



Government of **Western Australia**
Department of **Health**

Health Risk Assessment (Scoping) Guidelines

A health risk assessment process for risk assessors for use within the scoping stages of environmental and health impact assessments



Executive Summary

Health risk assessment is about providing information to make informed decisions. This document and framework have been developed to provide those involved in approval processes with an approach to consider health risks within the scoping stages of health and environmental impact assessments. The specific focus of the process described here is the Scoping stage of the approvals process but it could also be useful in the risk assessment/risk management stages of the impact assessment process.

The Environmental Protection Authority (EPA) developed a risk-based approach for environmental impact assessment which acknowledged the importance of recognising public health issues associated with project development. Brief information is presented on the establishment of this framework from the EPA's approach, clarity on the terminology used and the role of the framework within Health Impact Assessment.

The framework is based on risk assessment methodologies but provides a more specific health characterisation of potential risks to the public from new project proposals. It is hoped this framework will assist prioritisation of risks within the scoping stages of impact assessments and provide some guidance on the reduction of risks to the health of potentially affected populations.

It is intended that the use of this framework is trialed by proponents and the health sector and that a review of the process will be undertaken during 2011. Your feedback on the process at this stage will be welcomed.

Acknowledgements

The framework outlined in this document arose from the development by the Western Australian Environmental Protection Authority of a risk based approach for environmental impact assessment. The expertise of the many specialists within the Department of Health, at Curtin University of Technology and elsewhere who contributed towards the development of this framework is acknowledged. These contributors are listed in Appendix 1.

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Message from the Environmental Health Director

The use of risk assessments to assess the potential impacts to the community, businesses or the environment have increased in recent years in response to many factors. Of particular relevance is the need to assess whether products, processes, situations and activities could increase the risk of significant health consequences for human populations.

The Department of Health in Western Australia has endorsed the use of Health Risk Assessments of potential impacts to health during the planning stages of new developments and to evaluate activities where potential risks to health are being considered.

The processes outlined in this document provide a more specific characterisation of potential risks to the public than currently available and been developed to assist proponents and others required to undertake formal impact assessments for new developments. These processes may also be useful for other forms of assessments where risks to the public are being considered.

Users are also referred to the following publications when undertaking risk assessments for health:

Health risk assessment in Western Australia (Department of Health)

Environmental Health Risk Assessment: Guidelines for assessing human health risks from environmental hazards (enHealth Council, Department of Health and Aging).

It is hoped you find these processes of assistance.

A handwritten signature in black ink that reads "Jim Dodds". The signature is written in a cursive style with a large, looping initial "J".

Jim Dodds
Director Environmental Health

Health Risk Assessment (HRA) definitions, terminology and interpretations

The use of consistent and readily understood terminology is important to risk assessment and risk communication and facilitates a wider understanding of the risk-based component of the Health Impact Assessment (HIA) approach. The following sections provide definitions of terms used in HRA based on a combination of terminology used in HB 203:2006, AS/NZS ISO 31,000: 2009, by the World Health Organisation, other reputable authorities as well as from investigations carried out within the Department of Health in WA.

Definition of terms – general

Health

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (WHO, 1948).

Public Health

The draft Public Health Bill (2008) for Western Australia defines public health as the physical, mental and social wellbeing of the community

The World Health Organisation (1998) defines the practice of public health as ‘the science and art of promoting health, preventing disease, and prolonging life through the organised efforts of society’. It has also been referred to as the “combination of sciences, skills and beliefs that is directed to the maintenance and improvement of the health of people” (Last, 1986). The aims of public health practitioners are to improve health, prolong life and improve the quality of life among whole populations through health protection, health promotion, disease prevention and other forms of health intervention (WHO, 1988). Priorities include “reducing disparities in health status between social groups and influencing the underlying social, economic, physical and biological determinants. Public health practice informs and empowers individuals and communities, and creates healthy environments through the use of evidence-based strategies, best practice and quality improvement approaches, and effective governance and accountability mechanisms” (NPHP, 2000).

Health Impact Assessment

Health Impact Assessment (HIA) has been defined as “a combination of procedures, methods and tools by which a policy, program or project may be judged as to its potential effects on the health of the population, and the distribution of those effects within the population” (European Centre for Health Policy, 1999)

Definition of terms – specific

Health Hazards

These are the elements of an organisation’s activities that present a hazard or source of risk to health or well-being and may be an event, incident or circumstances. They are activities or elements of a proposal that can interact with human health to represent a risk to health or well-being. Examples are air or water emissions, noise and displacement or relocation of people.

Health Impact

Health impacts are the overall effects, direct or indirect, of activities on the health of a population. The variation and vulnerability among sectors of the population need to be considered.

Risk

The chance of something happening that will have an impact on objectives. For proposals this would refer to a reduction or improvement in the health and or well-being of sections of the community.

Management/Mitigation

This is the coordination of activities to direct and control responses to reduce adverse health effects and enhance positive effects.

Population at Risk

Subgroups exist within populations such as children, the aged, people with disabilities or from low socio-economic areas and these may be particularly affected by proposals.

Context

The context of the HIA is that of community health and well-being.

Acute Health Effects

Health effects requiring medical treatment with a maximum of one month's incapacity/time lost. No significant disability.

Chronic Health Effects

Health effects that are prolonged (more than one month) or permanent.

Medical treatment

Treatment provided by a registered medical practitioner or State Government recognized health care professional.

Hospitalisation

The period of treatment and/or care between a formal hospital admission and separation.

Health Consequences

These are the effects of the event on health, either negative (such as injury, disease or disadvantage), or positive.

Likelihood

This refers to how likely it is that an effect will be experienced. It is referred to as the probability of an impact occurring.

Mitigation Criteria

These are the health risk management strategies developed to reduce negative impacts and enhance positive impacts to an acceptable level.

Health outcome after mitigation

This refers to the status of health effects after mitigation strategies have been put into place. There may be a residual adverse risk to health and well-being however this is regarded as an acceptable level of risk.

Uncertainty

The level of confidence or reliability in the health risk level determined



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Health Risk Assessment (Scoping) Guidelines

1. Introduction

Risk is associated with all human activities and risk assessments are used extensively to provide information on identified impacts to inform decision-making processes. New developments or proposals consist of elements and activities that may result in hazards that have the potential to impact on the health of the community and hence need to be evaluated.

Health risk assessments are a key component of the overall assessment and management of health impacts from development within a Health Impact Assessment (HIA) framework. The health sector in Western Australia applies health risk assessments to evaluate the potential impacts on public health from activities through a structured evaluation of the scientific, technical and social components of risks. The health risk assessment process is usually based on ensuring that the risks to health can be mitigated by the activity meeting appropriate health criteria or standards.

The Environmental Protection Authority (EPA) has determined that a risk-based approach may be applied in the Environmental Impact Assessment (EIA) process in Western Australia. It is assumed this process will apply during the scoping phases of the EIA and include the consideration of potential impacts of developments to humans.

To integrate HIA processes within EIA, it is appropriate that the criteria used within the EIA risk-based approach are consistent with the terminology and understandings used within the health sector and that they correspond with those used by the EPA.

This guidance document provides a framework for the health risk assessment component of the scoping phase within the Environmental and Health Impact Assessment processes.

The process outlined in this document will assist with determination of an estimate of risks to health of proposed activities. Where risks are identified as unacceptable, management strategies should be considered to mitigate them before the approval process proceeds to the next stage. The process can also be used to reassess risks once control measures have been developed.

The terminology and interpretations in this document have been based on consultation across the Department of Health Western Australia, particularly the Public Health Division, and representatives from the Population Health sectors within the WA Country Health Service. Specific sectors included Environmental Health (EH), Communicable Disease Control (CDCD) and Disaster Preparedness and Management (DPMU). Consideration of the potential impacts from development, especially in regional areas, on provision of health services and other local implications was included.

The Department of Health has previously published the document *Health Risk Assessment in WA* that explains the health risk assessment process in more detail. Similarly, the Commonwealth Department of Health and Aging provides information on the technical requirements for health risk assessments: *Environmental health risk assessment: guidelines for assessing health risks from environmental hazards*. The documents and further information on health risk assessment can be accessed from <http://www.public.health.wa.gov.au> and <http://www.health.gov.au> respectively. The framework should be used in conjunction with the processes outlined in these documents.

2. Background

2.1 The EPA Risk Based Approach and Health

The EPA's risk-based process was presented in the Report: *Review of the Environmental Impact Assessment Process in Western Australia (March 2009)*. During the EIA process this approach considered:

- the scope of impacts that may emerge,
- consideration of the scale of environmental consequences and risk levels,
- mitigation/management responses to the risk levels, and
- the level of risk to achieve appropriate environmental outcomes.

The section; the *Applications of Risk-based Approach in all stages of EIA*, from the EPA's review process was considered in the development of this framework. The EPA established draft consequence, likelihood and risk response tables with an associated risk matrix as well as risk treatment criteria.

The consequence rankings developed by the EPA include impacts to humans but these are not specific and the likelihood measures are not readily applicable to health impacts.

Potential impacts to health include benefits to people as well as potential adverse effects from activities that might arise in the short term or from the proposal over its life span.

The risks to the health of communities from activities are assessed using available information. If enough information is available a reasonable estimate of risk from activities can be determined. If information is limited, estimates are used. The perception of risk is an important factor which must also be considered in risk assessment but is beyond the scope of this document.

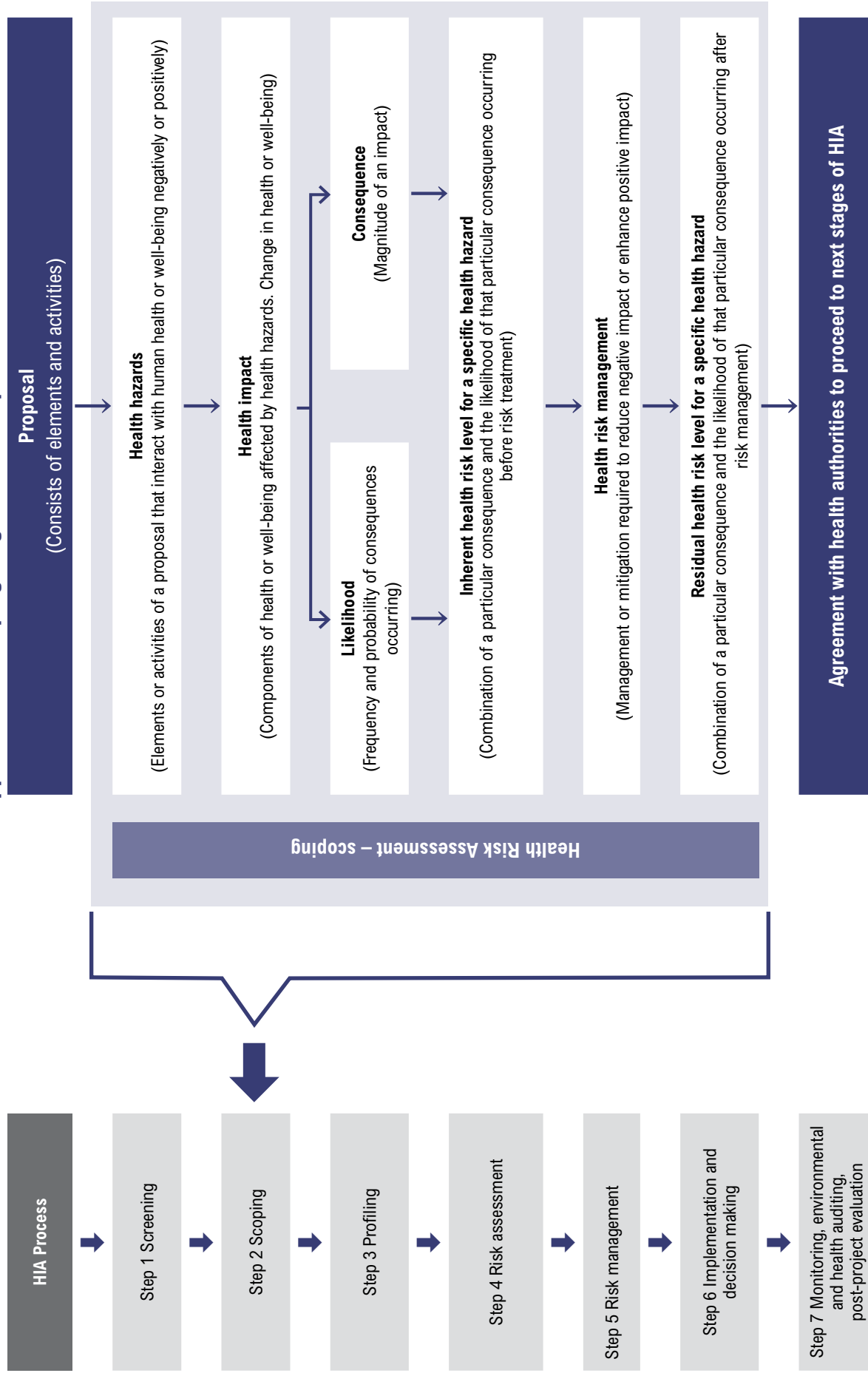
To enable an appropriate risk assessment of the adverse effects to health from developments, it is important that a framework is established which can guide estimation of the level of risk. This health risk assessment framework has considered a range of potential outcomes for acute and chronic effects as well as the potential risks to the provision of health services. The ranking criteria do not provide absolute limits but a range is given that would be considered appropriate from a human health perspective under most circumstances.

2.2 The Risk Based Approach for Health

Initially a decision is made by the proponent, decision makers or other stakeholders to determine if a proposal requires an HIA. An HIA is usually required if the health impacts of a proposal are not considered insignificant, if there is potential for unknown health impacts or if the impacts are not easily controlled using well established management strategies. This screening process will normally consider the size and nature of the potential health impacts (positive and negative) and whether there are likely to be cumulative impacts. The Health Impact Assessment Framework is illustrated in Figure 1.

Figure 1 Flow chart of the HRA process

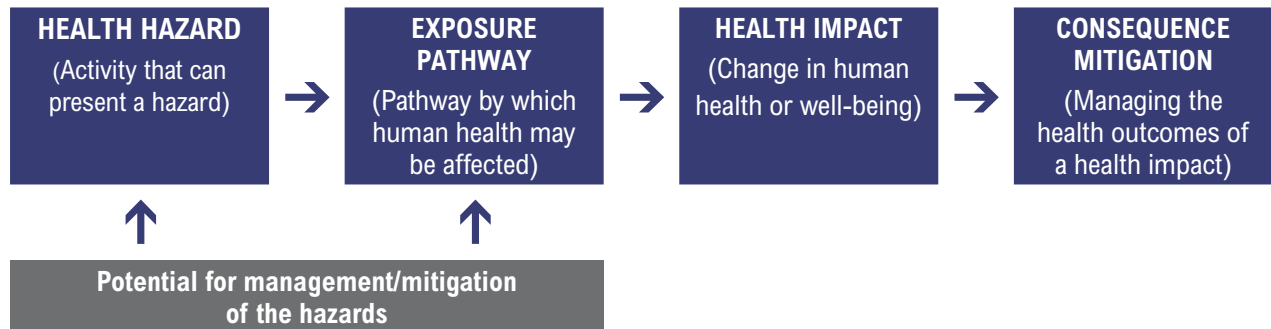
The HRA outlined in this document is to be applied at the scoping stage of the HIA process



2.2.1 Health Hazards and Health Impacts

The relationship between Health Hazard and Health Impact is shown in Figure 2.

Figure 2 Links between health hazards and health impacts



2.2.2 HRA in the Scoping Stage

If it has been established that a proposal could have potential impacts on health, the Scoping Stage of the HIA or EIA identifies the health impacts that need to be addressed. Scoping includes:

1. Characterising the potential health impacts: their identification and importance.
2. Setting boundaries such as the timescale, geographical area and the population that could be affected noting any sectors of special concern or vulnerability.
3. Identifying the stakeholders that need to be involved
4. Reaching agreement on details of the health risk assessment among the proponent, the health authority and other stakeholders (enHealth, 2001).

This document provides guidance in the Health Risk Assessment component of the scoping stage of the HIA process. The intention is to apply it as an initial appraisal of the potential risks to the health of the population for use by health sectors, proponents and other interested stakeholders.

The EPA established six levels of consequence rankings and so to provide parity six health consequence rankings have been established for this HRA process. These range from catastrophic to negligible/slight; each with comments about potential impacts to humans. Similarly, five likelihood possibilities ranging from almost certain to rare/remote have been provided. This document also provides ranked criteria for risk management, as well as confidence estimates that require consideration and interpretation by the health sector.

To determine the risk level for each identified hazard associated with an activity, the consequence and likelihood estimates are combined through the use of the Risk Matrix to provide five possible health risk levels ranging from very low to extreme. The issues under consideration for each potential hazard may vary across public health areas and could differ depending on the type of proposal and its proximity to human populations.

An outline of a case study example on a highway extension using the risk based approach for health risk assessment is given in Appendix 2.

3. Health Risk Assessment

The following outlines the use of the HRA framework demonstrating the relationship between consequences and likelihood to ascertain a level of risk for each identified hazard. In summary the process after determining the issues that require consideration (scoping) requires:

1. Consideration of consequences: refer to Tables 1 and 2
2. Consideration of the likelihood level: refer to Table 3
3. Determination of the risk levels: refer to Table 4

3.1 Health Consequences

A health consequence indicates the magnitude of an impact on health or well-being of the community at risk. Health consequences can result from any aspect of a proposed development from construction, operation and/or decommissioning. Health consequences may be expressed in qualitative or quantitative terms.

Consequences to health can also arise from and include community values (social values, environmental assets – e.g. national parks, nature reserves, and cultural areas) and policies.

Consequences can be categorised, on a scale of 1-6, as follows:

1. Catastrophic
2. Massive
3. Major
4. Moderate/significant
5. Minor
6. Negligible/slight

To determine the consequence categories two assessments will be required.

3.1.1 Consequences to Communities

Table 1 provides a guide to the range of possible consequences which can be used to determine the consequence category for a health impact. The table consists of two components used to consider the potential consequences to human health from specific hazards at a point in time or for the duration of the project.

To use this table, both the possible acute and chronic public health consequences need to be considered. If the consequence categories for the public health consequences are different, the overall consequence category will be based on the category with the most severe category. For example, when a proponent determines that the acute health consequences are 'Moderate/Significant' and the chronic health consequences are 'Major' the consequence category for the public health impact consequences will be 'Major'.

Table 1 Categories for Health Consequences

Category	Acute Health Consequences (per Hazard or Outbreak)	Chronic Health Consequences (per Project Lifecycle)
Catastrophic 1	>1 fatality OR >5 permanent disabilities OR Non-permanent injuries requiring hospitalisation for 5–10% of population at risk OR Acute health effect requiring hospitalisation for >5-10% of population at risk	Chronic health effect requiring medical treatment for 10–15% of population at-risk*
Massive 2	1 fatality OR 2–5 permanent disabilities OR Non-permanent injuries requiring hospitalisation for 2–5% of population at risk OR Acute health effect requiring hospitalisation for >2–5% of population at risk	Chronic health effect requiring medical treatment for 5–10% of population at-risk*
Major 3	No fatality AND (1 permanent disability OR Non-permanent injuries requiring hospitalisation for >1–2% of population at risk OR Acute health effect requiring hospitalisation for >1–2% of population at risk OR Evacuation is necessary)	Chronic health effect requiring medical treatment for 2–5% of population at-risk*
Moderate/ Significant 4	No fatality AND No permanent disability AND (Non-permanent injuries requiring hospitalisation for 1–2% of population at risk OR Acute health effect requiring hospitalisation for 1–2% of population at risk AND No evacuation	Chronic health effect requiring medical treatment for 1–2% of population at-risk*
Minor 5	No fatality AND No permanent disability AND (Non-permanent injuries requiring hospitalisation for 1–5 persons OR no acute health effect requiring hospitalisation) AND No evacuation	Chronic health effect requiring medical treatment for about 0–1% of population at-risk*
Negligible/slight 6	No fatality AND No permanent disability AND No non-permanent injuries requiring hospitalisation AND No acute health effect requiring hospitalisation AND No evacuation	No chronic health effect requiring medical treatment

*Estimated average size of population at-risk across project lifecycle

3.1.2 Consequences to Health Services

This section focuses on the ability of the health system to provide health care services for each hazard as shown in Table 2. Services may vary between locations, especially in regional areas, so it is important that appropriate consideration is given to the size, availability and complexity of services locally, regionally and where necessary, state-wide levels. Consideration should be applied to the potential for specific hazards at given points of time and over the lifetime of the proposal.

Table 2 Consequences to Health Services

Category	Consequences to Health Services
Catastrophic 1	>\$10,000,000 of health cost per hazard OR Demand exceeds capacity of health services by >40% at any point of time
Massive 2	>\$5,000,000 – \$10,000,000 of health cost due to hazard OR Demand exceeds capacity of health services by >30–40%
Major 3	>\$1,000,000 – \$5,000,000 of health cost due to hazard OR Demand exceeds capacity of health services by >20–30%
Moderate/Significant 4	>\$500,000 – \$1,000,000 of health cost due to hazard OR Demand exceeds capacity of health services by >10–20%
Minor 5	\$100,000 – \$500,000 of health cost due to hazard OR Demand exceeds capacity of health services by >1–10%
Negligible/ slight 6	< \$100,000 of health cost due to hazard OR Demand exceeds capacity of health services by 0–1%

3.1.3 Next Stages

From the two procedures two category levels for each hazard will be obtained. To proceed to the next stage of the risk assessment process and determine the risk for each hazard, the two components need to be treated separately.

It must also be noted that the risk management strategies proposed will be different for each component.

3.2 Use of Likelihood Table

Likelihood is the probability or frequency of a consequence occurring and takes into consideration the probability and frequency of:

- The health hazard occurring
- The population being exposed to the health hazard
- The population groups being affected.

The likelihood of a consequence may be expressed in qualitative or quantitative terms in a table format. A likelihood table shows a range of probabilities on a scale of 1–5 as seen below.

1. Almost certain
2. Likely
3. Possible/occasionally
4. Unlikely
5. Rarely/remote

Table 3 gives a likelihood table that can apply to the scoping phase of a proposal.

Table 3 Likelihood Categories for HIA

Level	Likelihood Descriptor	Frequency of Incident or Outbreak with NON-CHRONIC HEALTH EFFECT	% Chance of CHRONIC HEALTH EFFECT during life of project
1	Rare/remote	Once in more than 10 years	Up to 5%
2	Unlikely	Once in 5 – 10 years	6 – 30%
3	Possible/ occasionally	Once in 3 – 5 years	31% – 60%
4	Likely	Once in 1 to 3 years	61% – 90%
5	Almost certain	More than once a year	Over 90%

(Based on WA Health - CORPORATE RISK EVALUATION PROCESS and CRITERIA TABLES, 2009)

3.3 Health Risk Level Using a Health Risk Matrix

A health or well-being risk is the chance of something happening that may affect a health or well-being outcome. Health or well-being risk is expressed in terms of a particular consequence for a particular activity and the likelihood of that particular consequence occurring. A risk level is also an indication of the significance of a health or well-being impact.

Health risk level should be expressed on a scale as follows:

- Extreme
- High
- Medium
- Low
- Very low

Inherent health risk level is the level of risk before the application of mitigation or risk management measures.

Residual health risk level is the level of risk after the application of mitigation or risk management measures.

A health risk matrix comprises a range of consequences and probabilities (likelihood) to determine risk level. A health risk matrix is shown in Table 4.

Table 4 Risk Matrix for HIA (Qualitative)

Likelihood	Consequences					
	Slight/negligible	Minor	Moderate	Major	Massive	Catastrophic
Almost Certain	Low	Medium	High	Extreme	Extreme	Extreme
Likely	Low	Low	Medium	High	Extreme	Extreme
Possible	Very Low	Low	Low	Medium	High	Extreme
Unlikely	Very Low	Very Low	Low	Low	Medium	High
Rare/remote	Very Low	Very Low	Very Low	Low	Low	Medium

4. Health Risk Management or Mitigation

4.1 Health Risk Management Criteria (Mitigation Criteria)

Risk management criteria are developed for each risk level to indicate;

- The acceptability of the risk
- The extent of risk management or mitigation required
- Those health hazards requiring more detailed assessment (identified at the scoping stage)

Extreme risk is normally unacceptable and the aim is to reduce the risk to health to low or very low. Scoping risk management criteria according to the risk ranking is shown in Table 5.

Table 5 Risk Management Criteria According to Risk Rating at Scoping Stage

Risk Rating	Risk Mitigation/Management Criteria
Extreme	Potentially unacceptable: modification of proposal required
High	Major mitigation/management (including offsets) may be required – Assessment required of health hazards
Medium	Substantial mitigation/management required – Assessment required of health hazards
Low	Some mitigation/management may be required – No detailed assessment of health hazards required but addressed with routine controls
Very Low	No further assessment required

5. Uncertainty

It is important to understand that there is uncertainty about the reliability of the risk assessment process. The assessment of risks associated with impacts on human health and well-being is particularly uncertain in the early stages of the development of a proposal when not much may be known about the health and well-being status of the population likely to be affected.

Uncertainty can be addressed in risk-based HIA by:

- Obtaining more data and information through health impact investigations to better define the risks;
- Conducting screening level risk assessments for the population, especially vulnerable sections of the community, to better define the risks to the population at risk.

Uncertainty will be a consideration at the scoping phase and should be transparent in the results of the risk assessment process. This can be done by indicating the level of confidence in risk levels determined as follows:

- High confidence
- Reasonable confidence
- Low confidence

It may not be possible to determine a high level of confidence and so a conservative approach should be taken to provide an acceptable level of risk in the protection of health and well-being of the population. An adaptive management approach is needed. This approach aims to reduce uncertainties over time through monitoring and other information gathering processes. Table 6 provides an indication as to the level of confidence given the available data and information.

Table 6 Confidence in Predicted Risk Rating

Confidence Level	Data Available
High confidence	Several expert investigations/studies Excellent information and survey data Long term monitoring results available Modelling conducted and calibration shows good adherence to real occurrences Strong evidence of exposures resulting in adverse health impacts
Reasonable confidence	More limited information and survey data available – complies with Department of Health guidance Short term monitoring results available Modelling conducted but calibration shows occasional aberration from predicted occurrences. Available information is adequate and there is some evidence of exposures resulting in health impacts
Low confidence	No survey data No model verification possible No modelling conducted Available information is inadequate Little information on exposures and health impacts



6. Summary

This document has provided an approach to the consideration of health risks during the scoping stages of Health Impact Assessments of projects. This framework should assist proponents in evaluating and prioritising potential health hazards before moving into the next stages of the formal assessment procedures.

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Appendix 1 Workshop Participants

The contributions of the following from the Department of Health in WA and others in the development of this guideline document are gratefully acknowledged.

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Appendix 2 Case Study

Preliminary health risk assessment at the scoping stage within health impact assessment

Case Study

A proposed development of a major highway

Introduction

The aims of this case study are to give a brief outline of the process and to provide examples of how the terminology can be interpreted and used. This does not represent a real case and is only to provide guidance on the use of the process.

The proposal is a major highway development which is proposed for development through an urban area. Government has been asked to consider if the proposal requires environmental or health impact assessments.

Screening

The screening process is used to determine if a proposal requires a HIA. Consideration of potential impacts from the construction and ongoing operation of the highway on the population at risk has indicated that this development has the potential to adversely affect the health of the local community. Issues of concern are likely to be air and noise pollution, aesthetics of the area and psychosocial impacts. It has also been indicated that there may be positive health effects for some sections of the population such as easier access to facilities and increased jobs during the construction phase. The decision has been made for the HIA to proceed.

Scoping

The scope of impacts to be considered includes the timescale for the construction and for the operation of the highway, the geographical area concerned and the population likely to be affected by the construction and operation of the highway.

The stakeholders would include several sectors of federal state and local government, local residents and local businesses.

Examples of Risk Components

Risk Terminology	Examples		
Health Hazards	<ul style="list-style-type: none"> ■ Air emissions from vehicle exhaust (cars and heavy vehicles) ■ Noise emissions (during construction and use of highway) ■ Light pollution from traffic at night ■ Deposited rubbish (glass and metals) from road users ■ Particulate matter (including dust) from road materials and tyres ■ Increased traffic accidents (during construction and use of highway) ■ Loss of use of the land for current purposes (is it currently being used for recreation?) 		
Health Pathway	<ul style="list-style-type: none"> ■ Respiratory system ■ Cardiovascular system ■ Eyes ■ Stress from noise and visual pollution ■ Nuisance and stress from loss of amenity/aesthetics of the area ■ Stress from decrease in property values ■ Injuries from rubbish collection 		
Health Impacts	Acute Health Consequences	Chronic Health Consequences	Consequences to Health Services
	<ul style="list-style-type: none"> ■ Asthma and other respiratory attacks ■ Cuts and abrasions ■ Broken bones 	<ul style="list-style-type: none"> ■ Stress related illness ■ Disturbed sleep ■ Increased cardiopulmonary and cardiovascular disease ■ Loss of recreational opportunities 	<ul style="list-style-type: none"> ■ Increased medical attendances (GPs, health clinics, hospitals) ■ Complaints to Health Department and Local Government ■ Potential hospitalisations



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