective EISs. This, it became apparent, centred for the coordinating agency around the difficulties with coordination rather than the technical issues that were central to the health stakeholders. At the same time, that these tensions were raised in the interviews gives an indication of the scrutiny that was given to health issues during the EIS process.

*The [health department] don't have formal regulatory responsibility. So, it's easy for them to throw grenades in or criticise or whatever... But I'm not sure that they've, in those conversations, always had a grasp on the implications of those comments in terms of the work that's required and what that means for the outcome and the so what moment.*

Coordinating consultant

And when this was raised in the interview with a health informant the response was:

*To me, while it might be uncomfortable for the proponent, I don't care. It comes down to the fact that it's going to be more uncomfortable for the community if they get it wrong...I don't think that for such a large project that we should have had to spend so much time and work so hard to try and get people to understand the errors that they've made.*

Health informant

### **EISs are complex and expensive to coordinate**

The reasons behind these tensions were due to EISs being complex and expensive. They require high-level decision-making to agree on content, coordination between different disciplines and sectors and technical input from a large number of agencies, managing stakeholder input and technical advice and reviews of the information, and the ability to turn all this into an EIS for public scrutiny. The associated costs, it became apparent during the interviews, are borne by the proponent but also by the coordinating consultants and then the

technical consultants. This complexity provides pragmatic boundaries around the issues that were taken on in the cases, even at the earliest point in the tender process when companies are attempting to present a cost effective proposal. Health, then, risks being lost within these cost oriented decisions.

*'...[health's] never actually been really accepted by proponents. I think it's sort of like a bit of too many cooks in the kitchen sort of thing'*

Coordinating consultant

### **Wider and earlier government decisions and processes**

Supporting our documentary analysis the interviews confirmed that earlier decisions frame the content of EISs that go back even prior to competitive tender bidding. This explains how the EA / EIS is situated within the broader decisions made by 'the government' (the role of which we unpack later) that define the boundaries to the project within which issues like health are allowed or not.

It was explained that government will '*often*' call for '*design and construct*' contracts. These theoretically are a blank slate where no design has been developed but in reality conform to a reference design to 'determine' what 'has to be done'.

The crucial point is that these early decisions about the project frame the project in terms of focus (road, light rail etc.), size and scale, and geographic position <sup>18</sup>. For example:

*'Our planning approval goes through a corridor of nine kilometres. So that's what we do.'*

Government proponent

These broad project parameters were explained as non-negotiable. However the specific design the project can be influenced and this is the purpose of the EIS: '*The EIS is basically a big planning approval, that's all it is.*' Even this scope however, is constrained by concerns within government about what is being committed to in the EIS, as these can have legal and by extension cost ramifications for the issues that are included:

*'The big risk for government... is "Are we going to get challenged?," because that can lead you to court, can lead to the project being suspended, can lead you to paying damages to a contractor.'*

Government proponent

Outside of government business, informants stressed how the project parameters were a 'fait accompli' politically that the EIS, and the assumptions within the EIS, had to conform to. This is especially pertinent to the road projects although the guiding assumptions behind the light rail are also then brought into focus. The principal objection to the road projects came most vocally from the community informants, but was also supported by the health informants. This was that emphasising roads above all other forms of transport options acts as a 'traffic inducer' that negates any design aspects of the project to improve local conditions.

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<sup>18</sup> An important policy driver for the road projects at the time of the research was a Federal government decision to focus on roads. For example see <https://theconversation.com/federal-budget-2014-infrastructure-experts-react-26575>

### **Other, earlier, entry points for including health issues in infrastructure decisions**

There were several discussions about health issues being considered earlier than the EA process that butted up against the positioning of health (or lack thereof) in government business about infrastructure. The rationale for this was that health, broadly defined, was better positioned early when decisions were being made about the parameters of the project. A good example of this was an exchange with one of the health informants that directly asked about doing more than risk assessment in EA:

*Interviewer: Is there space in this to do more work around the relationship between social and health – those kinds of things that are more on the health promotion side of things?*

*Respondent: I think as long as it's more upstream.*

*Interviewer: So, not in the EIS itself?*

*Respondent: No. Once it gets to an EIS stage, it's about refining a project to go ahead.*

*Interviewer: That's 'the risk?'.*

*Respondent: Yeah. It's not about whether the project should go ahead or not. Mucking around at that stage is not useful for anyone.'*

Health informant

It is important to stress that informants such as this were not arguing against these wider health issues (see the above comment about these being 'legitimate things'), but suggested that the parameters of the project being assessed in EAs required a strong focus on risk to refine the project and protect health. The support for considering health earlier than EAs was uniform across all informants. For example

*'Yeah, if someone can come up with a creative way of doing that and in a way that's workable, there would be benefits... Sit back and say government looks at that project – how would they consider whether it was good from a health perspective or not to push forward with the WestConnex M4 East program and works? It's a whopping big motorway tunnel and people are going to sit in their cars. They're not going to be as active. Gut feeling is it's probably not going to be a positive health impact, because people are going to be driving more than being active. Does that mean necessarily that the project is bad? Probably not. There's benefits in terms of economics and congestion already, loss of revenue for the government or the state. You talk about health upfront for a project, but how you would then do anything with that thinking?'*

Coordinating Consultant

Similar sentiments were expressed by other informants who felt that there was a place for broader health decisions at more strategic planning levels, but ultimately this needed to be seen to be proactive and not obstructive to other broader goals such as economic concerns.

As we have discovered through the documentary analysis, these earlier decisions are largely economically driven and focus on options and the development of a business case. These earlier upstream decisions then butt up against the machinations of government infrastructure decisions, whereas the project by project EIS process does not.

## The vital place of the EIS requirements

The interviews supported the central positioning of the requirements that became clear in the documentary analysis. One informant stated this importance simply with the observation that the requirements cement the content of the EIS:

*'If it's not asked for in the requirements, they're not going to do it.'*

Technical health consultant

In both cases where health was included in the requirements, the interviews suggested that the Department of Planning had actively engaged with the Department of Health concerning that content. In the WestConnex M4 East case, for example, the comment was made that the Department of Health actively moved to include health in the requirements more broadly in terms of content than they traditionally advocated for. And in NorthConnex the Health department was explained as being 'vocal' in 'early' conversations leading up to the requirements being set.

Moving out to EA generally, it was noted that that there was no articulated mandate to routinely engage Health in the setting of requirements was made clear. For example (and note the bold emphasis in this quote which is a point to which we will return shortly):

*'there's hundreds of state significant developments ... But certainly for the big ones, **and the ones that they know people are going to raise health concerns**, they will generally ask us. And one of the problems, because they don't always do it routinely ... Health doesn't get involved in a project until after that, because the planning department didn't realise that health was likely to be something that was at the forefront of the communities'.*

Health informant

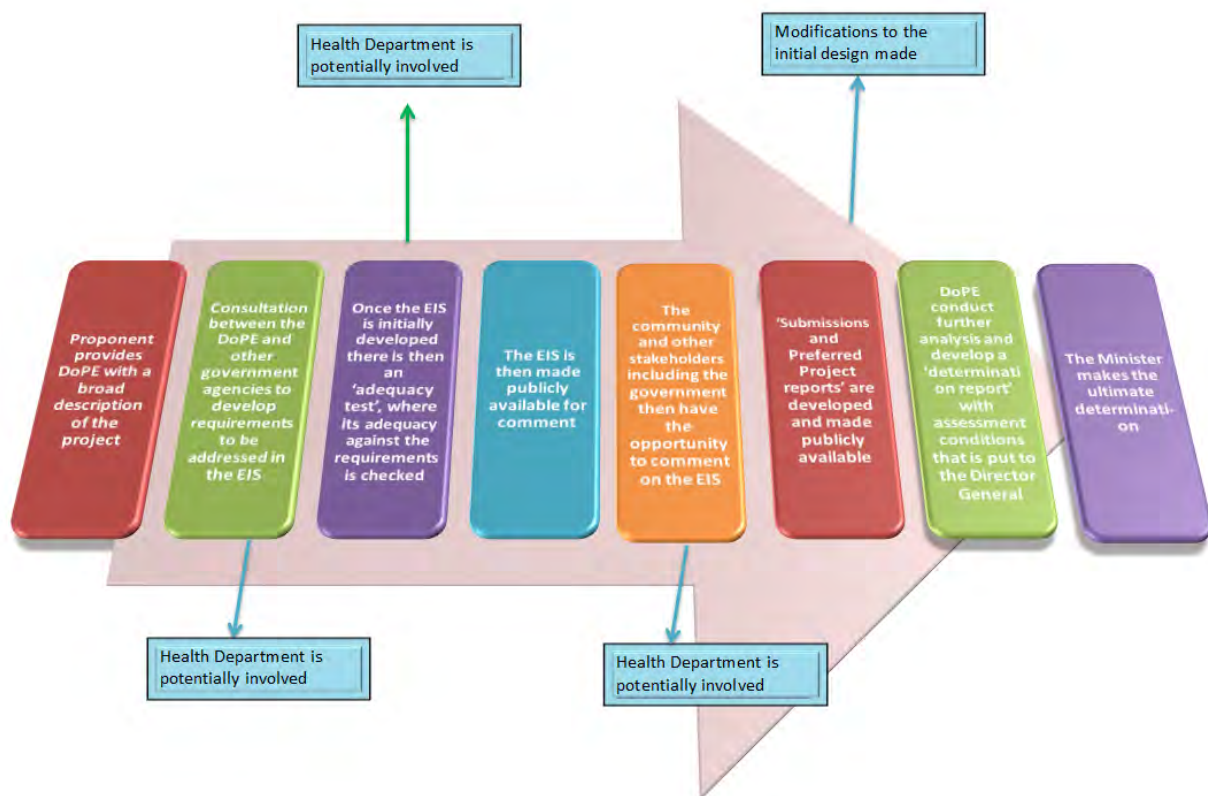
Extending this idea of mandates for engagement broadly in EA another health informant recommended that guidance be developed for the planning department concerning what projects health should be engaged in. Usefully, given the number of projects being processed, the suggested triggers for this were the potential risk associated with and the scale of the project. This need for clearer policy guidance health engagement in the requirements was also suggested by the coordinating consultants.

## The core points in the EA process (to influence the EIS and then the project approval conditions)

The interviews revealed a number of core input points to the approvals process (recalling that the proponent had explained this was essentially what the EA was). These are shown in Figure 2.



Figure 2: Opportunities for the Health Department to input across the EA process



### Summary

In summary, this section has shown how a good understanding of the EA/EIS process sits behind the mechanisms involved in including health in EA. We demonstrated how, in various ways, that EA process is influenced by the earlier and broader decisions which governments make about projects. Within these decisions, health is fighting for space as an idea both due to the need to keep costs down and concerns over what is being committed to. The EIS can only influence the scope of the project within these broader parameters but not the parameters themselves (size, positioning, and from the documentary analysis this includes focus of project on the tunnel itself). There was uniform support for earlier engagement about health issues in

strategic government infrastructure decisions. This was however tempered with the need to connect health proactively within decisions about economic growth. Returning to projects, we saw that the EIS requirements are the crucial point of influence. The health department is brought in largely in the absence of a formal mandate or guidance for including health issues in such instances. The health department, however, has a crucial influence on EIS content through its involvement in the setting of the requirements.

#### 4.2. The idea of health within EA

The idea of health, it became clear, in the absence of a formal mandate, characterizes current practice concerning health in EA. This is detailed in this section and centres around the concept of health risks, the sufficiency of this in relation to also including benefits, the methods to assess this, and the technical assumptions which inform that assessment. We have somewhat artificially disconnected this from our analysis, which occurs next, of actors, their positions and values.

##### **Community concerns as a crucial implicit structural mandate for the requirements**

There was a perception within government that the community will be concerned about the health risks associated with a project. Similarly, the department of health quotes included in the previous section made it clear that the health informants took their mandate for engaging in the EA from perceived concerns in the community. It also became apparent that the historical influence of previous local projects set a precedent in the community about the health effects of roads that then became an institutional driver (notably not yet an officially required mandate) for the government to include this in an EA. The counter example is the CSELR where there was no health requirement and there was no noted community concern about the health risks of similar projects. In contrast, both NorthConnex and WestConnex M4 East EISs were directly connected by most informants back to this community driven precedent. This was most clearly articulated in the following quote that a previous tunnel project:

*... really sensitised the community and the agencies to the health risk issues associated with obviously tunnels and stacks and emissions.*

Coordinating consultant

And this concern was clearly articulated by a community informant:

*Obviously air quality is the biggest issue. Why, because this tunnel is a massive tunnel...*

Community informant, NorthConnex

##### **Focusing on health risks is necessary**

This articulated risk focus became the crucial idea to which informants felt EAs necessarily had to respond. During the interviews the idea of risks (to health) vs benefits was brought up repeatedly. The observation was made however that communities are not overtly concerned by benefits:

*It's nice to put all the positives into an EIS – it might be completely fine and everyone agrees with it – but I think the community sees that as project spin trying to cover up the negatives.*

Coordinating consultant

This community interest was felt to influence the content of the EAs to be about risks or negative impacts, rather than benefits. This focus was also explained as a pragmatic function of the EIS process and its purpose in generating approvals for projects.

*It's the way EISs are run....focusing on the negatives, the impacts, making sure that those adverse impacts can be managed within acceptable limits. Then you get an approval. You rarely get an approval based on the positives or even a balance between the positives and the negatives.*

Coordinating consultant

### **But benefits can and should be included**

Others however, felt that including benefits was useful. The light rail, as the documentary analysis has revealed, did heavily focus on the benefits of the project (health being clearly articulated as one of these). In another example the observation was made that not focusing on benefits in NorthConnex was a missed opportunity.

One aspect to the tension about risks vs benefits lay in the idea of trade-offs characterizing EAs and the projects they are assessing. The wider benefits of the projects, informants suggested and supporting the documentary analysis, were often positioned as being for the wider community. The risks, conversely, were mostly experienced by local communities. This was not always the case, with the two NSW road projects being singled out for potentially improving the flow of traffic for the local community while simultaneously inducing more traffic. However, generally there was the suggestion that the risks are felt locally, and the benefits regionally, and that a core task of the EA is to manage these trade-offs.

One of the major challenges facing EAs, according to informants, was that inevitably there will be a small minority who are affected negatively even if there are wider benefits. The pragmatic response was that it was this group who were, understandably, focussed on risks rather than benefits.

This was put starkly in terms of 'winners and losers' by the community informant about NorthConnex.

*It is very much the story of winners and losers. I mean, that's like with any ... most road projects. There's winners and losers in there. Working on road projects is often very hard to describe to people that you're doing this for the benefit of other people and that you can only mitigate a certain number of impacts.'*

Community informant - NorthConnex

### **A wide range of impacts related to health**

It is useful to briefly turn to the categories of impacts that were discussed by informants. Informants clearly supported that air quality and noise impacts were crucial issues to be included. However, other important connections between the projects and health arose in the interviews that were not so clearly articulated in the EISs.

The wider health benefits of the CESLR project ('*active travel opportunity, cycling, walking, air quality, health benefits due to less cars on the road in the long-term. Employment*

*opportunities, mobility, social interaction*) were, as noted, included *'a bit'* (health informant, CESLR) in the SIA technical assessment and in the conclusion to the document. All informants on this case, however, felt that the EA and EIS could have included more about these wider health related issues.

Two of the most discussed health impacts were stress associated with the tunnel and property acquisitions. The health impacts associated with these changes to local communities were felt to be very important.

There was also the already noted discussion in several interviews about the problem of inducing traffic through road projects and the health issues associated with increased car use.

One of the main challenges to health as an idea in the road projects was that the social impacts had been under considered. The *'social'* was the point which was seen as needing improvement in the road EISs, and there was an acknowledged health dimension to this.

The WestConnex M4 East EA, as revealed by the documentary analysis, did include health as related to social impacts (this was required and the suggestion is that the health department influenced this content). But this, according to informants, could have been improved and more time spent on this aspect of the EIS.

### **Summary**

In summary, the interviews suggested that there is a necessary requirement to assess risks in EAs. This comes about principally through community concern with the negative impacts of proposals. However, it was also noted how projects can and should include benefits despite this focus in the community. A major task of an EA is to manage and present trade-offs in health impacts from proponents, and the interviews suggested that these can occur at multiple levels of the population. By and large the EAs tend to focus on the benefits of projects for regional populations, and these are traded off against more negative impacts to local communities or even smaller populations within those communities. The EA and EIS process, as discussed by informants, could better engage and manage these localised risks for potential *'losers'* of projects. Finally, a wider range of impacts were identified in the interviews than those associated with the traditional environmental exposures to air quality and noise. These mostly concerned property acquisitions and changes to local amenity and the stress and mental health problems associated with these changes. While, according to informants, these social issues were attended to better in WestConnex M4 East than NorthConnex, more time and focus on these issues was felt to be required <sup>19</sup>. In the next section we focus on the technical procedures for including health in EA, and why risk assessment appears to be preferred and some of the core issues surrounding that preference.

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<sup>19</sup> The social impact assessment for the CESLR demonstrates how health can be incorporated into an SIA even when not required as an idea.

### 4.3. Procedures

The driving ideas detailed in the previous section played out in various procedural ways within EAs and particularly EISs, according to informants. Principally this manifested itself the EISs as the focus on human health risk assessment. Surrounding this were issues surrounding whether or not thresholds for going ahead with the project or not are possible, how risk is communicated to community, and the assumptions around modelling of other issues that then necessarily characterise a human health risk assessment. We then include a brief discussion of health baseline data. We also move away from the EISs to look at broader strategic decision making processes, although notably these do not appear to include health as currently practiced. We conclude with some insight into why health impact assessment was not used.

#### **Quantitative health risk assessment as the preferred methodology**

The necessity of human health risk assessment within EISs was provided by various informants. This was the centre of a response by one informant when asked if health was useful in EIS:

*Informant: Absolutely. You just wouldn't do an EIS for a major motorway project, with or without a tunnel, without doing a health risk assessment.*

Consultant

Quantitative health risk assessment was principally described in terms of causality, with the purpose to allow an analysis of causation that traditional epidemiological studies cannot.

*That's the difference between epidemiology and a quantitative risk assessment. You can't apportion causality with these sorts of low levels of exposure that you've got using an epidemiological method. ... What you can do is to do the quantitative risk assessment, which is a different thing. It uses much larger epidemiological data, for example, on particles and you get a relationship between particle exposure and outcomes. So, you've got an exposure metric, then you apply that to an epidemiological model, for example, and then you can come up with a risk. That's what quantitative risk assessment for environmental health is all about.*

Health informant

This characterisation suggests a preference for quantification to demonstrate causal relations between the environmental exposure that characterise (some of) the project and health outcomes. This preference for quantification was highlighted by nearly all informants. There was an acceptance of qualitative analysis of risks, but this was not preferred and was often implicitly suggested as being inferior because of issues around certainty. For example in relation to WestConnex M4 East:

*'So it's still qualitative but we do bring in some discussion about traffic, property acquisitions, and impacts on property acquisitions.'*

Health informant

The issue of qualitative information was brought up directly in another interview with an experienced consultant who was not from Health, but who observed 'dangers' in qualitative data:

*Informant: I think that is a very dangerous path to go down because unless you've got some statistically valid data, particularly in the health area, you could be getting entirely fallacious conclusions.*

Consultant

The problems of quantification and certainty appeared across the interviews, even in relation to the quantitative risk assessment. Several informants, as suggested in the content analysis of submissions, discussed issues with incremental increases of risk from the project when compared to background existing levels of particulates. The population numbers, even at levels of 20,000, are apparently too small to causally assign risks from the project to population health outcomes. This was made clear in the following interview where this 20,000 figure was discussed:

*Interviewer: And that's [the 20,000] tiny?*

*Respondent: It is. From a health perspective, from a health study's perspective it's too small to get any trends. But all you'll see is if you did the study perhaps beforehand in summer, and then you did the study afterwards in winter, you're going to see respiratory disease go up. Of course it will, because it's winter. So there's all these local things and other things that affect such a small population that you don't see anything necessarily. And then you can't, because there's no measureable change in air quality you can't relate it to anything.*

*Interviewer: And then to causally align it to the project is even more difficult?*

*Respondent: Is even more difficult. Particularly when we're looking at a project that has an incremental impact that you just couldn't measure on any monitor. So it's like how are you ever going to prove that any changes that you did see are anything to do with the Tunnel, or it's to do with something else that's going on?*

Technical health consultant

This was a shock to us qualitative researchers, so we directly asked other informants about this point. The response, crucially, was that the process of including the health risks in the EIS is in and of itself important such that health has been taken into account in the final planning decision. This, it was argued, is the reason for the focus and the interest of the health department on risks and causal certainty. An example was

*'We can talk about the risk and then it's not our decision to say build or don't build. We can say, **you can do this to make it of lower risk**, we can try to quantify the risk or comment on the quantification of the risk and its appropriateness. But in the end we can't say do or don't build it, it's you consider this risk and government will consider other things like benefits and whatever of say, economic development or other factors and they have to weigh up those.'*

Health informant

Note the emphasis in this comment on the presentation of information such that changes can be made (where the EIS, as we have shown, presents the final iteration of this back and forth). One of the related tensions raised during the interviews by different stakeholders (see actors section) was that proponents and the coordinating consultants felt that the department of health should be prepared to provide a risk threshold for the project, below which health would

not be impacted on. This was rejected by the health informants who felt their role was to ensure the risk of the project was at the lowest level possible, rather than at a certain acceptable point.

*'The reason why we do it is to provide information that we have assessed all the health endpoints, we have assessed whether this is actually going to harm you in any way, and it gives us a tool to actually tell people that we have done that work.'*

Technical consultant

This, then, returns us to community perceptions of risk as the mandate for why health is considered in EA. Supporting this, a number of informants across the spectrum of our sample observed that informing perception was the crucial task. For example the community informant for NorthConnex commented that the issue was not the actual effect but the perception of a risk. This perception required that the EIS required an assessment of health risks.

*'The change is so small it's mixed up in background. But it doesn't stop people seeing a stack. If you see a stack and you think you can see the haze coming out of it and the pollution coming out of it and stuff, then you may be worried about your health and there may be some impacts with that.'*

Community informant - NorthConnex

The ultimate extension of this argument was that, in the case of NorthConnex, the community apparently did not question the human health risk assessment (they did however challenge the modelling that informed this, detailed shortly).

*'one of the interesting things to my mind from the EIS, I think most of the community comments, you could probably double check this, but there were very few about the health risk assessment.'*

Health informant

While this analysis has demonstrated the necessity of human health risk assessment, it should be reminded that the CSELR included health as part of the social impact assessment. This demonstrated that risk assessment is not the only methodology to use to measure health effectively, qualitatively and rigorously. Crucially, as explained in the CSELR case the rigour can also be in the transparency of the method rather than the need for quantification or certainty.

### **Certainty vs do the best we can**

One of the drivers underpinning risk assessment and the acceptance of this as a valuable methodology concerned certainty. There initially appeared to be a value bias toward wanting certainty in terms of health data and predictions. This, however, was raised explicitly and then countered during the interviews. A pragmatic response countering uncertainty was the default position across all the interviews, which ultimately recognised that the search for certainty may be the wrong approach:

*'I prefer to look at data in terms of levels of confidence, confidence in the rules, whatever. That's just how I look at it but I know the general public, they want certainty that they're not going to be affected.'*

Consultant

And a health informant similarly observed that certainty is not a valid concern:

*'To say that Health has got some uncertainty and that's a real issue, I think you need to put that in perspective with the other uncertainties that are on there and that people need to deal with. Just because it's uncertain doesn't mean you ignore it. You do your best, and that's what we do.'*

Health informant

This does however suggest that educating the community about certainty is an important precursor to presenting the findings of an EIS.

### **Risk communication**

While reassuring community perception is a core task, one of the major problems with risk is that it is complex and can be poorly communicated to the community (and often too late apparently). NorthConnex was the case where this was felt to be particularly problematic. This was explained on the one hand as poor overly technical explanation of the modelling that informed the assessment. On the other, was the problem of timing, where the information is explained to the community too late in the EA process. There also appeared to be a lack of understanding in the community that modelling around air and noise is standardised in NSW. The community, apparently, is not fully aware that this standardisation gives the health informant the confidence that the modelling itself is not spurious, even if the data may require refining to change the design of the project to protect health.

### **Assumptions**

One of the principle challenges levelled at the EA process, and the health assessment within this, is that health is secondary to the modelling and assumptions of the other chapters or issues assessed. This was raised across all the cases – recalling that health was part of the social and economic assessment in the CESLR:

*'I think one of the difficulties is that the health risk assessment is reliant on inputs from air, noise, the socioeconomic study et cetera. So it's the last cab off the rank and it was, in fact, the last chapter and the last study to be written in the EIS.'*

Consultant

The community informant for NorthConnex focussed on this throughout the interview. For example in relation to the air quality modelling:

*'It's rubbish in, rubbish out. It doesn't matter how good your modelling is if you don't have the data there to start off with and you are relying on computer generated data that produces a huge amount of risk...'*

Community informant, NorthConnex

However, while this was discussed by most informants, it also became apparent that what was not well understood or explained in the EIS was that the health assessment actually influences the other issues in an iterative manner (see EA process section).



*'So I tell them they have to get their, whichever particular compound it is that might be causing the issue down even lower, and they'll look at "Okay, so we have to put in additional mitigation measures", so they put them in, they have to remodel it, then I'll get, so there will be another couple of rounds of iterations before I'm comfortable with the numbers that actually I can put forward that they're actually really, really low.'*

Technical health consultant

### **Health baseline data**

There were also some contradictions raised about the use of health baseline data, recalling that the EISs were unable to use local health data to inform the assessments. This, it was discussed, became particularly important for those in the community – often as noted smaller in number – who were identified as being at risk. The challenge however was raised, as discussed, that these small numbers made any allocation of causation to the project difficult and problematic.

*'This was a big issue on [previous NSW Tunnel]. So the people that lived within 500 metres they said, look we're getting headaches, we're getting sick.... So Department of Health did quite an exhaustive study looking at before and after health impacts on a relatively small population. And they could detect no change actually - but it was a very costly study too. The thing was, people were saying, we want you to look at us not the general population and we want certainty and all of that. And all of the symptoms that they exhibited and were medically assessed as having were not related to the emissions from the stacks.'*

Coordinating consultant

The challenge with useful baseline data is also one of timing. For example while one informant felt that gathering baseline data was useful, this was often out of sync with the timing of the EA.

*Respondent: It would be useful for someone to do. You'd have to be able to do it early enough to get a baseline because there's the challenge is getting the baseline. So the amount of lead up time is very short. So even to get that data every year is a very short period of time.*

Technical health consultant

This point is interesting because it suggests that the timing of the EIS process (when the health consultant is brought in) is short. However there are additional opportunities at earlier decision making points in the EA. The health department, for example, could commission some baseline work to occur as soon as the project options have been worked through and the preferred option chosen. Something like this happened in the CSELR when the social impact assessment was commissioned very early on in the planning process to gauge the impact on local businesses.

### **Health impact assessment?**

Health impact assessment was not the focus of discussions, but was raised because of its absence in the cases. Health impact assessment locally appeared to some informants to have a checkered perception that it is principally qualitative and not as rigorous as a health risk assessment.

However, one of the major problems that arose around health impact assessment was that only the health informants appeared to have an opinion about this. Those from the community and the non-health informant did not know what range of methods existed to assess health, or they conflated health impact assessment with health risk assessment.

This not only became clear in the interviews with non-health informants, but was also noted as a core issue by the technical health consultant who was familiar with both approaches when initial discussions about the content of health assessments were being worked through:

*'If someone asks me to do a health impact assessment, I usually have to ask them "What do you mean by a health impact assessment? Are you meaning you want me to look at all aspects of the project and how it affects health ... traditionally it's always been under the health risk assessment generally. There's more and more people becoming aware that there's more to health than just the bad things, but very few people actually understand that there is all those different aspects and we might want to actually assess them. So traditionally health has always got into assessments by just looking at the negatives and the impacts, and usually it's only because someone complains.'*

Technical health consultant

### **Strategic level assessments**

One opportunity for health that connected back to discussion about strategic government decisions was strategic level assessment. There was apparently not always the appetite for a new strategic layer of assessment. However, for WestConnex M4 East, there had been a 'strategic review' that was described as accompanying the 'critical infrastructure' declaration by the Minister. This included (as detailed in the documentary analysis) options analysis, route selection and 'where you should put the infrastructure', but health, it was immediately noted, 'did not feature'.

The answer to what health might look like within this strategic discussion was outlined in the CSELR interview. This turned back to the idea of health economics mooted in another interview and inserting this into these earlier decisions. This, as it turned out, supported the rationale for how health was included in the technical economic impact assessment appendix of the CSELR.

*'Well, if it's spending government money, theoretically, to get money from Treasury, you need to have a positive benefit cost ratio.... it says benefits and costs it means to society as a whole. The problem is they really only can quantify, they can often only rely on dollar value, things that can be put into dollar values. But more and more there's a, or depending on the government, a tendency to also put in a whole lot of qualitative things. And dollar values for health savings would go up top, and anywhere that additional, costs of additional health infrastructure, new hospitals, new beds or savings on this or that, and then benefits to the health workforce...'*

Consultant CSELR

### **Guidance**

One of the major procedural challenges concerning assessing health in EIA was the lack of guidance on how to do this. This was introduced by the proponent:

*‘And so if there were some predetermined, so in other words, rather than saying “Oh, we’ve looked at the project, that looks okay”, if there were some predetermined guidelines that were, and the project team had to satisfy those predetermined guidelines, it would just make everyone’s life a lot easier.’*

Proponent

The human health risk assessment guidance at the Commonwealth level were pointed to as being important for practice in terms of adequacy and perception in the community.

*‘So if what you put out can be linked in with something that is a Commonwealth or a health body, so an en-Health, or an NHMRC weight behind it, that will be held in a lot more weight in doing any of these assessments, without any DGR requirements, by the community. And as soon as it’s an expectation, a default expectation by the community, it will be pulled in.’*

Technical health consultant

### **Summary**

In summary, this section has focused on the procedural preference for undertaking human health risk assessments in EISs. This, it was discussed, is a necessary (and increasingly recognised) practice in EA because of community perceptions about their health. There are however major methodological issues around assessing incremental risk from the project over and above existing background exposures. This however, was identified as a core purpose of the health risk assessment such that a transparent overview of the lack of risk to health from the project is made clear. There is also a preference for quantitative measurement of risks to ensure that the presentation of risk is as rigorous and objective as possible when it is provide to the community or Department of Planning to make their final assessment about the project. The counter example to this was the light rail that demonstrated how health can usefully, rigorously and qualitatively included in social impact assessments. Concerns about using the modelling and assumptions of other assessments to inform the health risk assessment was also included. One issue not well understood is that the health assessment is often used to change or revise those assumptions or data from other assessments to the point where there is not a health effect, and that the modelling that informs these is based on standardised guidance and methods. We also then briefly turned to Health Impact Assessment, which does not seem to be supported. Strategic level assessments were then introduced as an opportunity where health is not, currently, a consideration. The importance of guidance was then discussed as influencing the requirements to include health and also practice itself.

Underpinning much of the above analysis are the positions and values of informants concerning health as an issue in EA. This, then, is the focus of the next section.

#### **4.4. Actors and networks in the EA process**

The focus here is the roles of various actors as influencing and gatekeeping the content or ideas that are included or excluded (often unknowingly) from the EA and the EISs within this. We first identify each of the stakeholders. As part of this, as well identifying the range of actors involved in the EA process as far as health is concerned, at a deeper level it became apparent how their roles, positions, and values guide their interests in how health is considered. We

focus in on community, government across differing agencies and with particular focus on the health system, and then consultants. Specifically, informants revealed various positions about what health should look like given the purpose of EAs, the type of evidence required to position health in this way, and the methods used to achieve this. It became apparent that there are, as introduced, wider institutional influences on whether or not actors exercise their interests.

## **Community**

The community were identified as stakeholders in various ways. First they were impacted on by the project, differentiated between the wider NSW community and the local community. As previously shown the EIS process was framed in large part to respond to issues in framed by the community in terms of health risks associated with noise and water, although social and amenity issues are also a concern, with less concern shown about the potential benefits of the proposal.

In the two cases where health featured in the requirements, there was the general view that the community were accepting of way that health was assessed in the EIS (health risk assessment). However, as already detailed there was a consistent view that the modelling and assumptions underpinning the project were flawed, which, it was felt, the EIS tended to buy into and not challenge:

*'Yeah, it's not the [EIS] methodology that's the issue. That's not what we have been arguing about. That's the same about the health risk assessment to some degree. It was some of the assumptions they use and some of the issues that they cherry picked to do the health assessment on.'*

Community informant, NorthConnex

Beyond but influencing the inclusion of health, a crucial finding from across the sample of informants, however, was that the community seemed pitted against and distrustful of the motivations of government. Managing this distrust was framed as part of the nature of managing large infrastructure projects. As discussed where health was required for the road projects this seemed to be in response to this distrust and provide as much detail as possible about potential health effects.

Internal community dynamics also had a role to play. For example it was made clear that some affected by NorthConnex had a pragmatic response to accepting the project would go ahead whereas others opposed it and that there were tensions between these groups. It also became apparent that these dynamics and 'different views' complicated the engagement process in the EA.

The major institutional challenge facing EAs and EISs – over and above but surrounding the acceptance of technical issues like health - appeared to be the sense of disempowerment in the community in the face of decisions the government had already made about the project.

*'I understand it is quite frustrating when you get pesky people like me making complaints about things. But sometimes that's what you've got to do. You've got to deal with the imponderables. And I do accept that governments do have to make decisions, someone has to make a decision. But I don't think people should be made to be just collateral damage. If you have to*

*make a decision for a greater good then there needs to be a revision of how people who are affected, truly affected, not just because they acquired your land, are dealt with.'*

Community informant - WestConnex M4 East

There was clearly a disconnect, across the EA engagement processes, between the intentions of government as a proponent driving the project and the engagement of the community who are distrustful of those intentions. Resolving this disconnect is not possible here. There however were several suggestions made by community informants to alleviate this fundamental problem for the EA process. One was that politicians making decisions directly engage – 'front up' was the phrase used – with the communities that those decisions impact on and explain the decisions being made. Another was that the process of the EA engagement be more informed by local community input and removed from perceptions of a being a 'fait accompli' given the role of the government as a proponent<sup>20</sup>. This, along with the advisory role of the department of health, is discussed next.

## **Government**

'Government' is a broad label for a range of actors with varied roles and networks. On the one hand were agencies, Planning and the Environmental Protection Agency were the focus, with a legislated responsibility concerning EA. Then, a major focus of this section was the Health department, which plays an advisory role over content. We identify that local councils were largely absent from our data for various reasons. We then turn to the larger looming influence of the government (usually Transport agencies) as the proponent for these projects.

First however, the interviews suggested that there is a general lack of understanding of what health is and how to assess this outside the Department of Health. Indeed, this lack of knowledge was the ultimate driver for why health was included in the way that it was in each of the four cases. Indeed there were some instances when there was surprise that health was able to be assessed in an EIS. For example:

*... it hasn't been immediately obvious to people that it's something that should be looked at. I think there's also a dimension of, until relatively recently, there's probably not been a lot of data to say, yes, we've got a credible way of assessing these impacts.*

Department of Planning

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<sup>20</sup> The public private partnership between government and private sector in NorthConnex was discussed in similar terms. This was the first 'combined' EA and procurement process in NSW history and led to community distrust over the process being a fait accompli, for example:

*'as a member of the public really it contributes to this idea that by the time you go to the community and say this is what you want to do, there's not much you can do to change it, because you've got a contract with the person to build it, like that.'*

Community informant, NorthConnex

The Department of Planning <sup>21</sup> (in NSW) was suggested as the ultimate gatekeeper for EAs through their role as regulator for the project and having responsibility for what final approvals decisions (consent) given to the project are made. Technically, in developing these decisions, the Department needs to take into account a range of issues, including health.

Under legislation the Department is charged with developing requirements, reviewing content as it develops and is provided by the proponent, and developing consent approvals for the project based on the details in the EA. There is some flexibility across all these aspects which either become opportunities for including novel (rather than standard) issues like health, or later on facilitating the inclusion of modifications to the project as part of the approval consent. The role of the Director General (since renamed as Secretary) under legislation was raised as crucial.

Individuals were not discussed in detail. However, during the analysis it became apparent that key individuals take responsibility for particular projects. There appeared to be recognition that the Department as an agency played a role in identifying other government stakeholders such as health to provide input. However, informants emphasized that the Health department was not brought in automatically as a regulatory agency but as an advisor in response to the idea that health would be a key issue. Overall the suggestion in terms of cross agency engagement with health as an issue was that the Department of Planning made the call as to whether the Health department was included or not as an advisory agency.

#### Environmental Protection Agency

The EPA was identified, although in less detail, as playing a dual role of regulator in terms of licencing the project and advisor on the technical aspects of the assessment.

The EPA was identified as having a particular regulatory role (including developing guidance for) air quality and noise issues. Indeed this role has a critical influence on the modelling that these assessments are based on and that the health risk assessments are subsequently based on.

There was also, recalling the distrust with the EA engagement processes, an interesting view put forward by a community informant that:

*EPA is generally pretty good. Out of all the organisations they are probably the most independent.*

Community informant, NorthConnex

#### The Department of Health

Throughout this analysis the influence of the Department of Health on the EIS process was identified as crucial. The focus on EISs in interviews was telling, as this appeared to be the only point of engagement in the process and hence where informants focus was. There was the overarching recognition that the culture of the health system is overwhelmingly focused on hospitals such that engagement in processes like EAs is under-supported. EIS engagement

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<sup>21</sup> Notably we did not interview a Department of Planning representative so the analysis presented here is the view of their role from other stakeholders.

appeared to default to the parts of the health system that had actively engaged over time and where the core business – health protection – had clear overlap to the concerns the EIS was positioned to address.

The Health department had a particular influence on content largely in the absence of any broader guidance within government concerning how to include health in EIS (or the planning system more broadly):

*They [the health department] come in in that advisory case ... and it's really through consultation with them that the methodology for doing health risk assessments developed.'*  
Consultant coordinating agency

The health department is not uniform in NSW, and is split into levels and then functions, each of which has a bearing on how health is considered in EISs. When engaging within EAs the culture within population health services (the point in the health system that has the remit to engage) is highly influential. The central state level health agency point of engagement is (the then named Environmental health branch) has a core business of 'environmental health'<sup>22</sup>. Local health districts were explained as being invited to provide more locally oriented views. Across both levels there was the view that concerning EAs:

*From a Health Department point of view the culture is that we're much more comfortable with risk assessments. And I think that's probably largely it.*  
Health informant

In another the interview with the health informants from a different part of the health system suggested that the health promotion side of the health system – that focusses on promoting health and wellbeing through, for example, active travel – was more challenging to position in EAs:

*So it's a matter of making sure if it's within the EIS you cover those things relating into Health Promotion rather than just the air quality [and] noise sort of things*  
Health informant

The culture of the health system connected to EISs then, defaults to health protection and risks to disease rather than promoting health and the broad range of positive and negative impacts that a project can have. At the local level the response to EISs is coordinated through the Public Health unit (or equivalent). While these units do canvass widely across the health district to provide comments, the remit of these units is to protect health (under legislation largely concerning disease outbreaks).

This focus was explained forthrightly by one health informant at a local level in the following exchange about NorthConnex, where the default position was this informant's job description providing the parameters with which to engage on the EIS:

*Informant: I can comment on health protection elements because that's the only bit I considered. In terms of does it disrupt the social fabric of a community by putting a road*

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<sup>22</sup> Notably this is broadly defined as "those aspects of human health determined by physical, biological, and social factors in the environment." <http://www.health.nsw.gov.au/environment/pages/default.aspx>

*through or something. Whether building a tunnel increases people's dependence upon cars and decreases their physical activity. I don't get involved with that stuff. I think they're all legitimate health things, but they're not something that I need to get involved with.*

*Interviewer: This is with your LHD hat on, or is it with your health protection hat on broadly?*

*Informant: Both, because I do health protection in this LHD. I don't do health promotion-type activities, and that's the job description that I have. I think that the health concerns were adequately addressed. I can't say that I'm necessarily happy with the outcome of what's been there, but I think Planning did a reasonably good job in terms of getting us a seat at the table, giving us some ability to be involved. I think the project has certainly improved with our input.*

Health informant

The role of the Health department in the EIS, including the focus on health risks, was noted by several informants as being pragmatically bounded by the project itself. Several informants were very clear that these boundaries concerned the health risks of the project, and that it was the job of other departments to work through the trade-offs between those health risks and other issues:

*We can say, you can do this to make it of lower risk, we can try to quantify the risk or comment on the quantification of the risk and its appropriateness. But in the end we can't say do or don't build it, it's you consider this risk and government will consider other things like benefits and whatever of say, economic development or other factors and they have to weigh up those.*

Health informant

These broader issues can, as discussed, be included in the EIS requirements and are not, as some suggested, the remit of earlier or later processes within the EA (although they can be considered at these points). The challenge that became apparent was encouraging the health department to focus attention on these broader issues. One informant suggested that a useful mechanism for including health in EA would be to have a 'health report card' as part of the requirements to direct what should be included in the EA. The informant agreed that this could include 'broader' issues than health risks associated with air quality and went on to suggest that this was not happening because the Health department had a 'muted' voice on these issues.

Capacity within the health system to proactively engage in EA was also raised. On the one hand health informants were asked what the resource requirements were for this type of work. Most informants were clear that actively engaging in EIS processes is very resource intensive, requiring not only strong technical skills (including the ability to navigate complex EISs), but also skills with engaging at high levels about political decisions. Additionally, the argument was made that this work is not routinized within the business of the Health department, and comes as an addition to existing work both at state and local levels. Conversely, it became clear that the health promotion side of the system were not engaged as actively as health protection and tended toward the writing of submissions to present their arguments, which was less intensive.

The analysis thus far has suggested that a lack of a structural mandate to include health has had several resolutions (guidance, resourcing etc.). One unresolved resolution is whether or not



to make health a regulated agency, rather like the EPA. There were some contradictions between informants concerning this. The technical consultant felt that making the Health Department a regulated agency was important based on her experience of many different projects where the advisory role was limited

*'I've been on plenty of others where we work under the same system where they go, no, Health is not one of the regulators that we actually have to abide by, they just provide advice, we don't actually have to abide by them.*

Technical Health Consultant

The move toward a regulated role for the Health department was raised in several interviews. Surprisingly the answer provided was mixed. Some suggested this was required because current EA practice is variable concerning health – indeed it is more often not included than included – and the requirement would ensure its inclusion.

Others, including informants from the Health department were more wary. It was suggested that a regulated role for the Health department was currently undefined especially at a state level – with the EPA providing the regulated voice for environmental health triggers such as air and noise. Local health departments, it was pointed out, can utilise the NSW Public Health Act to engage, especially through local government, on local public health issues. But in the case of major infrastructure projects and population health issues coming from these there is not a regulated requirement. There was also the recognition of some usefulness for the Health department in playing an advisory rather than regulated role such that health input is divorced in the eyes of the community from the final decision.

Related, there was however, support for the regulation governing the planning system including EA to include a health objective. This was seen as a fundamental requirement for health to be included across the business of planning, including EAs. It also, crucially, would require health to be considered by the planning sector itself as routine rather than ad hoc and would usefully shift responsibility away from the Health Department.

There was also the suggestion in another interview that this discussion of being mandated or not was not an 'either/or' position, but that both are required. A health objective, which around the time of data collection had been very close to being achieved in the NSW Planning system, has flow on effects through the system. However, that system also needs to be able to implement that objective through policy mechanisms, guidance and organisational requirements. The role of the department of health could, it was suggested, then shift away from engaging on a project by project basis to the development of policy and guidance to enhance practice:

*In a perfect world I would see it as being not our job to get involved in the development assessment process. I would ideally like it that we, our job is to produce the guidance and things like that to help the planners get the best out of the process, and judge the pros and cons themselves ...*

Health informant

Government as proponent

At this point it is worth recalling that government, with the exception of NorthConnex, was the sole proponent in each case. Crucially, the 'government' as proponent was a combination of the State government (usually transport agency but including the cabinet as decision-makers) and the federal government who provided additional funds that enabled the projects to proceed. This, as noted, raised the challenge in the community about the independence of the government for these projects:

*I think these big projects are always difficult. But I think one of the problems that the community have is if it's a government project, and the government says it's going to be okay, they're going "Well, where's the independence?"*

Government Proponent

Despite this misgiving, Government as proponent has benefits, according to informants, because the government is more likely than the private sector to want health to be covered in the EIS. This, however, was tempered with other observations that government as proponent is in the main looking to include fewer issues due to demands on costs that are potentially associated with delays and subsequent costs to the project.

NorthConnex, notably, was the only EIS that explicitly stated that it was not the responsibility of the proponent to provide new or upgrade existing infrastructure around the project. The experience of NorthConnex then, provides important findings about how the role of government plays out in terms of partnering with the private sector, and this is detailed here.

For example the dual observation of the role of government as needing to temper social responsibility with 'getting things done' was raised again as a central dilemma.

*Yeah, very little social responsibility to it, but this is an unsolicited bid. So, I think that puts it into a different ballpark. If you get an unsolicited bid coming to you, I think you treat it on its merits, and one of those things should be 'I don't know that I want to be involved with this if it's just going to be plonking a piece of infrastructure and foregoing other opportunities', which is a very large debate. Then there's the other way of looking at it. We'll never get anything done. ...this is the biggest city in Australia, and it'd be a good idea to get the bloody trucks off Pennant Hills Road.*

Health Informant

### **Consultants**

Consultants also were principle actors influencing whether and how health was included in the EAs. Consultants played two roles.

One was as coordinating agencies on behalf of the proponent, to coordinate the EA technical assessments and compile the EIS. From the documentary analysis there appeared to be a small network of these agencies, and the informants we spoke to, while they won the role through competitive tendering, appeared to have strong relationships with people across government in particular (as they should). The discussions held during the interviews confirmed that these individuals have extremely high technical skills in coordinating EAs and the ability to navigate complex relationships across government and with proponents. There was notable tension with the health department which we will discuss next.

The second type of consultant was technical. This role requires strong technical skills in health risk assessment principally but also impact assessment more broadly. The ability to navigate government and develop strong relationships with main government agencies, particularly the Health Department where their perceived credibility is paramount, came through across the interviews as a core skill. Notably the principle technical SIA consultant for the CSELR was the reason, in the absence of requirements, for the inclusion of health in the SIA. The technical consultant has a core role to play in the to and fro as part of the iterative development of the EIS. Ultimately, however, the technical consultants provide the job they are asked to do within the parameters of the EIS. Part of this, crucially, was the ability to explain complex health issues to the community.

Several observations were made about the general capacity of consultants in NSW to undertake this complex work. The overall view was that there is currently a limited pool of consultants to undertake health assessments in EA.

### *Summary*

In summary, this section has detailed the various actors and their values and positions that came into play concerning the inclusion of health in EA. The analysis has shown that these values and positions have a real influence on how health is included or excluded. Overall our analysis suggests that tensions between stakeholders emerged as a potential positive influence on including health. The community are at the centre of this given that the perception of the risks or benefits to the community lies at the centre of the EA process. The community informants interviewed were concerned about health as a technical issue, but their wider concerns were about the role of government as the proponent of the project and how this influences the EA process generally. Government plays several roles, as regulators, technical advisers, and proponent. As regulators for the project under legislation, throughout the EA process the Department of Planning has a gatekeeper influence. The Environmental Protection Agency plays an important regulator role in terms of issues considered, and also develops guidance use for air and noise modelling that health assessments in EAs subsequently are based on.

The Health department currently plays a technical advisory role and is invited to participate by the Department of Planning (currently in an ad hoc agency to agency manner). The Health department nevertheless has a crucial influence, when engaged, in terms of the parameters for the EA set in the requirements. Currently the Health department preferences human health risk assessment, in part because the point of contact concerning EAs is the environmental health branch or equivalent, but also because the parameters of the project at the EA stage suggest that health risk assessment is the necessary process. There is currently limited knowledge amongst other agencies about what health means for EA and how to assess this. The EA process, some informants felt, would be facilitated by an inclusion of health within the planning legislation, where the Health Department is a statutory agency to develop policy guidance to ensure the adequate coverage of health in EA.

The consultants engaged in the EIS process have a crucial influence both as coordinators of the EA process and in the more technical role played for specific issues such as health.

## 5. Conclusions from interviews

This analysis has presented a comprehensive empirical understanding of the wide influences on the (partial) inclusion of health in EA. These explain and reinforce the previous findings from the documentary analysis. From this we can conclude that EA is necessary, but as currently practiced insufficient, to fully protect and promote the health of the community in the face of large scale transport infrastructure decisions. Ultimately the findings suggest that health issues are subsumed under the earlier decisions of government about infrastructure. EA/EIS processes are characterised within these parameters. Investing in solid population health arguments to influence, but not be seen as impediments to, these broader decisions is a much needed dimension to policy making and planning that is currently missing.

We have presented evidence supporting the necessary focus on human health risks such that these are clearly developed and presented in the EA to then influence the decision, made by the Department of Planning, as to the dimensions of the project for its approval. We also then presented evidence that the current characterisation of health in terms of risks from environmental triggers is also seen as insufficient. Benefits are important to consider, for example. Perhaps even more vital is the need for a much improved process for assessing the health impacts of stress associated with changes to local amenity generally, and specifically property acquisition.

Overall the interview data suggests that the inclusion of health in EA is a relatively novel concept. Several entry points for including health across EA, including strategic assessments, were identified, although much of the focus lies on the statutory EIS process. The crucial point in this is the setting of the requirements. The Department of Health is engaged by the Department of Planning as an adviser for this which has several dimensions. While some suggested that a mandate regulated role for the Health department was required, this was not supported from within the Health Department. However in the absence of this there was recognition that better triggers for that engagement could be provided. Also, there very clearly needs to be improved guidance on what the content of health should look like in an EIS (across the various dimensions from risks to benefits to social issues).

There appears to be a lack of engagement in health by the community, who are primarily concerned with risks. Community backlash seems to be considered business as usual but the informants also suggested more can be done to improve the whole communication process around these large projects. Part of this could engage community in the back and forth between the health assessment and other chapters; although to be successful this requires much improved risk communication strategies than are currently offered.

Culture and organisational capacity are key influences. The culture of the Department of Health necessarily leans toward risk assessment, and this is a crucial and important role. However, a fuller response from the health system would also include a broad population health agenda that allowed the full characterisation and assessment of the acknowledged (in the EISs themselves) multifaceted pathways to health that a project influences. There is also work to do outside the Health department. There seems to be a lack of understanding of what health is

and how to assess this, and this risks questioning the value of those assessments for the EA process given the complexities and costs. Guidance on health risk assessment exists and is practiced effectively in EA given the parameters required, but there are also opportunities for a more detailed health impact assessment and / or the embedding of health in other technical issues than air and noise. Above all, an institutional mandate to include health as a land use planning issue would have a flow on influence through the system and EA and EISs would benefit from this.

## **6. Concluding findings from across the research**

This has been one of the first empirical investigations into the content of and the institutional drivers for the inclusion of health in EAs of major transport infrastructure projects. Across four comparative cases of EAs or equivalent in New South Wales (NorthConnex, WestConnex M4 East, the CBD and South East S Light Rail), and in South Australia (the Darlington Upgrade), we have developed a comprehensive picture concerning how and why health is included or excluded, and in what way, from these processes.

The content analysis showed that, against a framework that draws on international best practice, the EISs partially included health, although some did in more detail than others. The two NSW road projects that required a health assessment focused mainly, as required, on the risks associated with air and noise. Of these, the WestConnex M4 East EIS demonstrated a shift toward assessing health more broadly in relation to social and equity issues. The CSELR EIS showed that including health is possible as part of a social (and to a lesser extent economic) impact assessment, even when this was not required. Further, this EIS demonstrated that health can be considered as a valuable benefit, rather than simply a risk, of a transport infrastructure project. The Darlington Upgrade demonstrated that in the absence of regulated requirements, the inclusion of health requires at least good guidance for the proponent to include. Importantly the submissions reports analysed for the three NSW cases suggested that, at least for road projects, the wider community is deeply concerned about health impacts of projects. Further, this included air and noise issues, but also extended to more social concerns such as mental health. None of the road cases however, adequately assessed these concerns, although as noted, the WestConnex M4 East EIS shows that this can be done. Another major caveat raised in the submissions reports but which also came through in the EISs themselves was the reliance on other chapters' assumptions and modelling to drive the health assessments. The documentary analysis, in a partial answer to this, suggested that the EISs are only capturing a certain point in time in the EA process, and that the actual assessment and development of mitigation and management measures concerning health is a more fluid process. A major concern from a public health perspective concerning the road projects was the clear lack of commitment by government as proponent and regulator for these projects, to ensure that new infrastructure was provided as part of the project design.

The interviews expanded upon and deepened the explanations for many of the findings in the documentary analysis. By taking an institutional frame that investigated the structures (rules and norms governing practice), ideas (content), actors and networks (stakeholders) and the procedures (methods and processes) to analysing the interview data, we arrived at a multi-

layered account of including health in EA that has not, to date, been developed. The core aspects to these findings are presented in Figure 3. These dimensions under each unit of analysis explain why health was included ‘partially’ across each case.

The figure also presents the ultimate finding of this research, that:

*EA is necessary to support major infrastructure project decisions to fully promote and protect human health, but as currently practice is underdeveloped*

**Figure 3: Overall conditions and mechanisms leading to health being partially included in EAs.**

OUTCOME: HEALTH PARTIALLY CONSIDERED IN EISs		
MECHANISMS		
STRUCTURES	IDEAS	ACTORS
REQUIREMENTS DRIVE CONTENT  HEALTH REQUIRED (AS RISKS) WHERE A PERCEIVED COMMUNITY CONCERN  NO KNOWLEDGE OF HEALTH ISSUES OR METHODS OUTSIDE DEPARTMENT OF HEALTH  RESOURCE IMPLICATIONS	HEALTH A NOVEL CONCEPT  NECESSARY FOCUS ON HEALTH RISKS FROM ENVIRONMENTAL EXPOSURES  HEALTH BENEFITS MISSING, SOCIAL ISSUES UNDERCONSIDERED  QUESTIONS CONCERNING INCREMENTAL RISK FROM PROJECT vs BACKGROUND LEVELS OF RISK	RELATIONS AND TENSIONS BETWEEN ACTORS FACILITATE, ENHANCE OR EXCLUDE HEALTH  COMMUNITY DISTRUST OF GOVERNMENT  HEALTH DEPARTMENT TECHNICAL ADVISORY ROLE AT MULTIPLE POINTS IN THE EA PROCESS  CONSULTANTS INFLUENTIAL WITHIN EXISTING BOUNDARIES OF REQUIREMENTS
<i>TECHNICAL PROCEDURES:</i> HEALTH ASSESSMENTS ARE NECESSARILY TIED TO AND INFLUENCE THE ASSESSMENT OF OTHER ISSUES (AIR, NOISE, TRAFFIC). HEALTH IMPACT ASSESSMENT NOT SUPPORTED. LOCAL HEALTH BASELINE DATA COLLECTION NOT AVAILABLE.		
<b>CONCLUSION:</b> <b>EA IS NECESSARY TO SUPPORT MAJOR INFRASTRUCTURE PROJECT DECISIONS TO FULLY PROMOTE AND PROTECT HUMAN HEALTH, BUT AS CURRENTLY PRACTICED IS UNDERDEVELOPED</b>		

Including health in EA meant, above all, understanding the EA process within a broader frame of government infrastructure decision making. These broader and earlier decisions that set the geographical and conceptual boundaries to each project currently do not consider health issues. There is also, outside of the health department, very limited understanding of what health means for transport infrastructure and how to include this.

What did become clear was that the EAs, through the requirements set for proponents, were intended to focus on perceived issues of concern in the wider community. These issues, in the absence of a legislative mandate to include health, became an implicit mandate or rule for EA practice. Ultimately, the EA process considers trade-offs between the overall benefit of projects for the wider community with local impacts. Health was understood as being an important part of this analysis, but there was limited knowledge about how to progress these

assessments. The health department, invited to input into these requirements and across the EIS process, defaults to assessing the risks of the project. This is necessary because of the 'core' and previously set parameters to the work and the need, even where causal assignation of risks to a particular project is not possible, to ensure that health risks have been considered in as much detail as possible. However, risk assessment as currently practiced may be insufficient, as demonstrated by the WestConnex M4 East case, where social issues connected to community disruption, changes to amenity, and property acquisition can have major impacts on health that are not at current adequately captured. Further, risk assessment cannot capture benefits of projects. Crucially, neither the EA process nor the EIS document itself are adequately capturing the back and forth, iterative nature of communication between the health assessment and assessment of other issues. This, if better presented and communicated, could allay community concern about the assumptions behind the assessment of health and other issues in the EIS.

A notable absence from EA practice was health impact assessment. This approach appeared to be either not well understood (outside the health department) or dismissed as being not as valid as health risk assessment (within the health department). This is a major limit to practice that requires further investigation. Health impact assessment may provide a flexible process to engage communities better in an assessment while including risk assessment as a core part. A glaring gap in the policy guidance driving EA practice is that the federal level health impact assessment guidance has not been updated (as required every ten years) since 2001.

While the Planning Department acts as the principle gatekeeper of the EA process under regulation, the Department of Health has a crucial influence as an invited technical adviser. There are pros and cons to creating a regulated, as opposed to advisory, role for the Health Department. Health input may be more constrained under a regulated role as this would mean responsibility for the parameters of the project rather than the objective advice to inform those parameters. However in the absence of this role the engagement of Health in EA is currently ad hoc at best. A health objective and health detail in planning legislation is clearly required as this will influence EA practice beyond the input of the Health Department. Consultants, the Department of Planning, and communities themselves could benefit with clearer policy guidance concerning health input into the EA process.

Finally, health as a broad concern to do with ensuring maximum population health benefit from transport infrastructure was felt to be better considered at the earlier and higher points of government decision making. This intuitively makes sense given the constraints in terms of parameters that EAs are conducted within, although practice as described here has shown the opportunity for considering health beyond these pre-defined environmental risks (air, noise) is possible. At a more strategic level health can and should be considered, but more work is required to strengthen the voice of health within these decisions, and also to ensure that health is included as a proactive issue as part of the trade-offs between economic growth, sustainability, and community costs and benefits.

Above all, across EAs and earlier decisions, health advocates would do well to recognise that health is one of a great many issues to consider in infrastructure planning and investment. The

challenge currently, is that health is not being considered when crucial early decisions are being made.

There are some limitations to the analysis. Our approach is qualitative and therefore has limited generalisability. We were unable to interview informants from the Darlington case. While we had a good distribution of input across our interview sample, we were unable to speak with representatives from the Department of Planning or from local government. Our findings are necessarily focused on specific cases that existed in the Australian, mainly NSW, context which may limit generalisations to other jurisdictions. Finally, the Australian context is one where the government acts as the principle proponent on major infrastructure projects, and this may differ in other jurisdictions.

## **7. Recommendations**

There are some clear recommendations from this research for policy and EA practice. While the research was conducted in two specific contexts (with the interviews only concerning NSW cases) these are presented generically as they have relevance to a wider audience interested in improving EA practice both in Australia and elsewhere:

### **Policy and legislation**

- Insert a healthy planning objective into Environmental Planning and Assessment legislation
- Insert a healthy planning policy to govern strategic planning or plan making from state to local levels or equivalent
- Make human health an assessment criteria for State Significant Infrastructure
- Develop national 'health and transport planning' guidance / document, endorsed by relevant national bodies such as the National Health and Medical Research Council or the Council of Australian Governments
- Revise the 2001 National Health Impact Assessment guidance and connect this to the 2012 Human Health Risk Assessment Guidance
- Ensure Environmental Assessment is a statutory requirement in each state and territory (and federally)
- Incorporate population health concerns, including benefits and risks to community health and potential health care costs or savings, in developing business cases and options appraisal for major infrastructure projects
- Government ensure that projects are required to include new infrastructure that allows for a greater choice of transport options within the design parameters of new major road projects.

### **EA / EIS**

- Departments of Planning / Transport or equivalent to develop guidance for including health in EIS requirements, focussing on
  - Triggers for engaging the Department of Health (size, risk and benefit of project)
  - Health risks
  - Health benefits
  - Wider determinants of health



- Stress and mental health related to changes in local amenity and property acquisition; and
- Linking to updated Health Risk Assessment and Health Impact Assessment best practice models
- Department of Health to develop a population health approach to providing input into EIS requirements
- Develop training course on the EA and EIS process for population health staff
- Engage with principle consultancy agencies about the opportunities for and guidance concerning the inclusion of health issues in EA processes (including as part of tendering)
- Provide communities opportunities for understanding the broad health ramifications of projects at multiple stages of the EA process, and the iterative nature of the decisions that are presented in the EIS
- Develop and provide risk communication training to consultants and government agencies engaged in the EA process.

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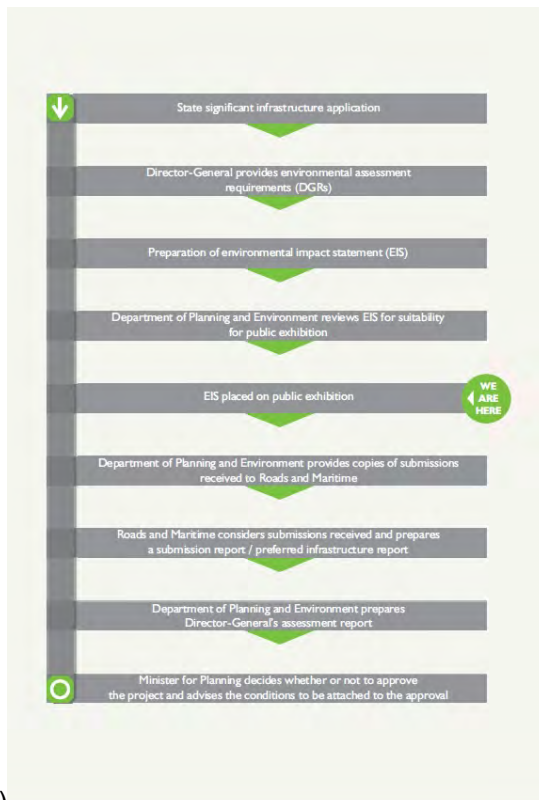
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## Appendix 1: Graphic illustrations of the EA process

(taken from the WestConnex M4 East EIS, although similar figures were presented in each



case)

## Appendix 2: summary of the cases and their statutory and strategic context (in order that each case was developed)

### NorthConnex

#### Proposal and objectives

NorthConnex is a tolled motorway which fills a gap between two existing motorways in the North of Sydney. The proposal satisfies several local, state and national objectives by drawing together an existing regional freight network, contributing to a series of integrated motorways designed to facilitate flow around the city, as well as free local roads from congestion and heavy vehicle movements with the intention of making them safer, more amenable to walking and cycling and providing opportunities for improved public transport in the area.

The key features of the project are twin motorway tunnels around nine kilometres in length with two lanes in each direction and provision for a third lane in each direction if required in the future. The project is also to construct several interchanges to facilitate its integration with the existing network, as well as for ancillary facilities for motorway operation, such as electronic tolling facilities, signage, ventilation systems and fire and life safety systems including emergency evacuation infrastructure.

Of note is that although the project proposes modifications to service utilities and associated works at surface roads near interchanges, it is not to make any substantial modification to the existing surface road network or to any other alternative transport infrastructure. No provision is made at this stage of the project to ensure these local roads receive any treatment to encourage slowed traffic and infrastructure for active and public transport modes.

### **Statutory planning context**

The proponent for the project is a state government authority responsible for roads – the Roads and Maritime Authority (RMS). Clause 94 of State Environmental Planning Policy (Infrastructure) 2007 permits development for the purpose of a road or road infrastructure facilities to be carried out on any land by or on behalf of a public authority without consent. The project is therefore, legally, permissible without development consent. On the 25 October 2013 the project was declared by the then Minister for Planning to be State significant infrastructure and critical State significant infrastructure, consent is therefore required with the state Minister for Planning officially responsible for assessment of the proposal and the granting of consent. The Director General of the Department of Planning is responsible for the initial assessment of the proposal and for the provision of Director General's Environmental Assessment Requirements (DGRs). These DGRs guide the conduct of the EA process and preparation of the EIS as part of that process. For this project, final DGRs were issued on 11 April 2014.

### **Strategic planning context**

In 2011, the NSW Government presented a broad strategic plan for development of the State in the form of NSW 2021 – A Plan to Make NSW Number One (NSW 2021) (NSW Department of Premier and Cabinet, 2011). In order to achieve key objectives of NSW 2021 relating to the provision of infrastructure, the NSW Government formed Infrastructure NSW, an independent statutory agency. The primary task of Infrastructure NSW was to prepare the 20 year State Infrastructure Strategy 2012- 2032 (Infrastructure NSW, 2012), which was used to inform the NSW Government's State Infrastructure Strategy (SIS) (NSW Department of Premier and Cabinet, 2012). The SIS is implemented through annual five year State Infrastructure Plans

Infrastructure NSW's recommendations are intended to enable NSW Government decision making, and are considered in conjunction with the advice from other State agencies including:

- NSW Department of Planning and Environment, which is responsible for Sydney's Metropolitan Strategy and associated Subregional Strategies (refer to Sections 3.1.3, 3.1.4 and 3.1.5). These strategies present an integrated planning approach to meeting the housing, employment, transport, land and recreational needs of Greater Sydney over the next 20 years.

Transport for NSW, which is responsible for the NSW Long Term Transport Master Plan (Master Plan) (Transport for NSW, 2012a). The Master Plan sets out an approach for delivering world class transport networks and services to the State's population.

## **CSELR**

### **Proposal and objectives**

The Central Business District (CBD) and South East Light Rail Project ('the CSELR proposal' or 'the CSELR') comprises the construction and operation of a new light rail service in Sydney. The proposal fulfils a number of both the state and city's objectives. It does so by improving reliability and efficiency of travel to, from and within the CBD and suburbs to the South East, improving access to major destinations in the South East, including Moore Park, UNSW, Royal Randwick racecourse and Randwick health precinct, and increasing the use of sustainable transport modes in the CBD and suburbs to the South East.

The project includes 20 light rail stops, a pedestrian zone on George Street, approximately 12 substations to provide power for the light rail vehicles (LRVs), an LRV stabling facility in Randwick and a maintenance depot in Rozelle. The CSELR requires a total of 13 kilometres of track including track required for proposed maintenance and stabling facilities. It will feature high frequency, 'turn up and go' services every two to three minutes during peak periods within the CBD; with services operating every five to six minutes between Moore Park and the Randwick and Kingsford branches, interchange with heavy rail at major rail stations (Circular Quay, Wynyard, Town Hall and Central), ferry interchange at Circular Quay, and bus interchanges at the Town Hall, Queen Victoria Building, Rawson Place, Central Station, Randwick and Kingsford stops.

### **Statutory planning context**

Transport for NSW is the proponent for the CSELR. The planning and environmental impact assessment framework for major infrastructure projects in NSW is provided for under the Environmental Planning and Assessment Act 1979 (the EP&A Act). The proposal was declared a critical 'State significant infrastructure' project by the NSW Minister for Planning and Infrastructure on 20 May 2013. Section 115V of the EP&A Act provides that SSI development can be declared by the Minister to be critical State significant infrastructure by an order of the Minister, if the proposal is deemed essential for the State for economic, environmental or social reasons. The Minister declared the CSELR proposal a critical SSI project by way of the Environmental Planning and Assessment Amendment (Light Rail Project) Order 2013. Under the provisions of section 115W(1) of the EP&A Act, as an SSI development, the CSELR

proposal may not be carried out without the approval of the Minister for Planning and Infrastructure.

The Director General of the Department of Planning is responsible for the initial assessment of the proposal and for the provision of Director General's Environmental Assessment Requirements (DGRs). These DGRs guide the conduct of the EA process and preparation of the EIS as part of that process. After consultation with the relevant State and local government authorities, and using information provided in the supporting document, the Director-General issued his environmental impact assessment requirements for the CSELR proposal on 5 August 2013.

### **Strategic planning context**

The CSELR proposal addresses a number of Sydney's important transport challenges and would make a major contribution to delivery of an integrated and modern transport system. These policies include NSW 2021, the NSW Long Term Master Plan, the draft Sydney City Centre Access Strategy, Sydney's Light Rail Future, Draft Metropolitan Strategy for Sydney to 2031, State Infrastructure Strategy 2012–2032 and various local government planning policies.

NSW 2021: A plan to make NSW number one (NSW Government 2011), is a 10 year plan by the NSW Government to rebuild the economy, return quality services, renovate infrastructure, restore accountability to government, and strengthen the local environment and communities. The plan sets immediate priorities for action and guides NSW Government resource allocation in conjunction with the NSW Budget. The NSW Long Term Transport Master Plan (NSW Government 2012a; 'the Master Plan') is a 20 year plan to improve the NSW transport system. It provides the basis upon which further detailed transport planning, including the CSELR proposal, can be undertaken.

The Sydney City Centre Access Strategy (SCCAS) has been developed in response to the *NSW Long Term Transport Master Plan* (NSW Government 2012a; refer to section 3.2.2) commitments that relate to improving access within and to Sydney's city centre. The SCCAS represents a 20 year program of initiatives designed to deliver a fully integrated transport network for the future of Sydney's city centre. The SCCAS considers all transport modes and their key networks. This strategy is a multi-modal approach to unlock additional capacity within the Sydney CBD and includes a number of separate components across different modes (bus, heavy rail, light rail, ferry, cycling, walking, taxis etc.).

Sydney's Light Rail Future (NSW Government 2012b) is the NSW Government's plan to expand light rail services for the CBD and inner Sydney. The actions outlined in *Sydney's Light Rail Future* would grow public transport capacity, enhance commuter experience and reduce congestion within the CBD, leaving more space for vital commercial traffic and pedestrians.

The draft Metropolitan Strategy for Sydney 2031 (NSW Government 2013a; the draft Strategy) lays the strategic foundation for the city to respond to a growing population with changing needs. The draft Strategy supports the key goals, targets and actions contained in NSW 2021

and have been prepared in conjunction with the NSW Long Term Transport Master Plan and the State Infrastructure Strategy to fully integrate land use and infrastructure outcomes.

The Randwick Urban Activation Precincts (UAP) program was announced by the NSW Premier in March 2013. The UAP process, which is being led by the Department of Planning and Infrastructure (DP&I) (in consultation with relevant councils, agencies and the community), aims to deliver additional housing in areas with access to infrastructure, transport, services and employment through land use rezoning and changes to permissible building density and height.

The NSW Government State Infrastructure Strategy 2012–2032 (Infrastructure NSW 2012) sets out and commits to the State’s infrastructure delivery and reform priorities over the next five years. The strategy is designed to complement the NSW Long Term Transport Master Plan.

## **Darlington**

### **Proposal and objectives**

The Darlington Transport Study (DTS) is a major multidisciplinary investigation into future transport options and land use arrangements. The Department for Transport, Energy and Infrastructure (DTEI) is the proponent of the DTS. The AECOM Consortium, comprising AECOM, PB and QED (part of AURECON), was commissioned by the DTEI to prepare an Environmental Report as part of an environmental impact assessment which has examined the road, rail, public transport interchange, and park and ride components of the DTS. The DTS proposals form an important part of the intention to create a non-stop road transport link between Gawler in the north and Old Noarlunga in southern metropolitan Adelaide. The link incorporates the Northern Expressway, Northern Connector, South Road and Southern Expressway.

### **Statutory planning context**

The Development Act 1993 and Development Regulations 2008 are the primary statutory instruments controlling development activities in the study area. Activities, deemed to be ‘development’ under the Development Act, include those that may affect State heritage places and significant trees, and Crown Development activities. Crown Development activities for the DTS transport proposals could include the park and ride facility, tram–train related infrastructure, bus shelters and related infrastructure. Major developments and projects are usually assessed and approved under section 46 of the Development Act. The environmental impact assessment process for the DTS closely follows the Major Development process under the Development Act, including preparation and exhibition of an environmental report and technical papers for public comment, as well as a supplement report addressing issues raised during the exhibition period.

### **Strategic planning context**

The DTS describes the strategic context as being guided by a number of key Australian and South Australian strategy documents. These include:



- *National Objective and Criteria for Future Strategic Planning of Capital Cities (COAG 2009)*. The Council of Australian Governments (COAG) has agreed that all states will have strategic plans in place for their capital cities by 1 January 2012. The plans will be guided by the national objective and national criteria for future strategic planning of capital cities. The national objective is to ensure that Australian capital cities are globally competitive, productive, sustainable, liveable and socially inclusive and are well placed to meet future challenges and growth.
- *National Transport Policy Framework (NTC 2008)*. The National Transport Policy Framework (NTC 2008) sets forth the requirements for developing a coordinated national policy framework for Australia's road, rail, air and sea transport systems.
- *Adelaide Urban Corridor Strategy (DOTARS and DTEI 2007)*. The *Adelaide Urban Corridor Strategy* (DOTARS and DTEI 2007) details the shared priorities of the Australian and South Australian governments under the previous AusLink Plan. It highlights the importance of South Road as the main route for north-south connectivity in metropolitan Adelaide, both for freight and private use.
- *South Australia's Strategic Plan 2007 (Government of South Australia 2007a) (SASP)*. Achieving strong economic growth without compromising the environment or quality of life are key objectives of SASP. The plan sets a clear vision for the State's future prosperity and wellbeing that is measured through interrelated objectives, specific targets and priority actions.
- *The 30-Year Plan for Greater Adelaide – A volume of the South Australian Planning Strategy (DPLG 2010)*. The *30-Year Plan for Greater Adelaide* is a framework for sustainably managing Adelaide's future growth. The 30-Year Plan recognises the need for a well-planned, well-designed and connected transport network, which supports modal choice, and an increase in public transport patronage. It also makes appropriate provisions for freight. The 30-Year Plan acknowledges the challenges of providing new transport infrastructure and seeks to ensure that existing and planned infrastructure is integrated with existing and planned land uses.
- *Strategic Infrastructure Plan for South Australia 2005/06–2014/15 (Government of South Australia 2005)*. The *Strategic Infrastructure Plan* (Government of South Australia 2005) is a high level framework for the planning and delivery of all State Government infrastructure priorities through to 2015. It was developed to identify infrastructure requirements and help realise the wide ranging goals of SASP.

## **WestConnex M4 East**

### **Proposal and objectives**

The WestConnex M4 East Delivery Authority (WDA), on behalf of the NSW Roads and Maritime Services (Roads and Maritime), is seeking approval to upgrade and extend the M4 Motorway from Homebush Bay Drive at Homebush to Parramatta Road and City West Link (Wattle Street) at Haberfield. This includes twin tunnels of 5.5 kilometres in length and associated surface works to connect to the existing road network. The project is a component of WestConnex M4 East, which is a NSW Government initiative to provide a 33 kilometre motorway linking Sydney's west and south-west with Sydney Airport and the Port Botany precinct.

### **Statutory planning context**

The WestConnex M4 East Delivery Authority (WDA), on behalf of NSW Roads and Maritime Services (Roads and Maritime) is seeking approval for the project under Part 5.1 of the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act). Clause 94 of State Environmental Planning Policy (Infrastructure) 2007 permits development for the purpose of a road or road infrastructure facilities to be carried out on any land by or on behalf of a public authority without consent. The project is therefore permissible without development consent. On 5 December 2014, the project was declared by the Minister for Planning to be State significant infrastructure and critical State significant infrastructure, under sections 115U(4) and 115V of the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act) and clause 16 of the State Environmental Planning Policy (State and Regional Development) 2011. Approval from the Minister for Planning is required for State significant infrastructure, and an EIS is required to be submitted and publicly displayed.

The Director General of the Department of Planning is responsible for the initial assessment of the proposal and for the provision of Director General's Environmental Assessment Requirements (DGRs). These DGRs guide the conduct of the EA process and preparation of the EIS as part of that process. On 16 June 2015, modified environmental assessment requirements (now referred to as Secretary's Environmental Assessment Requirements, or SEARs) were provided to Roads and Maritime.

### **Strategic planning context**

*A Plan to Make NSW Number One* (NSW Department of Premier and Cabinet 2011) (NSW 2021) is the NSW Government's 10 year strategic business plan. It sets priorities for action and guides resource allocation to deliver economic growth and critical infrastructure throughout NSW. The *NSW 2021 Performance Report* (NSW Department of Premier and Cabinet 2014) provides information on how the NSW Government intends to measure and deliver on the goals, targets and measures outlined in NSW 2021. NSW 2021 emphasises investment in and delivery of an efficient and effective transport system including road infrastructure that will relieve congestion, reduce travel times, improve road safety and enhance and expand capacity on key road corridors.

The State Infrastructure Strategy 2012–2032 (Infrastructure NSW 2012a) (State Infrastructure Strategy) is a 20 year strategy which identifies and prioritises the delivery of critical public infrastructure to drive productivity and economic growth. Infrastructure NSW's assessment of the State's existing infrastructure has highlighted critical deficiencies in urban road capacity. The State Infrastructure Strategy identifies strategic infrastructure options to meet the challenges of population growth and substantial increases in freight volumes.

In November 2014 Infrastructure NSW released a revised State Infrastructure Strategy – the State Infrastructure Strategy Update 2014 (Infrastructure NSW 2014; State Infrastructure Strategy Update)– to guide the allocation of funds from the sale of the State's 'poles and wires' electricity network businesses, as part of the NSW Government's Rebuilding NSW initiative. The State Infrastructure Strategy Update has identified the possible expansion of WestConnex M4 East to include connections to Victoria Road and the Anzac Bridge to the north (the

Northern Extension) and a connection to President Avenue at Rockdale to the south (the Southern Extension).

The NSW Long Term Transport Master Plan (Transport for NSW 2012a) (Transport Master Plan) provides a framework for delivering an integrated, modern and multi-modal transport system by identifying NSW’s transport actions and investment priorities for the next 20 years. Under the Transport Master Plan, WestConnex M4 East is identified as a critical link in Sydney’s motorway network and an immediate priority for the NSW Government.

A Plan for Growing Sydney (NSW Government 2014a) aims to promote the growth of Sydney by providing guidance on land use planning decisions in Sydney for the next 20 years. The plan describes where people are likely to live and work, and how they will move around the city and its subregions.

**Appendix 3: Coding Framework health in Environmental Impact Statements**

Approach	Coding for what?
Step 1: Attribute coding	Attributes of the case found in the EIS and requirements (e.g. tunnel, urban etc.)
Step 2: ‘Health’ explicit	<p>‘health’ and ‘wellbeing’ and derivatives of these which mention either word</p> <p>‘health’ or wellbeing sections / chapters</p>
Step 3: Additional detail	<ul style="list-style-type: none"> <li>• <b>Objectives</b> (for the project being assessed / for the EIA)</li> <li>• <b>Topics</b> (in the EIAs <i>against chapters, headings</i> etc.)</li> <li>• <b>Sub-issues / impacts / outcomes</b> – e.g. air quality, noise, social wellbeing               <ul style="list-style-type: none"> <li>○ Health outcomes (Mental health, mortality etc.)</li> <li>○ Environmental outcomes (reduced pollution, reduced noise, traffic flow etc.)</li> <li>○ Social outcomes (wellbeing, isolation etc.)</li> <li>○ Economic outcomes (business, jobs etc.)</li> <li>○ Behavioural outcomes (increased physical activity, reduced behavioural risk factors etc.)</li> </ul> </li> <li>• <b>Strategies</b> –               <ul style="list-style-type: none"> <li>○ structural e.g. road pricing, active travel, multi-modal transport</li> <li>○ individual behaviour e.g. active travel, car sharing</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Equity</b> (strategy or outcome) - Spatial, temporal, socio-demographic groups</li> </ul>
<p>Step 4: Method used</p> <ul style="list-style-type: none"> <li>- In the health assessment</li> <li>- In assessments of other issues</li> </ul>	<ul style="list-style-type: none"> <li>• Primary data collection – qualitative, quantitative and how?</li> <li>• Stakeholder analysis</li> <li>• Baseline</li> <li>• Secondary data (statistics, documents, literature)</li> <li>• Risk assessment – quantitative and qualitative</li> <li>• Cost benefit analysis</li> <li>• Modelling</li> <li>• Other</li> </ul>
<p>Step 5: Mitigation measures</p> <ul style="list-style-type: none"> <li>- In the health assessment</li> <li>- In assessments of other issues</li> </ul>	<p>What mitigation measures are proposed</p>
<p>Step 6:</p> <p>Best practice approach to technical inclusion of health in EIA</p> <p>Including and assessment of the quality of the information used</p>	<ol style="list-style-type: none"> <li>1. <b>Community health baseline/profile</b> (incl the existing distribution of mortality, morbidity and health status of affected communities and vulnerable/sensitive sub-groups.)</li> <li>2. <b>Causal pathways</b> [Evidence-informed?] discussion of the potential associations and causal pathways from a ‘project aspect’ (project process or activity) leading to a possible change in one or more health determinants that are likely to cause a change in one or more health outcomes (e.g. communicable disease, non-communicable disease, etc.).</li> <li>3. <b>Health data and evidence</b> Use of health impact research evidence, qualitative and quantitative, to identify causal pathways and the significance of a health impact.</li> <li>4. <b>Health equity</b> Discussion of the possible interactions between project aspects, health determinants, health outcomes and health equity. Discussion of the distribution of health impacts across vulnerable/sensitive groups e.g. lower socio-economic groups, women, children, etc.</li> </ol>