Guideline

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Capital Projects - Economic Appraisal

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Summary The NSW Health Interim Economic Appraisal Guidelines supplement the NSW Government Guidelines for Economic Appraisal to guide development of economic appraisals, with particular focus on health capital project proposals.

The Health Guidelines aim to assist in ensuring that an appropriate range of costs and benefits of capital projects are considered and the most appropriate option is selected.

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Applies to Area Health Services/Chief Executive Governed Statutory Health Corporation, Board Governed Statutory Health Corporations, Public Health System Support Division, NSW Ambulance Service, NSW Dept of Health

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INTERIM GUIDELINES

FOR THE ECONOMIC APPRAISAL OF

CAPITAL PROJECTS

JUNE 2008

(SUPPLEMENTARY TO NSW GOVERNMENT GUIDELINES)

Preface

In order to ensure the best health outcomes, it is important that NSW Health provides its services as efficiently and effectively as possible. This includes ensuring that capital investment in health facilities is considered in the context of value for money and competing priorities.

NSW Treasury has issued guidelines for economic appraisals and compliance with these guidelines is a requirement for capital works proposal across all portfolios.

Economic appraisal is a way of systematically analysing all costs and benefits associated with a proposal and assessing its overall benefits. Consideration of the social and economic benefits of NSW Health's capital programs need to receive appropriate emphasis. Economic appraisal is therefore an important tool in the assessment process. The analytical technique when applied in accordance with best practice provides a rational and logical structure to assist in making decisions about capital projects, program initiatives and policy proposals.

The NSW Health Interim Economic Appraisal Guidelines (hereafter the *Health Guidelines*) supplement to the NSW Government Guidelines for Economic Appraisal (hereafter the *Government Guidelines*) to guide development of economic appraisal, with particular focus for health capital project proposals.

The purpose of the Health Guidelines is not to duplicate the guidance provided in the NSW Government Guidelines for Economic Appraisal (TPP 07-5 and 07-6), which remains the ultimate reference for economic appraisal, but rather to focus on matters that are specific to health related economic appraisals. The Health Guidelines include base case definition in health capital proposals and consideration of health benefits which is an important step towards improving health benefits assessment techniques of identification, quantification and valuation over time.

The Health Guidelines aim to assist in ensuring that an appropriate range of costs and benefits of capital projects are considered and the most appropriate option is selected.

NSW Health acknowledges the role of the joint Health/Treasury Steering Committee in the development of the Health Guidelines.

NSW Health will continue the development of the database to promote continual improvement in the preparation of economic appraisals, which will include relevant research evidence on quantification and valuation of health benefits. NSW Health will continue to review the application of economic appraisals and users' feedback in conjunction with NSW Treasury.

Professor Debora Picone AM
Director-General
NSW Health
June 2008

Contents

NOTE

The Interim Guidelines were prepared by NSW Health with the assistance of Syncea Consulting. The sponsors and the Steering Committee members who have assisted in the preparation and review of the Guidelines are:

NSW Health: David Gates, Kathy Meleady, Cathryn Cox, Richard Pye, John Slater

Health Infrastructure: Robert Rust, Julian Thornton, John Sung, Elsie Choy

NSW Treasury: Enrico Sondalini, Joshua Shrubb, Roger Sayers

It is intended that the Guidelines will be reviewed in 2010 and will be updated to include feedback and experiences gained over the next 18 months.

Inquiries concerning the Guidelines should be initially directed to:

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VERSION RECORD

Version	Date of issue	Summary of changes
V1	June 2008	NA (first issue)

Abbreviations

ABS	Australian Bureau of Statistics
AHS	Area Health Service
BCA	Building Code of Australia
CBA	Cost benefit analysis
CEA	Cost effectiveness analysis
CSP	Clinical Service Plan
DALY	Disability-adjusted life year
PDP	Project Definition Plan
SPP	Service Procurement Plan
TAM	Total Asset Management
VSL	Value of a statistical life
WTP	Willingness to pay
YLD	Years lost due to disability
YLL	Years of life lost

1. Introduction

1.1 Purpose of the guidelines

The overall aim of these Health Guidelines is to improve the contribution that economic appraisal makes to decision making in the health area by providing guidance on the approach to be adopted in regard to key issues in health appraisals.

A standardised approach to economic appraisals facilitates comparisons across capital proposals. The Health Guidelines address the following:

- the relationship of economic appraisal to the planning process in NSW Health
- appropriate use of cost benefit analysis and cost effectiveness analysis
- the definition of the base case
- identification of a range of realistic options
- treatment of health benefits in the context of currently available information and in the future as new research data becomes available over time.

The Health Guidelines emphasise the importance of ensuring that the anticipated benefits from a capital proposal are clearly identified and quantified where possible, within the economic appraisal. The goal is to progressively improve benefits appraisal techniques and more reference sources will be available in the future.

However, it is acknowledged that at the present time, there is limited information on linking enhancements made to health facilities (either new or existing) with the resultant improvements in health outcomes. This is clearly because of the inter-dependencies of many factors which influence health outcomes, including, but not limited to baseline morbidity and mortality of relevant population(s), clinician input, technology and continuity of care. In view of this gap, it will be difficult to quantify many types of health benefits until the research and measurement of health benefits is further advanced. It is acknowledged that the prospect of improvements in health benefit valuation is contingent upon research efforts. Sponsorship and partnership arrangements with research institutes, academia and interested parties are to be encouraged.

In recognition that research in these areas is a gradual process, it has been agreed with NSW Treasury that an acceptable alternative approach at this point in time is to use a combination of cost effectiveness analysis and qualitative assessment of benefits, with benefits quantified where this is possible.

A consequence of this approach is that as most costs are quantified in monetary terms but most benefits are not quantified in monetary terms, the appraisal will show a negative net present value (or net present cost). In these cases, it is most important that the discussion in the appraisal demonstrates adequately the mechanisms for achieving the project outcomes as a result of the capital proposal. This should link to benefits realisation management for the project.

The Health Guidelines will be used mainly by those staff, consultants and analysts engaged in the assessment of service delivery options as part of service procurement planning and the project definition planning phases of the capital planning process.

1.2 Economic appraisal of capital projects

Health appraisals share important commonalities with appraisals in other areas:

- Capital investment is 'lumpy' and not only does it commit major community resources over extended periods of time, but decisions on capital also are a significant factor in determining the levels of service able to be provided to the community of NSW.
- There is a need in economic appraisal to clearly articulate the services to be provided to users of the health system and the outcomes to be achieved (the benefits).
- The overall purpose of economic appraisal is as a tool to identify the best value for money for the community from a range of alternative options and assist decision makers in comparing the relative value of alternative options.

Health appraisals need to deal with some issues that are different from appraisals undertaken in other areas of the public sector. Assessment of capital proposals for the delivery of health services is unique because the proposals are concerned primarily with health gains. These gains are influenced by the complex interplay of factors such as the built environment, workforce, disease incidence and prevalence, other population characteristics, geography and environmental and lifestyle factors. These gains are valued by individuals and the community but the value in many cases is not fully reflected through a market mechanism.

There are also other considerations. For example, major health facilities such as tertiary referral hospitals provide an extended range of services as part of a network often to populations which are geographically remote. Geographic and location considerations are prominent in health planning, both for operational matters and, more importantly, to ensure appropriate levels of access to health services.

The planning process and the economic appraisal must balance complex competing demands. The strength of the economic appraisal methodology is that it can articulate and present the relative costs and benefits of alternative options in a way that can make these competing demands more transparent to decision makers.

1.3 When and how should the economic appraisal be undertaken?

NSW Health has developed a State Health Plan that provides a framework for assessing models of health care, service delivery and demand management programs.

Area Health Services have all developed Area Healthcare Services Plans (AHSP). The AHSP is the overarching document identifying the key strategic directions for an Area Health Service, for a defined period, providing a clear foundation, and detail for more planning and operational decision-making within the Area Health Service. For some projects and some individual clinical services, particularly larger and more complex ones, a Clinical Service Plan (CSP) is also prepared by the Area Health Service to more specifically define the service needs and demands, and hence the scope of the proposed service or capital development.

The outcome of the service planning processes that occur at the State and Area Health Service levels feed into the economic appraisal at the value management study and Service Procurement Planning (SPP) stage. In particular the range of options developed at the Area planning phase will assist in shaping the range of options considered by the economic appraisal. Area Health Services should ensure they consider a wide range of service options to meet identified population health needs so the most appropriate options can be identified. Area Health Services are encouraged to apply the principles set out in the NSW

Government Economic Appraisal Guidelines and the NSW Health Supplementary Economic Appraisal Guidelines in the planning process to ensure value for money outcomes in meeting health service objectives.

The value of undertaking economic appraisal lies in the information and analyses that the process provides in promoting sound decision making on capital proposals. The effort put into preparing the economic appraisal should be commensurate with the consequences of the related decisions and the expected costs of failing to arrive at the "right" decision. Typically the resource implications of the initial decision to progress with a particular capital proposal are far more than the resource decisions made subsequently about variations on a preferred option. For example, the decision to build a new hospital has a larger resource implication than subsequent decisions on the location and configuration of the building. However, the overall cost of new build versus refurbishment and/or expansion and the ability of the options to meet service requirements also require analyses.

A further matter for consideration is that decisions regarding capital proposals can often be broken up into program/project components that are interrelated but can be considered separately for the purpose of economic appraisal. In certain cases, an economic appraisal can assist in comparing the costs and benefits of staging the development of a site as well as alternative configurations that deliver the same service outcomes. Where the service outcomes are different between the staging option and other options, the appraisal results must be interpreted with caution unless the benefits associated with each option can be reliably quantified and valued.

Economic appraisals are particularly important at the early planning stage when a range of alternatives are being considered to inform the decision that a major investment is worthwhile. Economic appraisal is definitely not a process for justifying decisions that have already been made.

It is not just the financial costs to NSW Health or other service providers that determine the importance of a decision: ultimately, it is the potential users of the health care system that will be affected directly by decisions in terms of health outcomes and access.

1.4 Managing appraisals

For individual capital projects, consideration needs to be given at the outset to:

- The availability and cost of economic appraisal resources that are needed
- The need for an appropriate range of advisers for example, by academic experts and peer reviews
- Establishing a project plan for the appraisal, setting out key milestones, resources and work streams
- The possibility of further research on assessment of health benefits.

Affordability, funding and cashflows will need to be considered separately in the Financial Impact Statement. The economic appraisal is not simply an exercise to repeat the financial analysis with discounting.

Health Infrastructure, as the capital project management and delivery agency for NSW Health, is responsible for the overall coordination of economic appraisals for major projects over $10M. Specialist consultancy assistance is needed to support the Project Team and the Project Director to conduct the economic appraisal. A pre-qualified panel of firms is to be established to undertake economic appraisals for major projects and potentially other NSW Health projects of value of less than $10M.

The roles and responsibilities of various contributors need to be well defined and clearly understood at the outset.

Additional guidance, key inputs and information will be required of NSW Health and the relevant Area Health Service. Inquiries in respect of service impacts should initially be directed to:

Area Health Service: Director, Population, Planning and Performance
NSW Health: Director, Statewide Services Development Branch

Further guidance and advice can be obtained from a Reference Group which will be established for 12 months to mid 2009 to support the implementation of the Health Guidelines. The members of the Reference Group will include:

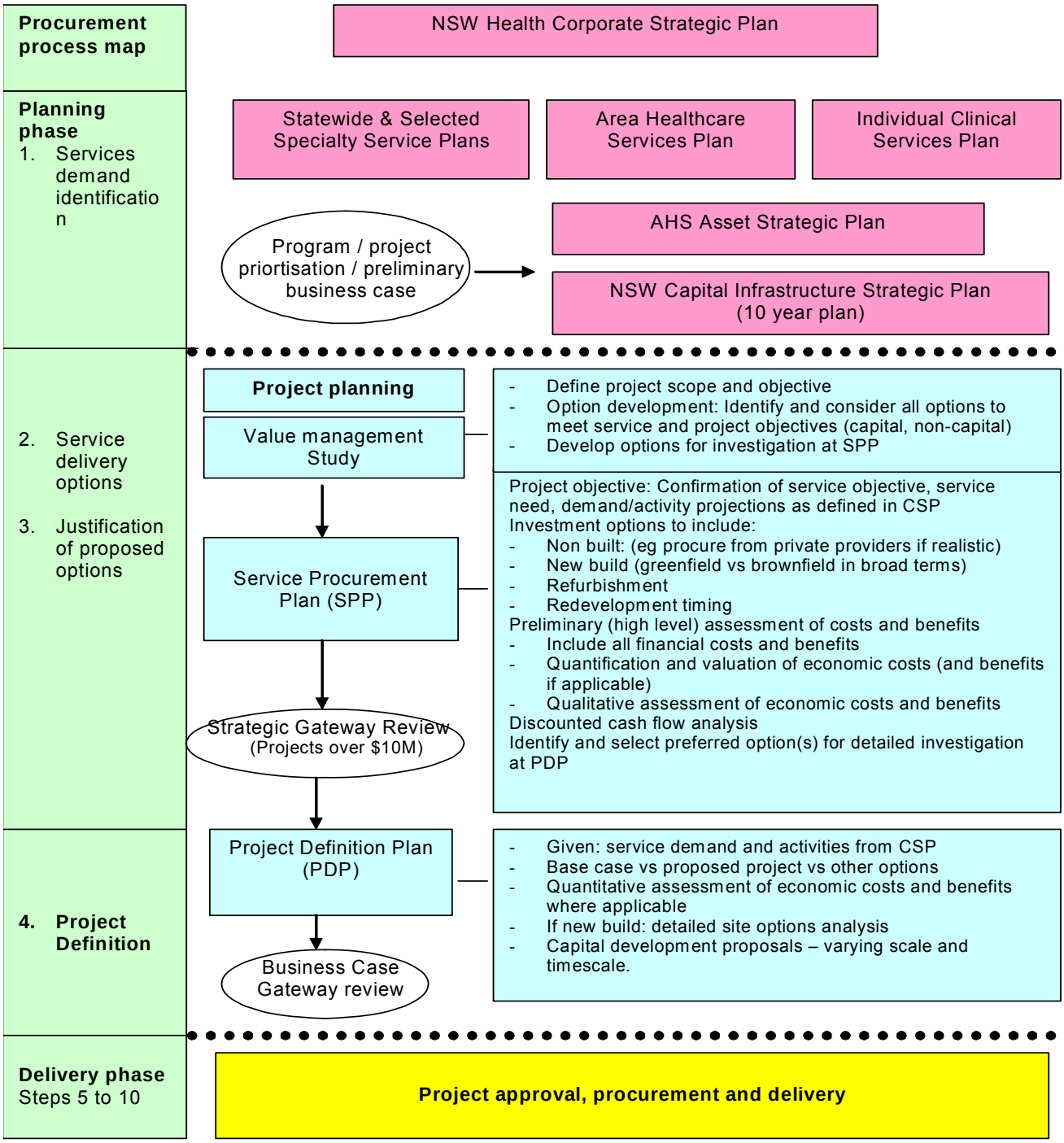
Representative of Health Infrastructure
Representative of NSW Health
Representative of NSW Treasury
Expert external adviser in health economics

2. Economic appraisal and the planning process

2.1 Overview of capital proposals in the overall planning process

A schematic of the capital planning process in NSW Health is shown in Figure 2.1. The diagram shows the first two stages in the process: Service Procurement Plan (SPP) and the Project Definition Plan (PDP). The procurement process map reflects the 10 steps of the NSW Procurement Policy.

Figure 2.1: Service and Capital Planning in NSW Health



Capital planning should form part of an integrated process with service planning as the foundation. The important elements include:

- Area Healthcare Services Plan and related services planning
- Asset Strategic Plans
- Results & Services Plan (RSP)
- Total Asset Management (TAM) planning including the five components of capital investment, maintenance, disposal, Information Computer Technology (ICT) and office accommodation.

Area Health Services identify projects in the Area Asset Strategic Plan for consideration for inclusion in the ten year Capital Investment Strategic Plan (CISP). In addition, a number of services are planned and coordinated at a whole-of-State level due to population issues or benefits to be gained from a statewide approach. These service developments often also require capital investment and will include strategies such as mental health, public health, ambulance services, highly specialised services (such as radiotherapy), and information and communications technology (ICT). Capital investment for these services needs to be considered alongside individual Area priorities.

As part of NSW Health's Total Asset Management planning process, these programs/projects are prioritised and included in the CISP. At the appropriate time, individual projects are then subject to the more detailed project development, planning and evaluation as required under the NSW Procurement Policy processes, including economic appraisal.

Generally, the requirements are:

- For projects of less than $5M, a Functional Brief is required including a summary schedule for the economic appraisal. The summary format should be consistent with Appendix 7.1 and 7.2 provided in the Government Guidelines (TPP07-05).
- For projects $5M to $10M, a combined Service Procurement Plan (SPP) and Project Definition Plan (PDP) report will be prepared, including an economic appraisal report.
- For projects over $10M, economic appraisal will be conducted at the SPP and PDP stages as follows.

2.2 Service Procurement Plan (SPP)

The objectives for the SPP are:
- following consideration of a wide range of viable options, to identify the preferred option to meet the recognised service gap
- to identify the indicative capital and recurrent cost estimates for the various options as appropriate.
- to justify the adoption of the preferred option.

The major outcome of the SPP stage is the identification of a preferred option for detailed assessment at the project definition planning phase. Reasons behind the rejection of each excluded option at SPP should be recorded.

The SPP is to provide an economic appraisal that compares all viable options that close the service gap with the base case option (which will not close the service gap). This comparison will involve qualitative factors to the extent that the benefits of closing the service gap are not quantified.

The economic appraisal should make appropriate citations to reference material used in the analysis that has been sourced from other parts of the planning process, such as the Clinical Services Plan (CSP) and the value management study. Any assumptions should be clearly documented. Demand for health services should be based on the CSP. The CSP will also be a source for information on the capacity and capabilities of existing facilities and the expected extent to which they can meet the service issues.

The economic appraisal at the SPP stage is necessarily of a strategic nature. At this stage, estimates for resource costs will be at a high level and benefits will often be subject to considerable uncertainty. There may also be gaps in data availability in which case it will be necessary to make various assumptions in the economic appraisal to enable certain key impacts to be analysed. While these limitations and difficulties are acknowledged, the economic appraisal is still required to ensure critical issues which impact on the decisions to be made at the SPP stage are identified and considered.

As indicated, the SPP needs to test a range of viable options to assess which one provides the best value for money. The preferred option at the end of the SPP will be the subject for a PDP.

It is recognised that it is sensible to balance the effort on detailed cost estimates and there are uncertainties in the costings at the SPP stage. However, as options excluded at the SPP stage are unlikely to be revisited, it is essential that all potential options are evaluated to an appropriate level of stringency before they are excluded from further consideration. The criterion for the level of detail particularly required in the estimates of costs is that it justifies the recommendations to concentrate on the preferred option(s) at the PDP stage.

2.3 Project Definition Plan (PDP)

The objectives of the PDP are to:

- define the preferred option identified through the SPP process
- resolve any issues with the preferred option
- accurately identify and set the project budget requirements (including recurrent, operations and maintenance costs) for the preferred option
- detail the expected costs and benefits of the preferred option and the project as a whole.

Economic appraisal at the PDP stage focuses on the preferred option(s) nominated from SPP. The thrust of the PDP economic appraisal will include analysis of a preferred option, including decision variables such as the location within a specified site of a facility.

The economic analysis will be more detailed including more accurate estimates of resource costs and qualitative assessment of health benefits.

Any new information obtained since the SPP appraisal will need to be incorporated in the economic appraisal. Where there have been major delays in the planning process or significant changes in the projected costings / scope used at the SPP stage, it will be necessary to reassess the justification of the proposal. On occasion, more accurate information could overturn the previous ranking of the options or it may be necessary to look again at some of the options discarded by the SPP. It is good practice to undertake this sort of iterative analysis.

Costs may also rise due to an increase in scope of the proposal, due to changes in service models or clinical practice, hence resulting in a material change in scope (increased capacity or the capability for new treatments) after completion of the SPP. These major

enhancements in effect are modifications of the proposal and it is not valid to assume that the findings from the original SPP economic appraisal still apply. The preferred approach is to conduct an additional appraisal to assess the anticipated incremental benefits of the enhancement against the projected cost increases and whether the preferred option still remains the best option.

The economic appraisal at the PDP stage retains the requirement for comparison against the base case, and the benefit assessment (where applicable) will need to be revisited as well.

3. Application of economic appraisal techniques to health projects

3.1 Overview of the economic evaluation technique

Economic appraisal is a systematic means of analysing all the costs and benefits of options for meeting an objective, then selecting the best option. Economic appraisal shows:

- Whether the benefits of a proposal or change are expected to exceed its costs
- Which option has the highest net benefit or which option is the most cost effective if benefits are equivalent
- The distribution of costs and benefits across stakeholders.

The results of an economic appraisal will not be the only factor taken into account when making a decision, as it may be the case that benefit quantification is not possible for some services, or aspects of services. Economic appraisals do provide important information on the effects of each possible decision.

3.2 Stating the objective

Capital investment by government is directed at providing appropriate infrastructure used for the delivery of goods and services to the public. Good practice in economic appraisal in the health sector demands that the objective capture and emphasise the health outcomes to be achieved by the proposal.

It is important that the objective is concise and should focus on outcomes (meeting community health needs), rather than outputs, although this is also an appropriate indication of the purpose of the investment. It should exclude mention of the means by which the outcomes are to be achieved, since this can have the effect of excluding what are otherwise valid options. For example, the objectives should not be stated as “provide a new 150 bed hospital” but as “meeting over a period of 25 years the essential health needs of a local catchment of X thousand people that is projected to increase by Y% over the next 10 years with a growing proportion of older people”. It is essential that the project evaluation period of options, whether operating or capital in nature, is measured over the same analysis period.

When the objective is written only in terms of the services to be provided rather than the population health gain to be achieved, there may be a bias towards a particular service solution. Particularly at the early planning stage, the aim is to identify the most cost effective service option to meet identified population health needs. The objective has to be stated in population health terms. For example, reducing the incidence and death from cancer for a particular population will require a range of health interventions from prevention through community based to acute care. If the objective is written as to provide additional surgical services, a specific service solution is implied.

The objective should have been already settled on in early activities of the planning process.

The objective should align with the corporate vision and strategic objectives for NSW Health, as well as based on strategies developed by the Area Health Service.

In the case of health economic appraisals for projects in rural areas, it is expected that often there would be a specifically regional reference in the objective.

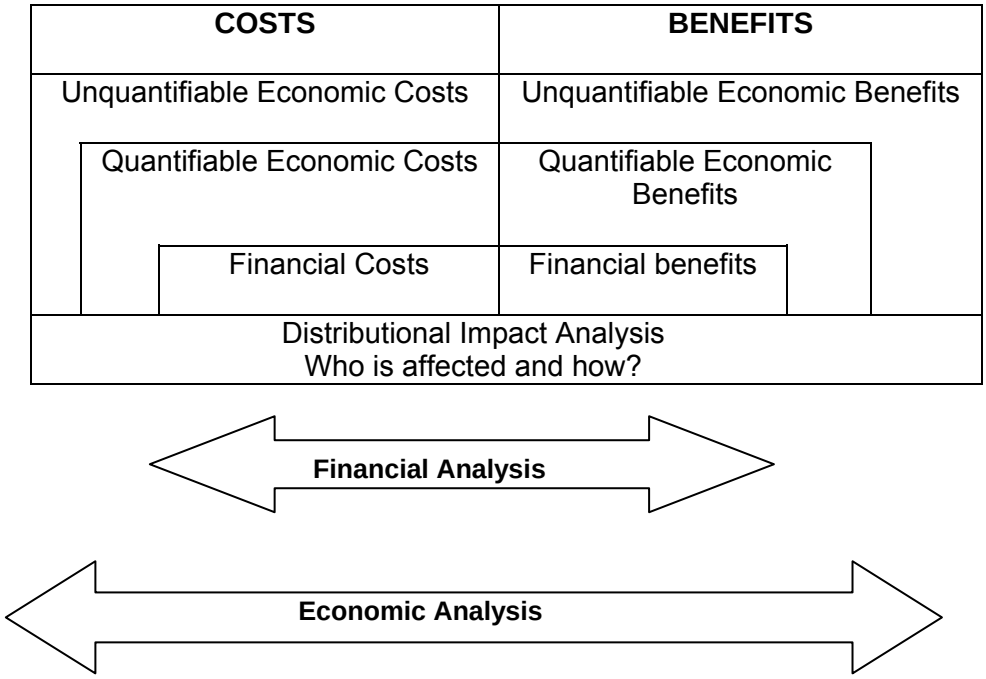
Box: Distinction between outputs and outcomes – Example

A major impact of investing in a refurbishment of a hospital is to facilitate better levels of integration between medical units. While this is an important consideration, improved integration in itself is not a benefit to the community or health system users as such. It is of value only to the extent that it promotes better treatment for patients or that it generates savings in the use of resources that can be deployed effectively elsewhere. It is essential that economic appraisals focus on improvements in the end outcomes. Appraisals should make clear the mechanisms by which these improvements are achieved, where appropriate, by means of the intermediate outputs such as the increased number of treatments after the integration or staffing numbers.

3.3 Overview of the economic evaluation techniques

Different types of evaluation can be applied to proposals. These range from financial evaluations to those that include broader impacts on the community, such as economic and social evaluations (Figure 1.1).

Figure 1.1: Economic appraisal techniques – types of evaluation



Financial analysis focuses on how the financial costs and benefits are paid (or saved) by NSW Health. For example, NSW Health will pay new staff and will purchase new medical equipment.

Economic costs and benefits mean all financial costs and benefits incurred by any party. They also include benefits and costs to other government agencies, Health Services, NSW Health clients, others in the community and non-financial impacts on NSW Health. For example, a proposal may impact on the discharge rates at certain hospitals, as well as improving the clinical outcomes for patients.

Some benefits may be longer term and/or difficult to quantify. For example the reduced morbidity and mortality of heart disease as a result of early intervention, or angiography may not always be well quantified.

The main forms of economic evaluation are cost benefit analysis (CBA) and cost effective analysis (CEA).

CBA offers a framework to compare the welfare of all stakeholders to a program or investment including direct beneficiaries, indirect beneficiaries, users involved in program/project delivery and fund providers. CBA translates all (or the majority of) outcomes and impacts into monetary equivalent. CBA compares all benefits to all costs. If the benefit to cost ratio exceeds 1, the program/project is socially valuable.

CEA is a tool applicable to projects where benefits can be identified but where it is not possible to value them in monetary terms, particularly where there is no market price attached to the benefit. Instead, benefits are expressed in outcome statistics such as number of lives saved, lower mortality rate, etc and service measures such as hospital beds.

Both CBA and CEA examine the costs of producing net outcomes.

Cost effectiveness analysis (like cost benefit analysis) involves identifying and comparing each option to the base case (which normally does not meet the project objectives). In assessing costs, the two methodologies are effectively the same. It is in terms of the non-market benefits that the two approaches diverge.

Where the benefits of each option differ, CEA is not applicable.

3.4 Assessment of costs and benefits in practice

Consultation with stakeholders will assist in identifying the range of costs and benefits to be incorporated in the analysis.

When considering how costs and benefits should be assessed/valued in practice, it is helpful to classify them into three categories:

1. Costs and benefits which can be readily identified and valued in money terms (eg cost of extra medical staff, operating savings from new models of health care, travel and accommodation, episode of care costs).
2. Effects which can be identified and measured in physical terms but which cannot be easily valued in money terms. In the health arena, difficulties in valuation arise because of the absence of market prices (eg increased length and quality of life)
3. Impacts which cannot be accurately quantified such as the comfort people value of knowing that they can access an emergency department if needed. The term “intangible” is often applied to these impacts.

In practice, the items to be valued in monetary terms will include:

Costs

- Capital costs (estimates of the cost of land, buildings and equipment)
- Operating cost (running costs for the whole life of the option)

Benefits

- Those benefits to the broader community which can be valued
- Revenue from selling surplus land
- Benefits to users of the services not reflected in the price paid but which can be valued
- Cost savings
- Avoided cost – that is, costs which will not be incurred if specific action is taken under some option(s)
- Residual value of assets (if any).

Chapters 7 and 8 provide guidance on costs and benefits. Appendix 2 provides a checklist for consideration in economic appraisal.

It is generally assumed that the costs of providing health services can always be quantified in monetary terms though there may be a degree of uncertainty in the estimates.

In accordance with the Government Guidelines, the project period of 20 years should be used for all options.[1]

For all options the expected costs of meeting current statutory obligations over the analysis period should be projected. For options that entail a new building, these statutory obligations may require little if any capital expenditure in addition to the initial capital cost and regular life-cycle maintenance. For options that entail a refurbishment or the continued use of an older building, the cost consequences of these statutory obligations must be fully considered based on sound and reasoned projections.

It is recognised that in the area of social and community services, health, education, law and order, it is difficult to put a price on wellbeing and there are limitations in full application of cost benefit analysis.

3.5 Cost effectiveness analysis in health projects

Cost effectiveness analysis (CEA) is used for comparing projection options that achieve the same or substantially similar service benefits (project outcomes) and when outcomes cannot be measured in monetary terms. To apply CEA in the NSW Health context, these options should be compared with the base case (status quo or keep safe and operating)[2].

The preferred option is identified from the list of options by making a comparison of costs, after allowing qualitatively for minor differences in benefits/project outcomes.

Where project outcomes and service benefits are broadly similar

CEA is regarded as the accepted method for capital project evaluation in NSW Health where benefits can be identified but it is impracticable to place a monetary value on a major proportion of them. Where possible, benefits are quantified (but not valued) and expressed in physical units such as lives saved, etc.

CEA involves identifying and comparing the base case (status quo or ”keep safe and operating”), which normally does not meet the project objectives, and project options that

[1] See the Government Guidelines TPP 07-5 chapter 8: The project life of preferably 20 years, but no more than 30 years, should be used.

[2] This is also known as status quo, do minimum, or minimum essential expenditure.

achieve similar benefits (project outcomes). For CEA, only those options that meet the project objectives (other than the base case) should be included in the analysis.

Each of the project options is compared in respect of its costs against the base case of "status quo or keep safe and operating" in terms of their relative costs in achieving the project objective and benefit.

Costs are measured in dollar terms and are adjusted for market distortions or imputed where the market does not exist.

Benefits, where quantifiable and able to be valued in monetary terms (eg residual value) will be included. Health benefits are significant and although they cannot be valued effectively, it would be appropriate to supplement the analysis with some quantitative measures (for example, impacts on the number of people with access to a service and qualitative measures.

Present value should be estimated for only costs and benefits that can be quantified and valued. The NPV of the net costs is used as the key decision criterion to rank projects, or options, on the basis of cost and to identify the lowest cost alternative.

While a CEA will identify the least cost option for achieving a particular outcome, it will not show whether the unquantifiable benefits outweigh costs. The decision measure for a CEA is the lowest ratio of costs to a particular benefit for each project option as compared with the base case (status quo or "keep safe and operating"). The implicit assumption with CEA is that the cost difference between the base case and preferred option is less than the unvalued benefits of the preferred option Therefore the predominant benefit of the project needs to be identified and quantified as far as possible. Linking the incremental net present cost of each option to the incremental service output over the life of the project will be further examined during the implementation phase of these interim Guidelines.

Box: A simplified example to illustrate the application of cost effectiveness analysis

A hospital redevelopment project was initiated to meet the service demands growth in the High Growth region in 2016. Based on the population projections, the models of health care were identified in the Clinical Service Plan and the projected increase in service demands included.

- increase of the number of separations by 20% from 5,000 to 6,000 per annum
- increase in acute bed numbers by 20 from 100 to 120
- increased integration in community health care by 30% requiring a new community health centre in the town centre.

The following options were identified at SPP stage:

Base case –keep safe and operating against current statutory requirements over the next 20 years, service demand will not be met.
Option 1 – Refurbish existing campus. To meet the projected demand, part of the projected services will be transferred to other hospitals.
Option 2 – Rebuild at a current or new site with all capacity provided at the site
Option 3 – Partnership arrangements with a third schedule hospital to expand/upgrade the capacity at that hospital. A capital grant will be made and funding agreement will be entered into between the parties.

In this case, all options (other than the base case) will achieve the project objectives but with different costing results.

	Base Case	Option 1	Option 2	Option 3
Project objective	Not met	Will be met	Will be met	Will be met
Health benefits		Not quantified	Not quantified	Not quantified
Service outputs in 2016				
- separations	5,000	6,000	6,000	6,000
- acute beds	100	120	120	100
Service gap in 2016	1,000 separations	NA	NA	NA
Net present value ($m)				
- capital cost (next 5 years)	-5	-120	-150	
- capital cost (beyond next 5 years)	-30			
- capital grants				-50
- recurrent cost	-100	-220	-200	-300
- user's travel costs	-5	-2	0	-10
- residual	0	+60	+75	+25
Net present cost ($m)	-140	-282	-275	-335
Incremental net cost as against the base case for cost effectiveness analysis	NA	-142	-135	-195
Based on the cost effectiveness analysis of the three options, option 2 has the highest ranking. It is assumed that the unvalued benefits of option 2 relative to the base case worth at least $135m.				

Where project options do not deliver similar project outcomes or service benefits

In the event that options are required to consider lesser and reduced service scopes, the net present cost of these options cannot be directly compared with the net present costs of those options meeting the project objectives. If this is the case, it is necessary to adopt a benefits appraisal method to rank the options to supplement the NPV analysis, if the preferred approach of CBA is not practical.

Where the project options will not achieve similar project/service outcomes (in terms of quantity and quality), the net present cost comparison of options cannot be used in isolation to identify the least cost option. The analysis should then take into account the unmet demand under each option and apply additional qualitative benefits appraisal method as follows:

- Identifying the benefits criteria relating to each service objective
- Weighting the relative importance (in %) of each benefit criterion in relation to each service objective
- Scoring each of the short-listed options against the benefit criteria
- Deriving a weighed benefits score for each option.

Benefits scores are to be allocated on a range of 0-10 for each option and will be reviewed by a review group nominated by the Project Steering Committee to ensure that the scores are fair and reasonable, and that possible "double counting" of benefits or costs is excluded.

Criteria should be agreed at the start of the process by relevant stakeholders and should be chosen to directly address the key service benefit(s) that the public will derive from the project, as defined in the project objectives. Ratings of each option against the criteria should be assigned objectively and on the basis of available evidence.

3.6 Incremental or total impact analysis?

If the assessment is being undertaken on an incremental basis, only costs and benefits incremental to continuing with the status quo would be included. The incremental net benefit or net cost is compared with a zero base, as the benefits and costs of the status quo have already been accounted for in estimating the incremental benefits and costs.

If the assessment is being undertaken on a total cost-benefit basis, all costs and benefits associated with the project would be included. The total costs and benefits for the project are then compared to the total costs and benefits under the status quo.

While the two approaches should yield an identical result, the total cost-benefit approach is less likely to result in omissions or double counting of costs and/or benefits, and is likely to be simpler for third party decision makers to follow.

For consistency across NSW Health capital project evaluation, the total costs and benefits are to be presented first and the incremental impact can then be derived.

3.7 Terminology: costs and benefits

The terminology adopted in these Health Guidelines is that:

- The sign convention is that “costs” are resources used in an option are expressed in negative terms. For example, resource costs incurred by NSW Health, other NSW agencies, the cost individuals incur in accessing the health system, such as the need to travel to obtain treatment would be expressed in negative terms.

- The term "benefits" mean improvements to the health status of members of the public. The sign convention is that improvements in health outcomes are expressed in positive terms.

3.8 Summary

- Because CBA is about measurement of net change to welfare of all stakeholders, many health outcomes are difficult to value (such as increasing the life expectancy arising from health investments). While CBA is the preferred method where practical, CEA is conceptually and operationally simpler for application to capital project evaluation. While a cost-effectiveness analysis will facilitate identification of a least cost option, it will not show whether benefits outweigh costs.

- Cost effectiveness analysis of different options is considered sufficient to justify why the preferred option is supported when:
    - The benefits of the various options under consideration are roughly similar
    - It is neither practicable nor feasible to place a dollar value on major benefits to estimate the value of benefits.

- In conducting CEA, the following requirements apply:
    - Qualitative assessment of the benefits is needed. In terms of presenting qualitative benefits it is important to clearly present them from the early stages of the project being developed.
    - Clear performance measures derived from the outcome sought should be listed for all proposals.
    - Any differences in output quality, for example because of differences in service quality and resultant benefits, should be identified.

- Every effort should be made to quantify and value as many benefits as possible

- Care needs to be taken in defining the scope of the costs and benefits to be included in the project to ensure that there are no omissions or double counting when comparing the project against the base case. The starting point is to assess total costs and benefits under the base case and each option that achieve the project objective. Incremental costs and benefits for the options can then be identified.

- Where the project options do not achieve similar project/service outcomes (in terms of quantity and quality), the net present cost comparison of options cannot be used in isolation to identify the least cost option. The analysis should take into account the unmet demand and additional qualitative benefits appraisal method.

4. Identification of options and definition of base case

4.1 Introduction

The identification and development of options for further assessment should be undertaken as part of the Process of Facility Planning process. This is usually done as part of the value management study. The set of options generated in the earlier planning stages is a key input into the economic appraisal process which should assess a range of options rather than focus on a preferred option that may be advocated for the Health Service or community.

At the SPP stage (or for projects with combined SPP/PDP):

- The option identification step provides a formal check that the set of options is complete – all potential options are identified.
- The options are defined in a consistent way within a sound analytical framework.

The process of culling the more obviously inadequate options is valuable in itself, and the reasons for culling the initially broad set of options needs to be included in the documentation associated with the economic appraisal. It is essential that the grounds for culling options are robust and specific to the population health needs under review. It is inadequate to make the bald statement that an option is culled because "it is not consistent with community opinion" without providing concrete grounds as to how and where the inconsistency occurs and, importantly, what consequences this has in terms of impact on health services to the community.

Options for consideration in the economic appraisals are:
- The base case, status quo or "keep safe and operating", which entails the minimum essential expenditure required to meet statutory obligations over the analysis period.
- An option involving the "minimum capital expenditure" that still meets the project objectives should be considered at the SPP stage.
- A range of options (capital and/or non-capital) that meets the project objectives.

Failure to identify all potentially valid options is one of the most common errors in economic appraisal.

Some classification of options may be possible on the basis of the type of capital proposal that is being assessed or the service gaps that the proposal is aiming to address. One possible classification of service issues is as follows:

- lack of overall capacity to meet present or projected community demand for health services
- inability or difficulty in performing specific medical procedures
- non-compliance with statutory requirements
- lack of functionality of facilities to support delivery of health services
- excessively high operating and maintenance costs, including costs due to out-dated facility design that impedes efficient integration in the provision of services and poor coordination in staff resources.

4.2 Definition of Base Case

The base case is used for comparison with the proposed project and other options. The NSW Government guidelines state that:

"*The first option to be considered is the Base Case of "Do Nothing" ie what happens if the status quo is maintained. Doing nothing does not necessarily mean "spending nothing"… where the Base Case in effect becomes the "minimum essential expenditure option". The base case must be realistic."*

The Base Case is defined as "status quo or keep safe and operating". Analysis of the Base Case is essential, as it is the benchmark against which all other options should be compared. It is important that the Base Case is carefully specified and its costs projected over the analysis period. It is, quite simply, a description of what will occur over the analysis period should the proposed project not proceed.

In defining the Base Case:

- An assessment is required as what will happen and the consequences/ outcomes under the base case. Will the project objectives, service demands and/or quality performance levels be met? Where will patients have to be referred to for treatment? How many patients may delay seeking treatment until their condition worsens? What will be the service gap and impact on the quality of services?
- Costs will be required/identified to meet all statutory requirements including fire protection, building safety (structural integrity and safety for occupants where not covered by OH&S), environmental protection and other matters relevant in the delivery of heath services covered by legislation.

Enhancements included in the base case should not go beyond meeting statutory requirements. Often, the Base Case will not meet the stated objective for the capital proposal which means it can only be compared with other options that meet the objective by using Cost Benefit Analysis or by using Cost Effectiveness Assessment and assuming that the unvalued benefits offset the cost difference.

The definition of the base case is important in that it influences the apparent arguments for proceeding to undertake some action. It is imperative that care is taken to ensure that the definition of the base case is consistent with the guidance and principles outlined above.

Decision makers need to be advised of what situation will exist in the absence of the project being approved. The Base Case may indeed prove to be a viable alternative based on affordability considerations and/or funding constraints. This is a separate decision criteria to economic appraisal.

Box: Compliance with the Building Code of Australia

In considering the scope of statutory compliance in the base case, the following should be considered:

The *Environmental Planning and Assessment Regulation 2000* (the EP&A Regulation) refers to the Building Code of Australia (BCA) in relation to building requirements. The BCA has been written specifically to set requirements for new buildings. As alterations are made over time to the BCA, buildings that were compliant at the time of construction may become non-compliant with subsequent requirements.

The Australian Building Codes Board, which has responsibility for the BCA, leaves the matter of non-compliance of existing buildings to the regulators in the states and territories. In NSW, the relevant part of the EP&A Regulation is clause 94. Subclause 94(2) provides that:

> "In determining a development application to which this clause applies, a consent authority is to take into consideration whether it would be appropriate to require the existing building to be brought into total or partial conformity with the Building Code of Australia."

Clause 94 applies where

"a development application for development comprising the rebuilding, alteration, enlargement or extension of an existing building where:

(a) the proposed building work, together with any other building work completed or authorised within the previous 3 years, represents more than half the total volume of the building, as it was before any such work was commenced, measured over its roof and external walls, or

(b) the measures contained in the building are inadequate:

i. to protect persons using the building, and to facilitate their egress from the building, in the event of fire, or

ii. to restrict the spread of fire from the building to other buildings nearby."

The EP&A Regulation does not require an existing building to be upgraded to meet the requirements in the BCA except under certain conditions when a development application has been lodged and at the discretion of the consent authority. The age of a building in itself is not a factor in assessing compliance with the EP&A Regulation.

4.3 Development of options

In addition to the base case, a range of options should also be developed for assessment in the SPP that meet the service demand such as:

- A range of capital investment options identified through the Value Management Study
- "Minimum capital spend" option to meet service demand and objectives – this option is to test, among other considerations, the use of existing capital assets where the capital investment proposal involves a new build solution.
- Non-capital proposals such as contracting out and involvement of private sector (subject to Government policy on health services).
- A mix of the capital and non-capital proposals. Occasionally, this may entail, as part of the value management study process, a modification of the model of care considered in the Clinical Service Plan, eg an increase in a community based model of care together with a more limited capital proposal.

The preferred option(s) for further analysis in the PDP stage will be drawn from these options assessed in the SPP stage.

Because these options all deliver the planned services outputs, it is acceptable to utilise Cost Effectiveness Analysis after quantifying the incremental net present costs of each option against the Base Case, providing that all non-valued benefits are similar.

It is noted that "mid-point" or "middle-ground" options (ie options that achieve approximately half of the proposed service outputs) do not achieve the project objectives. Inclusion of such mid point option will not allow comparisons to be made across options against the base case. The general guidance is that the mid-point options will not be included in the option appraisal. However, consideration may be given to the mid-point option to address financial affordability as sensitivity analysis where specifically requested by NSW Health and/or Treasury.

The assessment of procurement strategy/options should not be confused with the economic appraisal. Selection of a procurement method to deliver the capital proposal is one of the Process of Facility Planning tasks. Assessment of the procurement option should not be included in the economic appraisal.

By comparing options with the base case, incremental costs and benefits will be identified for each option, which will also represent the economic costs of providing enhanced and/or expanded services.

Box: Examples of options

Examples of options in capital proposals include:

- Varying time and scale of capital investments, including staging #
- Refurbishing existing facilities
- Changing locations or sites
- Transferring service provision to a private sector party *
- Improving, creating partnership arrangements *
- Varying the balance between outsourcing and providing services *
- Better implementation of existing resources or improved efficiency
- Refinement to models of care as specified in the Clinical Service Plan *.

Assessment is required as whether such option(s) will meet the project objectives and service outcomes. Where the service outcomes are different, CEA is not applicable and qualitative benefits appraisal (CBA if benefits can be reliably quantified and valued) should be conducted.
* Subject to government policy on health services delivery.

For each option, a statement is required of the outputs and the extent to which the objective will be met.

4.3.1 Minimum capital expenditure to meet service demand

This option is to be developed to meet service demand. It may involve:

- minimum capital expenditure to upgrade existing facilities, delivering as much of the proposed services as possible from the existing campus.
- any unmet demand will need to be addressed in this option, including the possibility of transferring unmet demand on the existing campus to other hospitals (either private or

public hospitals). The feasibility of transfer to other hospitals will need to be validated and travel costs included in the analysis of options. The costs of providing health services in alternative hospitals will need to be assessed.

Equity issues are part of the Business Case consideration but are not part of an economic appraisal. These issues have to be discussed in the policy context provided to support the capital proposal.

4.3.2 Timing of new capital investment (staging and deferral options)

Because of the time cost of money (the cost of capital appears in economic appraisal through the discounting process), it is less expensive in present value terms to spend money later rather than sooner.

This means that it is important to determine what need to be done and when, as there are opportunities to direct resources to alternative uses that can help to meet more pressing needs and to generate greater net benefits.

The savings in present value terms through deferring investment have to be considered in terms of the costs that might be imposed on health service users in the interim. These costs are often non-financial, for example compromised health outcomes due to increased delays in accessing services. Where the economic appraisal is able to estimate a monetary value for these non-financial impacts, then these value estimates should be discounted to a present value using precisely the same method as discounting financially based costs and benefits.

In many cases there may be an 'optimum' point in time for the investment when the marginal savings due to deferring for one further year based on the time cost of money are equal to the marginal improvements in health outcomes from making the investment now. Similar considerations apply in regard to opportunities for staging investment. Economic appraisals should test for the effects on costs and benefits of deferring and staging investment where benefits can be fully and reliably quantified.

Consideration should be given to the timing for new capital investment at the early phase (ie SPP) with identification of project timelines that meet the service outcomes within the affordability envelop. If deemed appropriate, sensitivity analysis may be undertaken to test alternative project timelines.

Where for example expected growth in demand is likely to be gradual over time, staging construction of a project in increments may be an option for economic appraisal. Building a hospital all at once with an objective to "save" on "cost escalation" factors is not relevant, as this may not represent the optimal allocation of scarce health resources. Economic appraisal should be undertaken in constant base year prices.

This is different to "end cost" project costs for budget purposes. The end cost of the project in nominal dollars will depend on the actual changes in prices that occur over the pre-tender and construction phase of the project. When seeking funding for capital projects from Government, the cost in constant base year dollars has to be escalated up to end cost dollars using the most appropriate index factor for major components of the capital project such as the Building Price Index for building construction costs and CPI for furniture, fixtures and equipment. However, this is a matter for the financial analysis of a project and not for the economic appraisal.

4.3.3 Non-capital options

Capital, as with all resources, is scarce and the efficient allocation of capital is a major imperative for undertaking economic appraisal. In terms of the Guidelines, non-capital options are assessed no differently from those options that require capital: in all cases the over-riding principle is that economic appraisal supports the option with the greatest net present value subject to considerations of risk. Equally the implications of a non-capital option in terms of disadvantages, also requires consideration.

Non-capital options can take a number of forms as discussed below.

Transfer patients to other NSW Health facilities

- This option relies on existing capacity of the health system. Patients who cannot be accommodated at the proposed facility (on the site of the proposed capital investment) due to lack of capacity could receive treatment at another facility or range of facilities.

- This option is feasible only if sufficient spare capacity exists in facilities within some 'reasonable' distance of where the potential patients reside. It would be necessary for the economic appraisal to determine whether in fact this surplus capacity exists at alternative facilities, if there was appropriate means to get to that facility, and/or if had surplus capacity.

- Capital investment tends to be 'lumpy' in view of economies of scale and the costs of disruption during construction. In those cases where the demand for health services is ramping up over time due to a growing population (possibly adjusted for the level of health services and the way that services are delivered), it is common for the capacity of facilities to be designed to meet projected demand at some time in the future, perhaps 10 to 15 years later. It then follows that such a facility will have spare capacity immediately after construction or an upgrade, which then gradually tapers off as demand grows. In such cases this option may only defer the need for upgrading. Assessing the staging of any capital investments would also be appropriate in this case.

- While this option involves no direct capital spending to expand capacity (the facility of interest may require investment for other reasons), the economic appraisal will need to include costs imposed on health system users in terms of travel, and these costs may be both financial and non-financial. Clinical and support costs at the other sites where patients are transferred to will also need to be included in the appraisal.

Involvement by the private sector

Opportunities for private partnerships in health care service delivery and involvement of the private sector in the provision of clinical services must be in line with government policy. Generally such partnerships have been developed where particular circumstances create a need for critical mass or other clinical need for combining public and private case load within the one service.

The primary measure of costs in economic appraisal is the quantity of community resources consumed and this is not affected by the fact that the resources are used by the private sector rather than the government.

Where health services are contracted out to the private sector, the common practice in the economic appraisal is to use contract prices as a measure of the resources used. This is generally acceptable where no other information is available on resource use.

4.3.4 Other considerations when developing options

The decision on how to deal with these options in the economic appraisal should take into account:

- the practicality of achieving the objectives
- the timing of the impacts on public levels of health (there will be long lead times for the health improvements from some preventative strategies)
- the desirability that the economic appraisal focus on the matters at hand and not canvas broader issues of little relevance to the specific proposal.
- The amount of time and effort and resources put into the analysis should reflect the relative significance of the health objectives to be addressed.
- Project bias with tendency to overstate benefits and understate cost.

Improved operating efficiency

The assessment of different capital options should assume the most efficient operating regime will be implemented in the new or upgraded facility.

Achieving improved efficiencies in operating a specific facility is a legitimate option in economic appraisal. If existing assets can be redeployed to increase throughput, then this may defer the need for a more extensive upgrade or the construction of new facilities.

At a broader level, there has been a trend towards greater efficiency in delivering health services through such measures as reductions in the length of hospital stays. These broader trends are outside the scope of economic appraisals for individual capital proposals, though any anticipated gains in efficiency should be incorporated in the projections of future demand for health services and this should be reflected in the outputs from the CSP and other planning documents used as a basis for the economic appraisal.

Preventative and early intervention strategies

It is acknowledged that these are important policies and strategies that are addressed at the state-wide level. Preventative strategies can be viewed as a form of demand management in relation to acute medical treatment.

The benefits of preventative strategies are realised both at the individual level (reduced mortality, better quality of life) and at the community level (less demand for health services that are largely funded by the state)[3]. Thus the need for investment in health facilities may be reduced and/or deferred, or even eliminated, if the public health gains from preventative strategies are sufficiently large.

It is expected that in many cases these are critical policy issues that will be captured at the department's policy development stage and will be evaluated at the higher planning levels (including clinical service planning), rather than individual capital program/project level.

[3] These programs should themselves be subject to social cost benefit analysis to demonstrate that they deliver positive outcomes for the community, but this is outside the role of economic appraisal of individual capital proposals.

Alternative models of care

An economic appraisal should take into consideration the extent to which alternative models of health care or changes to the way that community based care is delivered are capable of meeting the community health needs identified in support of the capital proposal. Strategies that avoid hospital care are a priority in the State Plan and can contribute to more cost effective health care.

This involves appropriate assessment of the costs to NSW Health of the alternative model of care and a capital proposal that together meet the health needs of the target population. This assessment is to occur at the Area and Clinical Service planning phase. However, during the value management process, there may be occasions that the models of care will either be refined or modified to meet changes and new policy initiatives since the time when the CSP was completed. On such occasion, the SPP may entail modified models of care in the option appraisal process.

Project bias

International research in both the public and private sectors has demonstrated a systematic, tendency for project advocates to be overly optimistic. This is reflected in a tendency to overstate benefits, and understate timings and costs. For example, the UK Department of Health has estimated that the capital costs for large projects increased from outline to full business cases by an average of 30%[4].

The potential for project bias should be given due consideration in economic appraisal from the outset and be reflected in the use of sensitivity analysis and review by external parties.

[4] See: UK Department of Heath, supplementary guidance on optimism bias, accessed at http://www.dh.gov.uk/en/Procurementandproposals/Publicprivatepartnership/Privatefinanceinitiative/Changestotreasurygreenbook/DH_4067488

4.4 Summary

- The Base Case is defined as "status quo or keep safe and operating". It is a description of what will occur over the analysis period should a preferred option not proceed. All options should be compared against the Base Case.

- Options that meet all or substantially the project objectives and service demand will be identified for assessment in the SPP, including:
  - A range of capital investment options identified through the Value Management Study
  - "Minimum capital spend" option to meet service demand – this option is to test, among other considerations, the use of existing capital assets where the capital investment proposal involves a new build solution.
  - Non-capital proposals such as contracting out and involvement of private sector.
  - A mix of the capital and non-capital proposals.

  The preferred option(s) will be identified from these options for assessment in the PDP.

- "Mid-point" or "middle-ground" options (ie options that involve less capital investment than the preferred option that achieve approximately half of the proposed service outputs) do not achieve the project objectives. Mid-point options will not be included in the economic appraisal. Consideration may only be given to the mid-point option to address financial affordability as sensitivity analysis where specifically requested by NSW Health and/or Treasury early in the project planning.

- Consideration should be given to the timing for new capital investment at the early phase (ie SPP) with identification of project timelines that meet the project objective/service needs within the affordability envelop. If deemed appropriate, sensitivity analysis may be undertaken to test alternative project timelines.

- Models of care and healthcare policies (preventative and early intervention strategies, community integration) are key determinants in the development of clinical services plan (CSP). Where there are major changes and new policy initiatives since the time when the CSP was completed, the models of care may need to be refined or modified. It is expected that this should occur at the early planning phase ie the value management process. This will facilitate more definite and timely completion of the SPP/PDP and consequently project delivery.

5. Identifying Health Impacts

When conducting an economic appraisal, it is important to consider the potential impacts of the proposed project for the health outcomes.[5] This chapter provides guidance on identifying health impacts and the types of effects that is applicable to health capital projects, policy and program development. This should assist in the understanding, identification and measurement of the health costs and benefits associated with each option in capital project appraisal.

The suggested way is to first list all the potential impacts on health in a systematic manner. Health effects, particularly benefits can be broadly categorised as follows:

A. Impact on, and outcomes for, consumers (patients, families, carers)

The key outcomes at this level are the health benefits or 'health outcomes' that consumers achieve. 'Health outcomes' need to be distinguished from 'health status'. A health outcome is a change in an individual or group of individuals that can be attributed (at least in part) to a health intervention or a series of health interventions.

There are two different ways that health outcomes can be measured. Typically health outcomes are measured as the difference in health status 'before and after' an intervention. This is the way that clinicians (and consumers) would typically judge the success of most interventions. Measuring health outcomes in this way is most relevant to acute care. A patient is admitted to hospital and is discharged when the health has improved. They may need to return to hospital on receive other health treatments, subsequently.

This approach has limited applicability for those consumers with chronic and progressive conditions. For many chronic diseases, the goal of intervention is to maintain current health status if possible or to slow down the rate of decline. Their outcomes are assessed taking into account what would have happened if they had received no intervention or another type of intervention rather than simply before and after the intervention.

In palliative care services, for example, the goal of intervention is not cure. Rather the goal of palliative care is quality of life for both the person and their family and carers. The outcomes of a palliative care service cannot be measured using the 'before and after' model. Rather, outcomes in palliative care are based on an assessment of the person's quality of life (using measures such as pain and symptom control and psychological well-being) in comparison to what would have happened if a palliative care service was not provided.

The 'before and after' approach is also of limited value in measuring the outcomes of prevention. In prevention programs the aim is to keep people well. Again, outcomes are assessed taking into account what would have happened if the consumer had received no prevention program or another type of prevention strategy.

In economic appraisal, the way that benefits are measured differs according to the goal of the health intervention. Examples include standardised morbidity and mortality rates, standardised intervention rates, quality of life measures, functional measures and goal attainment scales.

The strongest evidence of economic benefits at this level exists when it is possible to compare the outcomes of different models of care. For example, where it can be

[5] This chapter is based on the advice of Professor Kathy Eagar, University of Wollongong.

demonstrated that treatment in a community setting achieves the same health outcomes at a lower cost or that treatment in a hospital achieves outcomes that cannot be achieved with a lower cost model in the community.

It is also important to note that benefits at this level may be broader than health outcomes. For example, the ability to receive health care locally may be a significant benefit both for the patient and their family in terms of emotional well-being, travel time, cost, community integration and the coordination of ongoing care after discharge.

B. Impact on, and outcomes for, health care providers

The major benefits at this level are in relation to workforce development, workforce attraction and workforce retention. A safe working environment is also important in relation to OH&S and this can be costed or quantified by reducing back injuries etc.

All health services, to a greater or lesser extent, are involved in education and training. This workforce development role has long term benefits that extend beyond the specific service.

The ability to both attract and to retain health care providers is also a benefit where it contributes to better health services and outcomes for the community. Access to required facilities, and the physical fabric of these, can be important in attracting and retaining a high quality workforce.

C. Impact on, and outcomes for, the health system

Benefits at this level can be technical, allocative or dynamic. Technical efficiency, or productive efficiency, is the maximisation of service outputs with the use of minimal inputs. In calculating technical benefits in an economic appraisal, the preferred option is the one that, all other things being equal, produces the required output at the required quality at the lowest cost.

Allocative efficiency is the maximisation of the health of the community through ensuring an appropriate mix of health services that optimises the health benefits delivered. In calculating allocative benefits in an economic appraisal, the preferred option is the one that, all other things being equal, produces the best mix of outputs that best meet the health needs of the population. This will typically involve disinvestment from some services and investment in others that deliver better value for money.

Dynamic efficiency refers to the adaptability of the system over time. A health building that can be adapted over time to meet changing needs is more dynamically efficient than one that cannot. In the current context, this includes the capital implications of new models of care including an increasing focus on early discharge and more definitive treatment in a community setting.

6. Guidance on incorporation of costs

6.1 How costs should be expressed

Due to inflation, costs (and benefits) which occur later will be higher in cash terms than similar costs (and benefits) which occur earlier. All future costs and benefits must be expressed in real base year prices for the purpose of an economic appraisal. However, differences in the patterns of change in the prices of different items need to be incorporated in the 'real' values. For example, if labour costs are projected to increase by 4% per annum and the CPI is 3% per annum, the real increase in labour costs is approximately the difference between these two rates, ie 1% per annum.

As required by the Government Guidelines, the real annual discount rate to be used in economic appraisal is 7% with sensitivity testing at 4% and 10%.

Keep in mind that in real terms it is no more costly to undertake construction work in the future than it is today, unless there are special circumstances regarding costs and these would need to be documented carefully. The effect of discounting means that the present value of costs reduces, the longer the expenditure is deferred, and this effect also applies to the staging of construction works.

6.2 Asset related costs

Capital costs

Capital costs are generally incurred upfront in the early years of the analysis period, though the costs may be staged.

Capital costs tend be quite project specific. In estimating capital costs it may be possible to use standardised costs (unit costs) in the SPP economic appraisal with its lower requirements for accuracy (though the SPP should be comprehensive in regard to its coverage of potential costs). In some cases, even for the SPP there may have been some preliminary costings available from previous planning.

Capital costs include the land on which a facility is to be sited, regardless of whether the land is already owned by NSW Health provided that the land could be sold or leased if the proposal does not go ahead (in other words, restrictions on the use of the land do not constrain the uses that are envisaged in the analysis).

Capital estimates should be reported in real terms for the purposes of the economic appraisal.

Life cycle maintenance cost

This includes routine maintenance and life cycle capital replacement cost over the analysis period, typically 20-25 years for capital investment evaluation.

6.3 Recurrent service costs

Estimates for recurrent costs need to cover all components including costs for:

- clinical services;
- non-clinical and support services;
- building maintenance.

Refer to the Department's service costing to assist with incorporating recurrent service costs.

6.4 Treatment of certain cost types

Sunk costs

All costs must relate to future expenditure only. The price paid 10 years ago for a piece of land or a plant item is of no relevance. It is the opportunity cost in terms of today's value (or price) which must be included. All past or sunk costs are irrelevant and should be excluded.

Depreciation[6]

Depreciation is a concept used in accounting to provide a measure of the amount if value of a capital asset 'used up' during a year or other accounting period. Depreciation does not reflect the use of resources and must be excluded from economic appraisals. Economic appraisals incorporate the reduction in the economic value of a capital asset by means of the initial cost in the year(s) of acquisition and a residual value (possibly zero) at the end of the analysis period.

Interest

Future cash flows are discounted to present value terms in economic appraisals, with the choice of the discount rate based on various factors which include the rate of interest and associated finance charges. Therefore, the discounting process removes the need to include interest and other finance charges in the cash flows.

Opportunity cost

Economic appraisal addresses the question of how to get the greatest value from the use of community resources. The estimates of costs that appear in economic appraisal reflect the value to the community of the resources used. Simply stated, the opportunity cost is the value (benefits) foregone as a result of using a resource as part of the capital proposal from the benefits it would have generated in some alternative use. As an example the opportunity cost of land for a hospital is that the land then cannot be used for some alternative purpose. The opportunity cost is the maximum value to society of the land across these alternative uses – subject to realistic valuations.

The measurement of opportunity cost requires some care (refer section xx in the Government Guidelines for further guidance). In cases where a freely operating market exists to buy and sell a resource, it is common practice to make use of the market price as a proxy for the opportunity cost. This is valid provided any government imposts (such as GST or commonwealth excise) contained in the price are netted out. In the example above, stamp duty on the purchase of the land is not included in the price (it is paid separately by the purchaser). However, the market price of seemingly comparable land may not reflect the opportunity cost if zoning or other restrictions on the use of the land eliminate possible alternative uses and the value associated with them.

Avoided costs

A possible important gain from a capital proposal is a reduction in operating costs associated with the operation of the facility. The term *avoided costs* is commonly used to denote the reduction in costs, or the costs that are incurred in the base case but not in a specific option.

[6] Refer to the Government Guidelines for the distinction between economic appraisal and financial appraisal in regard to the treatment of depreciation, interest and tax.

The extent of avoided cost is shown by comparing total cost under each option and not by including it as a net benefit in one of the options.

6.5 Treatment of travel cost to health care users

The costs of travel are relevant to economic appraisal where the options differ in the travel requirements for users to access the health system. Examples include options where there is insufficient capacity at a facility and patients are transferred to an alternative facility.

Appendix 4 provides the method for identifying, quantifying and valuing travel time costs, with the relative savings identified by comparing the travel costs under the different options.

6.6 Cost impacts on other public sector agencies

Where resources used by other agencies are expected to increase or decrease as a result of the capital proposal, then the change in costs must appear in the economic appraisal. In this regard, impacts on other agencies are treated no differently from other impacts. One example is the need for enhancements to the road network to meet new traffic demands generated by, say, a new hospital.

Once again it is the opportunity cost of the resources used that is relevant for the analysis, not the details of inter-agency funding arrangements which represent transfers. Included in cost impacts on other agencies would be the use of fixed assets: an example is the use of part of a building or land if the space occupied could be used for an alternative purpose.

Any benefits that the capital proposal is likely to deliver to other agencies also need to be included in the economic appraisal.

7. Guidance on incorporation of benefits

7.1 Introduction

Improved health impacts on the community may be measured by the number of lives saved, the number of years of life lost and quality of life. The valuation of these non market impacts is a difficult, complex but important element of the economic appraisal, and should be attempted wherever feasible.

Appendix 5 provides an overview of the techniques on how to value non-market impacts, and some applications such as avoided mortality, design quality and the environment. As set out in Chapter 3, cost effectiveness analysis is to be applied to capital project evaluation where the project benefits are approximately equal across the options identified to meet the project objective.

This chapter describes the benefits and specifically those benefits that will be included in the CEA, including travel time and costs.

7.2 The nature of the benefits

The first of the overarching goals for NSW is *healthier people*. The *real* benefits from the use of resources to deliver health services are realised in improved health outcomes. Improvements in health represent the direct impacts on members of the public. Decision makers need to be confronted with the consequences of decisions in terms of these impacts.

In applying CEA, the primary focus in terms of health outcomes should be on such items as quantifying the number of patients affected and the nature of the improvement they will receive.

It is a requirement for economic appraisals to make explicit the project-specific impacts due to the proposed capital investment. Current analysis tools to assess health facility investments are deficient in their ability to quantify the consequent health improvements. The difficulties arise largely because major health facilities are multi-purpose providing a large and diverse range of services. This introduces considerable complexity since in most cases each of these services will have its own specific improvement rate as a result of investment in the facility.

These difficulties are less prominent in specific applications of health economics that focus on a single health condition (or set of related conditions) and where epidemiological or clinical trials provide quantitative information on the 'dose-response' relationship.

Over time, it is expected that new research efforts may guide valuation of health benefits.

7.3 Residual value

Many assets subject to economic appraisal have economic lives in excess of the length of the analysis period, which is generally set to 20 years. It is then necessary to assign a residual value for the asset at the end of the analysis period.

For assets that can no longer be used for their design purpose and are only good for scrap, the value can be estimated as the market price to be paid for the materials that can be used less any costs in extracting the materials.

For specialised health assets that can continue to be used past the end of the analysis period, a practical approach is to compute the residual value using the estimated proportion of the economic life of the asset remaining at the end of the analysis period.

In some cases, a market value may be estimated assuming the present value of the discounted stream of net revenues that the asset will generate after the analysis period.

7.4 Other considerations

Treatment of revenues

Revenues received by NSW Health for the provision of health care services that are not traded in a competitive market are excluded from economic appraisal since they do not reflect the full value of benefits received by the recipient of the services. They are generally a poor measure of the value obtained from health care and including them would constitute double counting since previous sections of this chapter deal with the benefits realised through improvements in health outcomes through a social welfare framework.

While these revenues are not to appear in an economic appraisal, they are of course important in a funding and budget context. Revenues for auxiliary goods and services (for example, from the lease of land owned by NSW Health) may legitimately be used as a measure of value provided the markets in which the revenues are earned are relatively free from distortion.

Where a project or part of a project will support a business unit selling services on a commercial basis in a competitive market, revenues received may be a reasonable proxy for the economic benefit created by those services. In this case, revenues may be included as a benefit in an economic appraisal, but care must be taken to ensure that the prices are true market prices and that the benefits they represent are not double-counted in the appraisal through being included in the assessment of health outcomes delivered as well as being counted as revenue. Where doubt exists, advice can be sought from Treasury.

Valuing design quality

Design quality is an important element of hospital projects which should be assessed during appraisal. The benefits of good design include:

- Savings in cost (capital and operating costs)
- Increased output and quality of service
- Staff recruitment and retention.

Where good design of a new facility is claimed to have a direct economic impact, eg improved staff retention or patient recovery times, then the economic appraisal should make explicit the expected changes and where possible estimate the incremental costs and benefits. Incremental costs and benefits can be identified by comparing options. For example, under one option the higher costs of locums could be included in the operating costs, another option where a new building will attract permanent staff, the operating costs will be lower.

8. Reporting results for economic appraisals

The decision criteria will include:

- Comparison of net present value (NPV) for the base case and different options. Net present cost (NPC) will be used where the majority of the health benefits cannot be quantified and valued)
- Non-quantifiable factors where quantification of benefits not possible.

The results of the appraisal should summarise:

- The drivers for this capital investment, with particular reference to supporting strategies, Health State Plan, clinical service plan, service program etc.
- The service and business needs for this investment, with particular reference to existing problems, service gaps and the need for service improvement.
- The full list of options explored in the Value Management Study and the Service Procurement Plan.
- The short list of options in the Project Definition Plan.
- How effective is the proposal in achieving the project objectives as against the base case and other options and why.
- An overview of the key outputs and outcomes of the capital proposal relative to other options.
- Findings of the cost effectiveness analysis / cost benefit analysis (capital, recurrent, cash and non-cash benefits), and option appraisal conclusions. Estimates for costs and benefits of each option must be reported relative to the base case.
- Summary of benefits appraisal – qualitative.

In health economic appraisals, especially for projects involving complex facilities offering a wide range of services, it is likely that a major part of the benefits will not be able to be quantified, let alone be valued in monetary terms. It is important that the major benefits are still addressed appropriately in the economic appraisal, given that these benefits are the key driver for capital investment. It is not acceptable to focus only on the variables that are easy to quantify if these variables are of less order of importance to the decisions to be made.

In reporting results, the NPC results of the base case and the options should be presented in absolute terms in a summary table. The difference between the base case and each option will show the incremental costs.

The qualitative treatment of benefits should relate to the service delivery issues that trigger planning for capital investment (and which should appear in the definition of the base case) and this provide a useful starting point, highlighting the consequences of failing to take some action.

Care should be taken to guard against double counting of benefits. It is incorrect to claim that the benefits include better integration of medical services and the improved health outcomes that result from the integration. The real benefits are the health outcomes enjoyed by users of the health system, and this is what the economic appraisal should focus on. However, the appraisal should demonstrate how the intermediate result (better integration in the above example) can deliver the ultimate benefits.

Appendix 1 – Extract from the NSW Government Guidelines for Economic Appraisal TTP 07-5

What NSW Treasury looks for in an economic appraisal?

In its review of economic appraisals to provide advice on proposed projects or programs, above all, NSW Treasury looks for objectivity in an economic appraisal. Common sense is an important guiding principle.

The economic appraisal should present an independent, unbiased assessment of all the costs and benefits of the various means of achieving the stated service delivery objective. The economic appraisal should not be a "business case" which simply promotes a preferred approach. The economic appraisal may form part of a business case, to explain how a preferred approach came to be selected.

In providing NSW Treasury advice on the best value for money approach from the community's viewpoint to meet a service delivery objective, Treasury closely analyses the appraisal usually in consultation with the proponent agency to better understand the results.

NSW Treasury's review of an economic appraisal considers issues which include:

- Has the appraisal been carried out in accordance with the NSW Government Guidelines for Economic Appraisal? Was NSW Treasury contacted by the consultant or agency at the outset? Were the proposed methodology and the approach to any contentious issues discussed and agreed with Treasury?

- Is the service delivery objective clear and unambiguous and the fundamental need confirmed?

- Have all reasonable, feasible options been considered, costed and analysed?

- Does the appraisal represent an objective analysis of the options to arrive at a preferred option, and is not simple a case to support a predetermined option? Has there been an iterative process to option development, where appropriate?

- Is there a realistic Base Case, as described in the Guidelines, against which other options' costs and benefits have been compared?

- Have all relevant costs and benefits, quantifiable and non quantifiable, been included? Are they comprehensive and do the estimates appear reasonable? For example, if it is proposed to construct a facility in a new location, have relocation costs and remediation costs been included in the analysis as well as the new facility construction costs? If a refurbished facility is proposed as an option, have costs of any temporary accommodation etc been included?

- NSW Treasury considers how the data are produced and reviews the assumptions incorporated in the analysis. This is to ensure there is no "project bias" in the analysis, for example, in terms of overoptimistic benefits and/or underestimated costs. Treasury considers the sources and basis of estimates - are they credible, informed, independent, the latest available, etc? Such matters may be discussed with the agency and with specialists within Treasury.

- Have a range of sensitivities, including worst case scenarios, been assessed and commented on in the appraisal results? Treasury considers whether the sensitivity tests carried out are reasonable and comprehensive. For instance, to allow decision makers to be fully informed it may be appropriate to consider what impact there would be on the appraisal results if, for example, both estimated costs increase and benefits decrease, not just one or the other? What are the chances of that happening? What are the risk management strategies to address such possibilities? Do they involve additional costs that should be incorporated in the analysis? What contingencies have been allowed for?

- Changes to the scope of the project can affect results - eg changes to address public concerns as a result of the Environmental Impact Assessment process, or other factors. Such possibilities should as far as is reasonably possible be taken into account upfront in the sensitivity analysis. If the outcome of the Environmental Impact Assessment process significantly alters costs or benefits, the project should be reassessed to ensure that it is still worthwhile proceeding.

- There should be reassessment of major project parameters as project planning proceeds, and if these vary significantly reassessment of the decision to proceed with the proposed project may be necessary to avoid implementing a project that has negative net benefits.

- NSW Treasury's approach to its review of appraisals is pragmatic and practical. Common sense is adopted in interpreting results and aspects of the appraisal are clarified with agencies where necessary.

- To ensure that NSW Treasury's advice to assist decision making in Government is timely and progresses smoothly, agencies should liaise with Treasury on an ongoing basis and ensure that draft appraisals are provided informally well in advance of formal submissions.

- Advice is available from NSW Treasury to assist agencies in the preparation of economic appraisals.

Appendix 2 – Checklist of costs and benefits to be considered

Resource Cost	**Include / Exclude**	**Comment on treatment**
General principles		All direct and indirect implications
Sunk cost	Exclude	
Opportunity costs	Include	Applies to all resources but most explicit in valuation of property
Avoided costs	Include	Reflected in the total cost analysis for each option.
Capital costs:		
Initial capital costs	Include	For base case, capital costs to meet statutory requirements
Life-cycle costs	Include	For all options
Refurbishment costs	Include	For refurbishment options
Medical equipment	Include	
Operating / recurrent costs:		
Clinical	Include	Consider and assess impact of future levels of clinical service delivery and future model of care Costs will be different across options
Cost of transferring/ treating patients in private hospitals	Varies	Subject to DOH/ministerial approval. This is only applicable where there is capacity in nearly private hospitals for the specified clinical services.
Non-clinical	Include	Include catering, linen, security etc
Facilities related running and maintenance cost		Include cost to maintain new and existing facilities at good industry practice.
Forecast savings	Include	Reflected in assessment of recurrent costs
Property values / opportunity costs:		
Property in AHS use	Include	
Property bought	Include	Use purchase price
Property rented	Include	Use market rent
Property transfer to Health	Include	
Other		
Commissioning / decanting costs	Include	

Benefits	Monetary valuation	Quantification	Qualitative assessment	Comment on treatment
AHS and agency benefits				
Savings in patient transportation costs		√		Reflected in AHS's resource costs
Reduced clinical costs	√	√	√	Changes to clinical costs and other ongoing costs
Residual value of assets	√	√		Based on the cost of the improvement (ie the asset value less the land component). After adjustment of this cost to reflect the change in the value of money between the time of investment and the end of the analysis period, the residual is the portion of the adjusted cost that corresponds to the estimated proportion of the economic life of the asset remaining at the end of the analysis period.
Property revenues	√	√		Property sold by AHS
Reduced adverse events	varies	varies	varies	Historical data may be limited. Quantification where possible but this is an area where there is no accepted methodology
Workforce benefit - Attract and retain clinical staff	varies	varies	varies	Any savings in recruitment cost will be reflected in the AHS's resource costs
Improved hospital design quality	varies	varies	varies	Impact such as improved patient recovery times Where possible, estimate incremental benefits (eg reduced clinical costs)
Health benefits				
Increased service delivery / reduced unmet demand / closed service gaps		√	√	Compare the services outcomes (no of treatments and bed utilisation data) with the base case.

Benefits	Monetary valuation	Quantification	Qualitative assessment	Comment on treatment
Improved patient recovery times			√	
Increased duration of life / lives saved		May be measured by lives, life years	varies	For capital projects with multi-clinical configurations, these aspects are difficult to quantify and value. A qualitative assessment must be included demonstrating how these improved health impacts are to be achieved.
Improved quality of life		May be measured by Quality Adjusted Life Years (QALYs)	√	
Benefits for patients and carers				
Travel time savings	√	√		Refer to guidance notes in Appendix 4. Key variables are: • the no of people affected • the average hours saved • savings in average travel distance • travel cost per km Contact AHS and DOH Statewide Services Development Branch to ascertain data on the current and projected number of patients affected receiving treatment
Distress and discomfort			√	

Appendix 3 – Case study: Far West Hospital Redevelopment Proposal

Context - Existing situation and service demand identification

This is a hypothetical example of application of cost benefit analysis to a regional hospital redevelopment project. It contains a simplified set of project assumptions and parameters. The figures used are notional for illustrative purpose.

Planning has been completed for the provision of clinical services in the Far West Health Region. Acute services for the region are provided by the Far West Base Hospital (FWBH).

FWBH has been nominated as one of the three major NSW Rural Referral Hospitals where specialty services will be developed or enhanced as part of the implementation of the NSW Rural Health Plan. Increasing self-sufficiency and the quality and accessibility of care in Far West NSW as part of Rural Health Plan implementation are key policy drivers for the proposed redevelopment at FWBH.

The Area Health Service's Healthcare Service Plan and Asset Strategic Plan identified a range of issues with the Hospital and its capability to provide services over the planning period to 2017, including:

- The lifts in the main building of the hospital requires urgent upgrading to comply with new regulations. There are a number of other issues with the current buildings in terms of statutory compliance.

- Recurrent costs for clinical service provision at the existing facility total $50 million per year.

- The hospital serves the Far West region with a population of 500,000. Population trends indicate that by 2010 the capacity in the hospital will be reached. Demand for the hospital is forecast to grow by an additional 20% by 2017. This translates into 500 patients each year after 2010 who will not be able to be treated at the hospital. For the purpose of the base case these patients are assumed to have to travel to other hospitals.

- In addition, the configuration of the hospital is such that it is not possible to introduce modern practice in health treatment or to install key equipment to bring the services requiring patients to travel to tertiary hospitals in Sydney.

To address these issues a capital project proposal has been developed for redevelopment of the FWBH.

Project Objective

The objective is to meet the health needs of a growing community in the Far West Health Region.

Base Case and Options

The following options have been evaluated in the economic appraisal:

- Base case ("status quo or keep safe and operating") – Minimum expenditure to meet current and (expected) future statutory requirements over the analysis period (compulsory option)

- Option 1 – Refurbishment to increase emergency care service with some patients transferred to other hospitals.
- Option 2 – minimum capital spend to upgrade capacity to meet projected demand (should be included where new build investment is proposed)
- Option 3 – New hospital on a greenfield site (the proposed option) that meets projected demand.
- Option 4 – Option 1 plus new clinical partnerships with the local private hospital.
- Option 5 – Refinement to models of care in the CSP plus reduced size hospital that meets projected demand.

The preferred option(s) for more detailed assessment in the PDP will be drawn from this list of options assessed in the SPP.

Base case

The base case is the ”status quo or keep safe and operating” over the analysis period to meet statutory requirements.

Costs
The estimated capital cost to refurbish lifts is $2 million
Capital costs to address other current statutory requirements in the near future are estimated at $1 million.
In addition, a further $5 million will be required over the balance of the analysis period to replace life-expired infrastructure to meet statutory requirements, assuming that they remain at current levels throughout the analysis period.
These capital investments will have no effect on recurrent costs and service delivery capabilities.

Service capacity and output assumptions
Physical capacity will remain at current levels.

There is sufficient existing capacity to meet future service demand projections up to 2010. After 2010, patients that are unable to be treated at FWBH in line with NSW Health policy will fall into one of the following groups:
- some patients will transfer to other private and public hospitals elsewhere (though these have capacity only to meet the projected demand increase till 2017)
- some patients will wait longer for their treatment
- some patients will opt to forgo treatment until the conditions worsen.

The economic appraisal will require scenarios of the relative proportions of these three groups of patients.

Note
The economic appraisal must always include the base case of “status quo or keep safe and operating”. All costs and benefits in the base case and each option should be spelled out in absolute terms. The base case thus provides pointers for the other options. Also the shortfalls in service levels should be described explicitly and quantitatively where possible (such as the numbers of patients in each of the three groups).

In comparing options, it is important that quantitative estimates are given relative to the base case. In addition, qualitative discussion of costs and benefits needs to make it clear whether the costs and benefits are relative to the base case or another option.

Option 1: Refurbish to provide additional emergency services

Option 1 is an upgrade of emergency services in the existing buildings so as to be able to meet projected demand in 2010 only. In addition, renovations are made to existing buildings that allow a set of specified procedures to be carried out to meet NSW Health policy.

Option 1 does not address the general capacity shortage after 2010. Patients who cannot be serviced at FWBH are transferred to other hospitals at the periphery of the region but spare capacity in these hospitals will be exhausted by 2017 (ie only the 20% growth in demand from 2010 to 2017 can be accommodated in these other hospitals).

Costs

Relative to the base case, the capital costs relate to the ED upgrade and the other building refurbishments and new equipment.

The recurrent costs associated with patients at FWBH will be subject to two effects that will move in opposite directions relative to the base case:

- an increase in recurrent costs due to an increased level of activity (more patients more procedures, improved ED treatment)
- decrease in building maintenance costs.

Benefits

The following benefits will occur:

- improved outcomes for the patients that will receive treatment to an appropriate level in the upgraded ED beyond the treatment they would have received in the base case)
- improved outcomes for the patients that will receive treatment with the new procedures that would be possible under option 1 but not in the base case (in the base case some of these procedures would happen at other hospitals but some patients may decline treatment in view of the travel and related costs)

Option 2: Minimum spend to provide capacity to meet demand to 2017

This option would involve the works planned for option 1 plus an expansion of capacity to meet demand in 2017 by making use to the maximum extent possible of existing buildings and infrastructure, in addition to some optimised combination of construction of new buildings and refurbishment of existing buildings. There would be no explicit attempt at obtaining the benefits from option 1 or other desirable outcomes (such as integration of services).

Costs

Capital costs relative to the base case are the total of the costs associated with new construction and refurbishment, plus costs attributable to disruption etc during the construction phase.

Recurrent costs will rise relative to the base case due to increased number of patients (latent demand: even under option 1 many patients transfer to other hospitals but some elect just to drop out of the health system). Note that the recurrent costs in the base case associated with treating patients in other hospitals need to be netted out.

It may be noted that in comparison to option 1, there will be a major reduction in costs for NSW Health due to the avoided patient movement costs to alternative hospitals and the associated costs in regard to patient records etc. Patients and families will also benefit from less travel costs relative to the base case.

There would also be savings in maintenance costs with new buildings or buildings that have had major refurbishment. In addition, the new buildings would be better designed (in comparison to the base case) for modern health services and this should reduce the costs of providing clinical and support services located in the new areas.

Benefits

The main benefit is that patients after 2010 who could not be treated in accordance with policy settings in the base case or option 1 will receive appropriate treatment at FWBH. For these patients, the benefits are measured as:

- reduced travel times for patients who would have been transferred to other hospitals
- reductions in delays for treatment
- improved health outcomes for patients who would have opted out of the health care system in the base case
- It is expected that some existing building space may become surplus to NSW Health requirements.

Other patients (not included in the above group) treated in the new or refurbished buildings would be expected to enjoy better levels of treatment, for example, more modern design could reduce the risk of cross-infection between patients.

Suboption – defer capacity enhancement

The effect of deferring the enhancement in capacity is that the capital costs would reduce in present value terms by the discount rate for the years that the project is deferred.

However, if the new capacity did not become available until after 2010, then in comparison to option 2 the gains from the ability to handle more patients at FWBH would be lost for the years after 2010 until the enhanced capacity came on line.

Note

The economic appraisal should always include this option of meeting the demand with the minimum capital spend, and will typically involve the maximum use of existing assets. This is in order to make the greatest use of scarce capital funding. This option will also provide a better comparator for Cost Effectiveness Analysis with other options because the same level of demand is being met.

Option 3: All new hospital facility

Option 3 is to redevelop and design the hospital avoiding compromises inherent in adapting existing facilities to deliver new or changed services. The preferred location for the new hospital is on a Greenfield site.

Costs

Capital costs are generally high for a Greenfield site but this depends on factors that are specific to the capital proposal. Major costs include the cost of land (whether already owned by NSW Health or not) and additional costs incurred to service the site (RTA, council, water and sewerage authority).

Disruption costs would relate to the move to the new facility rather than interference with operations during construction, and this should result in lower levels of disruption than say in option 2.

The existing site will no longer be required by FWBH and the land value and the residual value of the buildings (if any) will be a benefit to offset the cost of the land for the new site.

The $3M capital costs for statutory compliance in the base case will be avoided.

Relative to the base case, recurrent costs will be subject to the same competing effects: more patients and treatment versus improved efficiency. The rise in costs for the first factor will be similar to option 1 but the gains in efficiency should be greater in a purpose designed facility due to better communication between departments, better located departments to minimise staff and patient movement etc (the economic appraisal would substantiate any claims for improved efficiency).

Benefits

The benefits would be expected to be higher and this should be quantified where possible. On the other hand the costs will also be expected to be higher.

The primary benefits are realised as improved health outcomes through enhanced health services that are delivered more effectively and with enhanced measures to address matters such as infection control.

The benefits for people who cannot be treated at FWBH in the base case after 2010 would be similar to the benefits in option 2, in terms of avoided travel costs and reduced waiting times.

There are amenity benefits such as the effects of changes in parking, traffic and the accommodation characteristics of the hospital – these are not easy to quantify, although if there are time savings these could be captured in the assessment of travel costs.

Suboption: defer or stage development

The present value of construction costs will reduce the longer that development is deferred. Some health outcome benefits in option 3 will be lost during the period of deferment. If the project is deferred beyond 2010, then some of the impacts avoided in option 4 on patients from travel and delays will also be lost.

Staging development will also reduce the present value of costs. However, disruption costs will increase and the extent of any increase will be design dependent. It should be possible to minimise the loss of benefits that obtain under option 3 with careful attention to how the project is staged.

Option 4: Option 1 combined with partnership arrangements with the local private hospital

Within the Far West region there is a private sector general health facility that offers some relevant health services are known to have spare capacity. Preliminary discussion indicates that the spare capacity is only sufficient to meet the increase in demand from 2015.

Costs

The costs also include the resources used by the private sector facilities to treat patients who transfer from NSW Health. AHS has derived estimates of total charges by the private sector facilities.

Analysis of the charge estimates suggests that fixed costs have been fully distributed including a component associated with the cost of capital for the facilities. The cost of capital probably should be treated as a sunk cost for the purpose of the appraisal, suggesting that the estimates for the charges should be reduced to arrive at a measure of the resources used.

Benefits
The benefits relate to the patients treated at the private sector facilities. In comparison to the base case, these patients will have:

- avoided travel costs – for patients who would have been transferred to other hospitals
- reduced waiting times - for patients who would be treated at FWBH in the base case
- improved health outcomes – for patients who would have opted out of the health care system.

Option 5: Modification to models of care in the CSP plus reduced size hospital that meets projected demand

[Note: this option is applicable only if there are subsequent service/scope changes since the CSP and should be addressed early at the value management workshop)

This option would be a combination of capital and non-capital solutions to meet the projected demand. In developing the Area Health Plan and Clinical Service Plan, a strategy has been developed to avoid hospital admission of older people by working with local nursing homes and managing older persons in the community through an integrated community care centre with General Medical Practitioners, allied health and community health nurses that closely manage the health of at risk elderly patients in a community setting.

Costs
This would require a hospital with fewer beds than under option 2 or 3, but would include the cost of building an integrated community care facility and additional motor vehicles for nurse practitioners to visit older people after discharge to nursing homes.

The operating cost would have to include the cost of running the hospital and the integrated community care centre.

The cost of older patients travelling to hospital would be less, but there may be higher travel costs for health professionals who visit older people at home or nursing home.

Benefits
The benefits under this model would be expected to be similar to other options that meet service demand, but would include less acute health events for older people resulting in greater length and quality of life.

There would also be intangible benefits from people who prefer to stay at home connected to their family and community rather than go to hospital and risk infection or adverse events.

Note
This option is consistent with Premier Memorandum M2007-20 State Plan Priority F4: Embedding The Principle Of Prevention And Early Intervention. This memorandum states that all new policies and programs will be developed and assessed, having regard to whether there are prevention and early intervention alternatives that may generate a better buy for the investment made.

Appendix 4 – Valuation of travel costs

Travel costs are broadly grouped into three categories:

- private travel by patients or users of the health care system
- private travel by friends and family of health system users
- transport by NSW Health of patients and associated items (test samples, records, etc) between facilities.

The situation has been summarised in the following table for travel by private vehicle (the first two types of travel cost in the bullet list above). Each travel item in column 1 should be multiplied by the parameter in the second column to obtain the costs for one trip. Note that the distance and travel time apply to one round trip (there and back, from home to hospital and return). In the case of travel time costs, the calculation has to incorporate vehicle occupancy (in the case where there are passengers in the vehicle) to account for people accompanying the person accessing the health care system.

Parameters used in computing benefits related to travel

Travel cost item	Unit cost applied to	Other factors
Vehicle operating cost including fuel	Distance	
The personal cost associated with travel time	Travel time	Vehicle occupancy
Average costs of accidents	Distance	
Cost of environmental impacts	Distance	

Estimates for unit costs for each of the items in the first column have been extracted from the Economic Assessment Manual issued by the NSW Roads and Traffic Authority. The unit costs are updated on a regular basis by the RTA. For further detail see RTA (2005).

It is also necessary to have estimates of the number of trips that would be made by each patient that transfers to another facility, as well as the number of visitor/visitor trips (perhaps as a function of the distance or travel time). It may be necessary to disaggregate the patients affected by the type of treatment they will receive since this may determine the number of trips they will need to make.

The estimates of costs for one trip are then multiplied by the expected number of trips to the alternative medical facility. An estimate of the number of patients to be transferred for any option would be derived from the planning information (and is related to the shortfall in capacity at the facility).

The above process assumes that each transferred patient faces the same [increase in] distance and travel time in travelling to the alternative facility. This is a simplification of what occurs in practice. But provided the catchment population is distributed fairly uniformly around the closest facility, in most cases it would be adequate for the purpose of the analysis to take the increase in distance as the distance between the two health care facilities (and similarly for increase in travel times).

More sophisticated analysis may be necessary if the proposed facility is not at the centre of the catchment, or the configuration of the road network will result in non-proportional travel costs. Complex transport models are available that can be used to refine estimates of the differences in travel costs between options if this is considered necessary. Also if it is expected that there will be significant public transport use, then this would need to be analysed separately – the approach proposed above assumes travel by private vehicle.

The assessment includes only avoidable impacts from the travel. Impacts associated with the purchase of vehicles and the construction of roads are excluded.

Parameter values based on RTA revised 2005 figures[7]

Item	Area of application	Unit estimate	Units
Vehicle operating cost (including fuel cost)	Urban road network	21.01	cents/km
	Regional highway	21.03	
Value of travel time	All	11.05	$/hour
Cost of vehicle crashes	Local/ subarterial	75,480	$/M km
	Arterial	54,995	
	Freeway	17,193	
Environmental externalities	Urban	Rural	cents/km
Noise	0.79	0.00	
Air pollution	2.37	0.02	
Water pollution	0.35	0.03	
Greenhouse	1.69	1.69	
Nature and landscape	N/A		
Urban separation	N/A		

Source: RTA

[7] The RTA issues updates for the values of these parameters. A new set of values is expected to be issued in 2008.

Appendix 5 – Measuring improvements in health outcomes

This Appendix outlines the approach for placing monetary values on quantitative estimates of improvements in health outcomes. The process of applying estimates obtained in research is referred to as 'benefit transfer'.

Quantifying health impacts

Health impacts may take account of changes in life expectancy (including expected life years where lives are lost or saved) and changes in the quality of life. This approach makes use of a concept known as the disability-adjusted life year (DALY).

To apply the findings from the theory of health economics, it is necessary to establish linkages between the action or health intervention to be assessed and the consequence in terms of reduced mortality or improvements in health more generally. For each option where an improvement in health outcomes is anticipated, it is necessary to generate estimates of [the change in] the number of disability adjusted life years (DALYs). The number of DALYs is multiplied by the accepted value of a DALY to arrive at the estimate of the value of the health outcomes for that option. In practice, since economic appraisal is a comparative exercise, it is more likely that the number of DALYs will relate to the *difference* between an option and the base case. The difficulty is how to estimate the number of DALYs.

The assessment of broad health programs such as immunisation or screening generally makes use of epidemiological research and/or laboratory tests to establish the forecast relationship between action and health outcomes (see for example UK Department of Health 2004a).

There is much less experience with the application of the DALY approach to economic appraisal of individual capital proposals. There is substantial uncertainty in quantifying the relationship when the government actions taken:

- tend to vary considerably from case to case for major building proposals (there is less 'control' than in epidemiological research)
- result in cause-effect relationships that are not well defined
- have an extensive range of impacts (operating over many different aspects of the facility in the case of many hospital projects for example).

Valuing health impacts – reduced mortality

In terms of premature mortality, it must be emphasised that there is no attempt to place a value on the life of an identifiable person. Rather what is attempted is to determine the 'value of a statistical life' (VSL). The value of a statistical life (VSL) is a measure of the benefit of a reduction of mortality by one death. This term is a shorthand way of evaluating the trade-off that people make between expenditures and small changes in the risk of death.

The accepted VSL is multiplied by the reduction in lives lost between the base case and each of the other options to generate a monetary estimate for the value of reduced mortality.

Valuing health impacts – reduced morbidity

There are basically two approaches for estimating the value of improvements in morbidity.

Human capital / Cost of illness approach (CoI)

The cost of illness method is based on the 'economic' costs incurred as a result of illness. The costs are measured both as direct costs for treatment of disease, and the foregone production when people die or become ill and are unable to work at their normal levels. In general, CoI estimates are based on objective data available on items such as health care statistics and wage rates.

The major drawback of CoI method is that it fails to provide any measure of the pain and suffering experienced by people who become ill and the emotional impacts on friends and family, or the loss of enjoyment of life. On a more technical note, the interpretation of CoI estimates of foregone production within a welfare economics framework is not completely straightforward.

Willingness to pay approach (WTP)

WTP is an extension of the concept that in well-performing markets the value of a good or service can be gauged by the price charged: a consumer will only purchase a good if the value to the consumer equals or exceeds the price.

WTP estimates have been generated either by specially designed surveys (commonly referred to as the *stated preference method*) or by observing choices made by people in situations where risks can be traded off against financial outcomes (*revealed preference method*). While the WTP approach in theory can capture the entire value (both financial and non-financial) of avoiding premature death or illness, there is considerable ongoing debate in regard to certain issues, and a number of these will be discussed below.

WTP estimates for the value of a statistical life (VSL) tend to be higher than CoI estimates. The most common approach to generate VSL estimates is to examine the wages premium paid in risky jobs and relate this to the observed increased incidence of fatalities in these jobs. While this method has been criticised on a number of grounds[8], it remains the most popular.

The Guidelines on economic evaluation of environmental health (DoHA, 2003a) recommend the WTP approach and a value of $2.5 million for VSL.

[8] For example, it is not known if workers in high risk jobs have the same wage-risk trade-off as other workers; and there are doubts as to the level of awareness workers have of the actual increased risks that they may face.

Appendix 6 – Other data and research sources

Construction costs

- Rawlinsons compendium of construction costs – three forms
  - o detailed prices on building components, eg costs of doors
  - o 'elemental' building costs (broad elements) $ per square metre or $/bed estimates for various building types including hospitals (4 types), 4 other types of health facilities
  - o comparative costs by building elements eg substructure/beams
- Reid/Cordellls compendium – detailed prices, possibly other cost estimates

Service costs

- Costs of Care Standards 2005/06, NSW Health

Cost of transferring patients to other facilities)

- Costs of transport of patients to closest hospital (with given service capability) – NSW Health
- indirect costs eg cost of transferring records etc – NSW Health

Benefits

Value of statistical life

- Enhealth guidelines recommend $2.5 million in 2003 dollar terms

DALY weights

- Mathers et al (1999)
- Mathers et al (2003)

Appendix 7 – Template for Economic Appraisal report

[The format for CEA is set out in Appendix 6.2 of the Government Guidelines TPP07-6.]

1. Executive Summary

1.1 The strategic context –
- The drivers for the proposed investment and associated service delivery model are as follows: …..
- State Plan, Area Asset Strategy, Clinical Services Plan

1.2 Why capital investment
- The existing situation
- The service needs are …..
- The project objective
- The proposed scope for the project is….

1.3 Project Objective
- Required service outcomes
- What are the service outputs (now and future)

1.4 Options appraisal
- The long list for SPP is based on the value management study and the shortlist for PDP is based on the options recommended in the SPP.

  The following options were considered …..

1.5 Results of Cost Effectiveness Analysis
- Provide net costs and benefits for all options

1.4 Recommendations

For SPP

On the basis of the preliminary economic appraisal, it is recommended the following options be examined in detailed appraisal at the Project Definition Plan phase

- The base case
- The preferred option
- Other options with NPVs sufficiently close to the preferred option that require further investigation in the SPP

For PDP

The recommended option is ……

2. Background

- Orangisational overview

3. Strategic context

- Clinical service planning

- Model of care
- Service need analysis (based on CSP)
- Service strategy for AHS and/or state wide directions, as appropriate

4. Project and investment objectives

- Improved service outcome
- Improved service quality
- Need for replacement

5. Option appraisal

6. Assessment of costs

- Methodology
- Decription, sources and assumptions

7. Assessment of benefits

Qualitative assessment:

- The appraisal of the qaulitative benefits asscoiated with each option was undertaken by identifying the benefits criteria relating to the project objective.
- Service gap (quantity and quality) as compared with base case (status quo or keep safe and operating)

Quantitative assessment (if applicable)

- Summary table of service levels and benefits

Type	Direct to AHS / Health	Indirect
Quantitative (or quantifiable)		
Base case		
Option 1		
Option 2		
Option 3		

8. Net present value findings

The following table summarised the key results of the economic appraisals for each option:

Table: Key results - total Net Present Value / Cost basis

	Net Present Value / Cost
Base Case – ”status quo or keep safe and operating”	
Capital	
Recurrent	
Total costs	
Less	
Cash and/or non-cash benefits to agency	
Cash and/or Non-cash benefits to users	
Total	
Special considerations	Both qualitative and quantitative
Option 1 -	
Capital	
Recurrent	

Total costs	
Less	
Cash and/or non-cash benefits to agency	
Cash and/or Non-cash benefits to users	
Option 2 – subheadings as above	
Option 3 – subheadings as above	
Option 4 - subheading as above	

Table: Key results of economic appraisal: incremental cost relative to the base case

Incremental NPV (NPC) relative to base case	Net Present Value / Cost
Option 1	
Option 2	
Option 3	
Option 4	

9. Options ranking

10. Sensitivity analysis

- Brief results of sensitivity analysis

11. Option appraisal conclusions and recommendations

- Options ranking
- Preferred option

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