Overview of Sustainability Rating Tools

Phase 2

Recommendations Report

BRISBANE CITY

ArupSustainability

OVERVIEW OF SUSTAINABILITY RATING TOOLS – PHASE 2 RECOMMENDATIONS REPORT

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Abbreviations Box

ABGR – Australian Building Greenhouse Rating
BASIX – Building Sustainability Index
BCC – Brisbane City Council
BEDZED – Beddington Zero Energy Development
BERS – Building Energy Rating Scheme
BREEAM – Building Research Establishment Environmental Assessment Method
CBD – Central Business District
CD – City Design
CP – City Planning
DA – Development Application
DRS – Development and Regulatory Services
EPA – Environmental Protection Agency
EPGB – Environment Performance Guide for Buildings
ESD – Ecologically Sustainable Development
IPA – Integrated Planning Act
LCADesign – Life Cycle Assessment of Design
LEED – Leadership in Energy and Environmental Design
LISA – Life Cycle Assessment in Sustainable Architecture
NABERS – National Australian Built Environment Rating System
NatHERS – Nationwide Housing Energy Rating Scheme
PPH&S – Pollution Prevention, Health and Safety
PSP – Planning Scheme Policy
PV - Photovoltaic
SEQ – South East Queensland
SHC – Sustainable Housing Code
SPeAR® - Sustainable Project Appraisal Routine

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1 Introduction

Arup Sustainability was commissioned by Brisbane City Council in February 2004 to conduct an overview of sustainability rating tools. The aim of this consultancy was:

> *'to analyse sustainability rating tools available in Australia and to apply them to the regulatory assessment process of sustainable developments in Brisbane'.*

The study has been conducted over the past four months in two phases:

- Phase 1: Evaluation of nominated rating tools and identification of a preferred tool(s); and
- Phase 2: Application of the preferred rating tool(s) to Council's regulatory planning framework.

The study has revealed a number of findings in relation to the availability and relevance of rating tools, the constraints currently associated with assessing sustainable development applications in Brisbane and the opportunities for better integrating sustainability within the regulatory planning framework of Brisbane City Council.

This final report has been structured into seven sections. **Sections 1** and **2** set the study context. **Section 3** outlines the study methodology. **Section 4** outlines the existing planning framework for sustainable development, whilst **Section 5** provides a summary of the findings from the Phase 1 Paper on the Evaluation of the Rating Tools (**Appendix A** presents the full Phase 1 report). **Section 6** of this report outlines the method and findings from the evaluation of rating tools in the regulatory planning process and **Section 7** provides recommendations for short, medium and long term actions for Council to better understand, assess and report on sustainable developments in Brisbane.

2 Study Context

As part of its 'Clean and Green' initiatives, Council is seeking to promote innovative and best practice urban development in order to preserve environmental quality and reduce resource consumption of new and existing developments. Council acknowledges that Brisbane City faces rapid population growth over the next 20 years and the subsequent likely demands on residential housing and other building types.

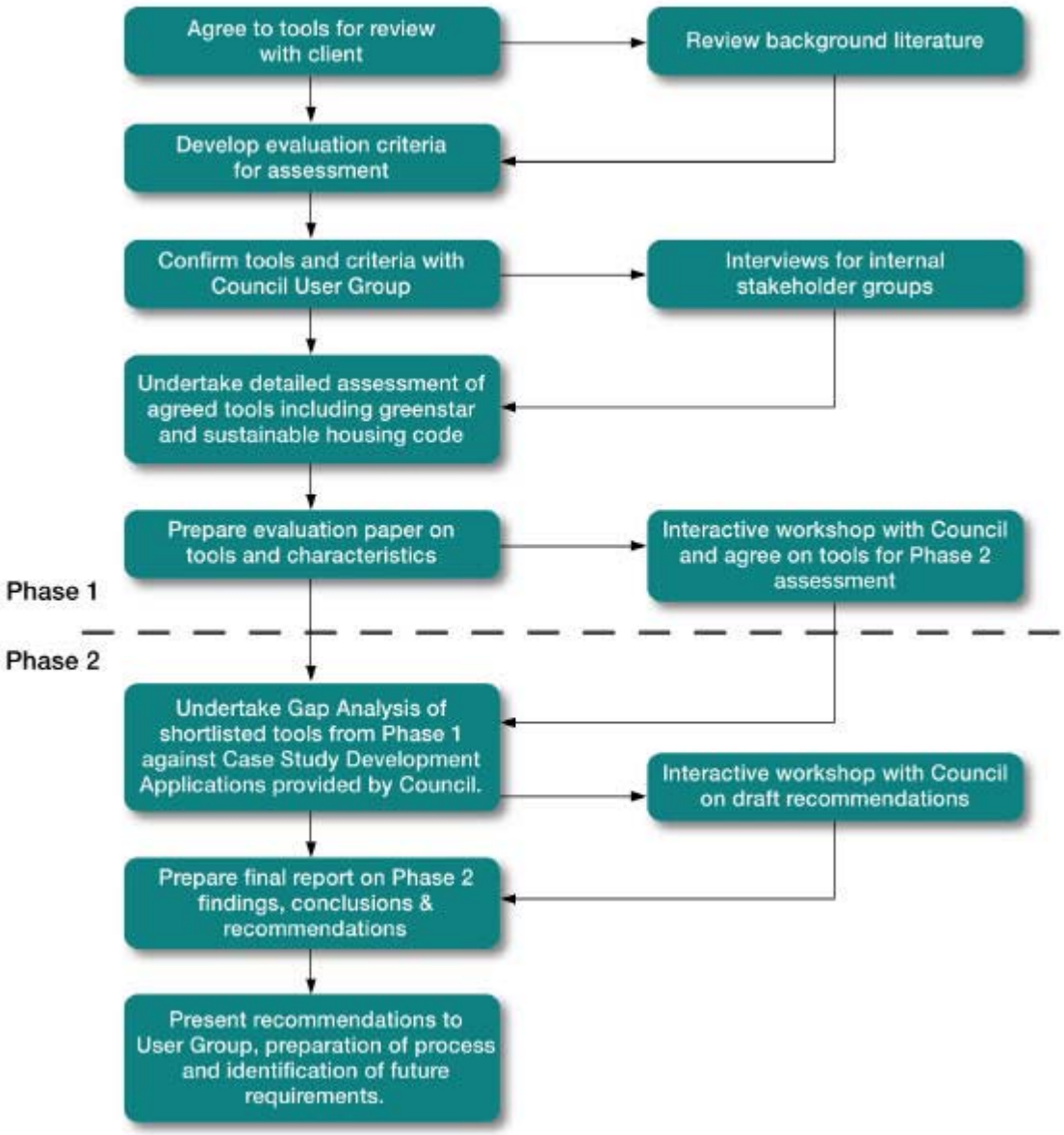
Brisbane City Council in its role of planning authority in Brisbane is seeking to influence development to achieve more sustainable outcomes. Council has the most influence on development outcomes through regulating planning approvals, but would like to achieve as much influence as possible on achieving sustainable development throughout the planning, approval, construction and operation phases of a project. It is considered by Council that sustainability rating tools have some part to play in influencing sustainable development outcomes in Brisbane.

Currently, rating tools that are applied through the Energy Efficiency Code (namely BERS) and House Code in Brisbane City Plan tend to be energy rating tools focused at the detailed design phase of a project. Council realises that these tools are not leveraging across the board sustainability outcomes (given their singular focus on energy) and that because of their use at the detailed design phase in the development assessment process, there is less opportunity to influence planning and design outcomes earlier in the process. Therefore Council is seeking to understand the potential range of issues that can be influenced by a rating tool and the most appropriate time for the use of such a tool in the planning and development cycle.

3 Study Methodology

The methodology for Phases 1 and 2 of the project is represented graphically in **Figure 1** below.

Figure 1 - Methodology



3.1 Phase 1 Activities

The purpose of Phase 1 of the project was to evaluate a selection of domestic and international rating tools to help in identifying a preferred tool or matrix of tools to assess how sustainable a development is in Brisbane City. In doing so, Council is seeking a tool that:

- Can provide clear and unambiguous measurement of sustainability outcomes;
- Is easy to understand;
- Has a wide application – including but not limited to residential, commercial, and industrial development and subdivisions; and
- Is transparent – it can be easily understood why a proposed development achieves a higher rating than others.

The first task was to select a range of tools for evaluation. Fifteen tools were agreed upon by the project team including energy, environment and sustainability tools. In consultation with Council, twelve evaluation criteria were developed and approximately fifty sub criteria to assist the evaluation of the fifteen tools. The criteria addressed the scope, application, relevance to Brisbane, benefits and limitations of each tool.

The evaluation process utilised information on tools gathered from background research, use of the tool spreadsheets or interfaces and interviews with tool creators. The results were documented in an electronic database. Part of the evaluation process also involved consideration of using a combination of Green Star and the Sustainable Housing Code for commercial and apartments/houses respectively. To highlight key areas of importance and simplify results, each evaluation criteria was given a priority of high/medium/low by Council and applied to the evaluation by the Arup Sustainability team.

Results of evaluation and prioritization allowed for an elimination process to narrow down the tools relevant to Brisbane's development needs. This was conducted through an interactive workshop with Council and the Arup Sustainability team.

For further information on Phase 1 of the project see **Section 5** of this report or **Appendix A**.

3.2 Phase 2 Activities

The purpose of Phase 2 of the study was to apply a number of short listed tools from the Phase 1 evaluation to the regulatory planning framework using worked examples.

The Phase 1 interactive workshop process resulted in the choice of five short listed tools (covering residential, commercial and a mix of development types) which were relevant to the Brisbane context and able to achieve Councils priorities. Three of these tools were taken into Phase 2 for further evaluation.

The Arup Sustainability team were provided with development applications (DA's) for two sustainable developments. This information was used in an assessment (using a gap analysis approach) against the requirements of each of the short listed tools' indicators.

The assessment undertaken was used to understand the gaps in data required by each of the tools against that which is currently required by Council through the planning scheme, highlighting the suitability of the tools indicators and the potential burden on the applicant of these tools. The assessment also reviewed the ability of the tools to be adopted in the regulatory planning context.

The results of the gap analysis allowed the identification of preferred tools and formed the basis of the key findings, conclusions and short, medium and long term recommendations to Council.

4 Existing Planning Framework for Sustainable Development

4.1 Introduction

The concept of protecting the environment, maintaining an equitable society for future generations and delivering financial benefits for economic prosperity is not a new one to Brisbane City Council. Brisbane has continually aspired to be a clean, green, connected and inclusive city through initiatives inspired by Council involving businesses and communities. Brisbane City Council's response to the sustainability agenda can be found in several documents addressing external and internal principles for managing the triple bottom line of environmental protection, societal inclusiveness and economic prosperity of the city. These include for discussion here:

- Living in Brisbane 2010: A Vision;
- The Brisbane City Plan;
- Developing Brisbane: A Sustainable Approach; and
- A Framework for Delivering Environmental Sustainability.

4.2 Living in Brisbane 2010: A Vision

The holistic long-term vision statement for Brisbane City: Living in Brisbane 2010 is an overarching public document created from consultation with government, businesses, industry, schools, community groups and individuals. The aim of the vision is for a collective process which

'gives our city the flexibility to succeed in a rapidly changing world without sacrificing what is important'.

The eight strategic directions outlined in this document that reflect the core aspects of sustainable development include:

- Clean and green city;
- Accessible city;
- City designed for subtropical living;
- Smart and prosperous city;
- Creative city;
- Inclusive city;
- Active and healthy city; and
- Regional and world city.

4.3 The Brisbane City Plan

Council's primary driver of land use and planning policy is the City Plan. The Plan contains a range of controls that influence both the process and the outcomes of development in the City, in terms of:

- Providing the strategic vision and direction for the City in the Strategic Plan;
- Providing the outcomes for discrete parts of the City, whether expressed more broadly in Areas or specifically in Local Plans;

- Setting standards of development through Codes; and
- Providing supporting standards, information and processes in the Planning Policies.

In its day to day regulation of development, Council has identified the City Plan policy outcomes in the different elements of the planning scheme outlined above, and sought to translate the policy into determining the application processes that apply, whether self, code or impact assessable. Further details of the regulatory planning framework are provided in **Section 4.5**.

4.4 Developing Brisbane: A Sustainable Approach

In response to a need for detailed and specific sustainability principles to apply to Brisbane's development assessment process Brisbane City Council has produced 'Developing Brisbane: A Sustainable Approach'. This document outlines eight core principles of sustainability to show specific requirements which would enable a project to be deemed a 'sustainable development'. These eight principles are voluntary and address:

- Energy efficiency;
- Conservation & reuse of water;
- Protection of the natural environment;
- Minimising waste;
- Incorporation of transportation strategies;
- Enhancing the indoor environment;
- Selection of appropriate building materials; and
- Building a community.

Currently Council provides this document to applicants at pre-lodgement for consideration in the applicant's DA. However, it is currently at the developers discretion as to how the eight principles are addressed or indeed if they are all met by the sustainable development proposal.

4.5 A Framework for Delivering Environmental Sustainability

Brisbane City Council have also started to address key environmental sustainability priorities and have developed a document entitled 'A Framework for Delivering Environmental Sustainability' which as the sustainability agenda evolves, aims to integrate it within Council, to move to a more pro-active and systematic, rather than opportunistic role in the social and economic elements of sustainability. BCC considers that environmental sustainability is a goal that will be reached through multiple strategies targeting key improvement areas. These strategies are described as:

- Embedding sustainability into corporate processes;
- Community engagement; and
- Facilitating 'showcase projects'.

4.6 The Current Regulatory Planning Framework

4.6.1 Council's Roles And Responsibilities In The Regulation Of Development

Council's Development and Regulatory Services Branch has the responsibility for development assessment, compliance and technical input into the appeals process. Its' development assessment staff primarily deal with applications required by the City Plan, Council's IPA planning scheme. In addition, a range of other

assessments are made under the planning scheme, in relation to matters such as detailed operational works, including landscaping, stormwater management or erosion and sediment control.

The Council's regulation of development comes with often competing objectives of:

- The need for certainty in decision-making – so that the development sector and community can predict with a reasonable level of confidence what outcomes are expected where.
- The need for a 'level playing field' - confidence that similar developments in different locations across the City are addressed in consistent ways;
- The need for flexibility in decision making – so that individual site characteristics, and particular aspirations and innovations for each development are taken into account during the assessment of development;
- Meeting community expectations about input into local development issues, and the increasing awareness of social and environmental issues contributing to continuing pressure for Council to influence developments considered detrimental to the character and environment of the city; and
- Timely assessment – providing applicants with a timely response to development proposals so that subsequent development tasks can be well planned.

Whilst these could be regarded as external pressures on the regulatory system, a number of internal pressures are also relevant in the regulatory environment:

- The need for processing of applications in short timeframes;
- The need to reduce the number of DAs;
- The need for regulatory systems to avoid complexity and provide clarity in outcomes;
- The change in position and high turnover of assessment staff;
- Trends to move assessment towards self assessment and wherever possible, self certification of assessment; and
- Increasing pressures for regulatory systems to reduce costs and apply pay-for-service fee structures.

4.6.2 Regulation of Sustainable Developments

It is in this environment (described above) where tools and processes to measure and report on sustainability performance of development should operate. To do so effectively, any policy shift towards more sustainable outcomes, and the accompanying tools and processes, frameworks or City Plan amendments to support them, must take account of the competing objectives of the regulatory system.

In terms of tools and processes that assess sustainability performance, or City Plan amendments to better support sustainability objectives, Council at the commencement of this study, outlined some desirable requirements for tools that include they should:

- Not further burden the development assessment process with more complex or additional processes;
- Not require additional staff, additional staff hours or a new area of professional advice;
- Not be considered the source to resolve disagreements about the assessment being carried out;
- Wherever possible require a self assessable model – that is, that the standards of performance for sustainability are set and assessment against those standards is certified by external agencies, so that:
- Council is not directly involved in the assessment of sustainability issues;
- Council is able to audit a small percentage of reports and outcomes to ensure the checks and balances are a part of the system; and

- Council becomes the recipient of the sustainability report, and as such, is able to keep an overview on the outcomes and performance of its regulatory system in accordance with the tools protocol and agreed indicators.

Throughout the course of this study the reality of achieving many of these desirable requirements has been tested and further comment on this is provided in **Section 7**.

4.7 Development Assessment Sustainability Team and Incentives

BCC has been trialing a range of processes and incentives in relation to sustainable development and the development assessment process. These have included the establishment of a fifteen member multi-disciplinary team of planners, engineers, architects and scientists to support sustainable developments in the development assessment process. The role of the team is to provide expertise, resolve policy conflicts and ensure timely decisions on sustainable developments received by Council.

The role of this team has been to have early involvement with applicants promoting sustainable developments, for the team to be involved in design of these developments helping give advice and solve problems. The intent of this approach is to help move away from the more common adversarial roles the team find themselves in due to their regulatory function. The intent for the Development Assessment Sustainability Team is also to be less risk averse with applicants and seek to encourage innovation. The team have also developed the document 'Developing Brisbane: A Sustainable Approach' described previously in **Section 4.4**. This document has been developed as a guide to help applicants understand the elements Council considers to be important in a sustainable development.

There have also been a number of incentives mooted by the Development Assessment Sustainability Team as a means to encourage sustainable developments. These include GFA bonuses, infrastructure charges, dedicated decision times, reduced application fees, design advice and joint marketing of developments. Some of these incentives have been reasons for applicants submitting DAs, but more transparency regarding how these incentives are applied is currently needed and is subject of review.

There are additional opportunities for the Development Assessment Sustainability Team within Council which move beyond the traditional roles of development assessment personnel. These include the use of the team members to provide a strong feedback mechanism to policy makers within Council on policy barriers and opportunities for sustainable developments; and a role required in the facilitation of sustainable development and education about sustainability for applicants. These opportunities are explained further as recommendations in **Section 7** of the report.

4.8 Rating Tools in the Regulatory Planning Framework

4.8.1 Introduction

Investigating the opportunity to use an existing rating tool or tools in the context of Brisbane City has been the main impetus for this study. Given this, it is worth reviewing the history rating tool development and the current or proposed use of rating tools in the regulatory planning framework elsewhere in Australia.

4.8.2 The History of Rating Tools

Rating tools have been developed over the last decade to address a number of sustainability issues which occur within the built environment. Energy efficiency and reducing the greenhouse gas emissions of buildings has been a popular focus of these rating tools. In 1993, the Australian government made commitments to energy efficiency and environmental improvement which manifested in the development of the national Housing Energy Rating Scheme (HERS). The aim of the scheme was to "facilitate rating of the thermal efficiency of dwelling design and construction" and to assist the building industry to identify the potential for energy efficiency in houses. The NatHERS software was developed from this process and lead to state-specific energy software

tools such as FirstRate, BERS and the recent upgrade of NatHERS called AccuRate. These tools were focused on thermal performance of residential dwellings based on a computational 'engine' (CHENATH developed by CSIRO) with a user-friendly interface. But despite slight differences in scope, these tools are limited to energy-related issues.

However, since the emergence of the sustainability agenda focusing on the triple bottom line performance of environment economic and social issues together, a large number of tools have emerged which encompass aspects of these additional impacts. Moving beyond energy efficiency, benchmark environmental performance and design tools such as BREEAM and LEED were developed in the UK and USA in addition to the International Green Building Challenges' GBTool. These tools sought to address the horizontal and vertical aspects of the built environment to include different stages of development (design, construction, operation), different parts of development (interior and exterior) and different types of development (commercial, retail and industrial).

In Australia, these benchmarks have become adapted to create rating tools to suit our own environmental and societal conditions in the form of the Australian Greenhouse Building Rating (ABGR), National Australian Building Environmental Rating System (NABERS), Green Star, Building Sustainability Index (BASIX) and the Environment Performance Guide for Buildings (EPGB). Specialist consultancies have developed their own commercialised versions such as Arup's SPeAR® and The Heilbronn Group's EcoIndex. Efforts to integrate sustainability issues into the development assessment process have also commenced with Melbourne Docklands ESD Guide and South-East Queensland's Sustainable Housing Code.

The fields of life cycle assessment (LCADesign, LISA, ENVEST, ECOTECT), green building materials (EcoSpecifier) and zero energy developments (BEDZED) have also contributed their own versions of rating tools or similar to incorporate sustainability into the built environment.

4.8.3 Sustainability Rating Tools Developed by Government

The majority of rating tools available in Australia are voluntary and have been created, designed and funded by privately owned organisations or associations. In the past, there has been little mandated use of rating tools in the regulatory planning process other than for those tools that address energy efficiency. In addition, there has been minimal guidance during the development assessment process relating to methods of evaluating the sustainability performance of developments provided by local or state governments.

However, recent years has seen the development and use of government-built tools that address more issues than energy efficiency for adoption during the development assessment process. Two examples include:

- The Building Sustainability Index (BASIX) by the Department of Infrastructure, Planning and Natural Resources in NSW; and
- The Melbourne Docklands ESD Guide developed by VicUrban and the Dockland's Authority.

BASIX aims to assess the potential sustainability performance of residential developments during the development assessment process using a set of sustainability indicators (initially water and energy with later versions addressing landscape, stormwater and thermal comfort). While created and funded by at a State level, the tool is being implemented throughout local governments within NSW as a mandatory component of the development assessment process under the Environmental Planning and Assessment Act 1979.

BASIX is a web-based tool which will be used by building applicants for each residential development proposal to produce a certificate with their DA. The tool gives the development a score for water and energy performance compared to average of existing housing stock in NSW. BASIX has also been designed to create a simplified process for assessing the sustainability performance of homes, documenting this performance within a DA and certifying and auditing performance by local councils.

Another rating tool developed and implemented by the government is the Melbourne Docklands ESD Guide. Developed by VicUrban, the Victorian Government's urban development agency, in conjunction with the Docklands Authority, the guide is created specifically for the Melbourne Docklands – a waterfront development

in Melbourne comprising commercial and residential developments. The ESD Guide provides a method for building applicants responsible for developments within the Docklands to assess, review and report on the sustainability performance of their buildings as part of the development assessment process. Developers are required to report on indicators within the ESD Guide throughout the development assessment process which fits within the Melbourne Planning Scheme facilitated by the state government Department of Infrastructure with input at the local government level from Melbourne City Council.

The above examples provide evidence of the movement towards government-built rating tools specific to the development assessment process. These tools are successfully mandating the assessment of sustainability issues in new developments via legislation, rather than voluntary methods promoted by privately owned rating tools. By utilising rating systems, these government agencies are able to simplify sustainability within the development assessment process and measure overall performance of sustainability issues such as resource use over a particular area by providing specific benchmarks and targets. This mandatory process also puts the onus of incorporating sustainable design elements on all developers, not just a select few.

4.8.4 The Queensland Context

With the exception of the use of BERS (an energy efficiency tool) mandated in Brisbane City Plan and the promotion of the use of ABGR (a greenhouse rating tool) by the Queensland Environmental Protection Agency (EPA), there has been very little promotion of other rating tools by the Queensland Government in recent years. The Green Building Council has been promoting the use of Green Star nationally and it has been used in several different projects recently including BCC's new headquarters building (Brisbane Square) and included in tender documents issued by the Department of Public Works for example. It is also apparent the EPA and Department of Local Government and Planning are also in the process of reviewing BASIX for its potential adoption in the Queensland context.

However, in any discussion on rating tools there needs to be a consideration of context. The adoption of a rating tool that considers a broad range of sustainability factors is more complex that mandating an energy efficiency tool for example, that has a small number of parameters that need to be 'fixed' to suit climatic needs. When thinking about the contextual issues prior to the adoption of a rating tool, the following should be considered (this list is not exhaustive):

- What are the critical environmental, social, economic, factors our region is facing from population growth and consequent increase in development?
    - What types of development are our biggest issue (i.e. residential vs. commercial, infill vs. greenfield etc)?
    - What climatic conditions do we have to take into account? Etc
- What sustainability outcomes are we seeking for our region over time?
- What must a rating tool address to be able to positively impact on the outcomes being sought?
- What targets do we already have in place that the use of a rating tool will help achieve? Etc

Brisbane has in recent years experienced considerable growth in population. This growth has a consequent impact on development, especially in the residential sector either as infill development in inner Brisbane (as houses, units or apartments) or as greenfield development in the outer areas of the City (generally sub-divisions). At a slower pace and in significantly smaller numbers, large new commercial developments have been developed in the central business district and smaller commercial ventures and services in the suburban areas. Such context is important for Council in helping to prioritise the need for a tool and the issues to be addressed by a tool. For example, given the very large numbers of existing and forecast residential housing and sub-division developments seeking approval through Council, this presents itself as a leading priority in relation to the choice of tool and issues to be addressed by a tool.

5 Phase 1 - Evaluation of Sustainability Rating Tools

5.1 Introduction

As detailed in **Section 3**, Phase 1 of this consultancy involved selecting a range of rating tools and conducting an evaluation of the characteristics of each tool requested by Council against twelve criteria given below:

- Extent of coverage for sustainability issues;
- Summary of rating tool features;
- Description of tool's coverage;
- Pros and cons of use of tool and its limitations;
- Extent of benchmarking for best practice;
- Ability to verify and quantify sustainability issues;
- Ability to compare between developments;
- Ability to be updated to reflect best practice;
- Degree of acceptance/recognition by development industry practitioners and regulators of the credibility of the tool;
- Current usage of the tool in Australia;
- Proposed changes to the rating system; and
- Ease at which the tool can be communicated.

Each of these criteria had a number of sub-criteria that tools were also evaluated against and these are provided in **Appendix A**. In order to help the evaluation process, Council also prioritised the criteria into high, medium and low categories. These prioritised criteria were then used to eliminate inappropriate tools and shortlist tools relevant to the priorities of Council. This process was followed by an interactive workshop held with Council to help support the results of the analysis.

5.2 Tools chosen for Evaluation

Fifteen rating tools were chosen for assessment in this study. These tools were selected due to their relevance to the Australian context, coverage of sustainability issues, prominence in the market and their ability to deliver tangible outcomes toward sustainable development. The selected tools display differing foci such as energy efficiency and detailed aspects of economic, environmental and social sustainability. Several of the tools have been used extensively for years and other tools are still in the development stages and are yet to be released.

During the evaluation and prioritisation process three distinct categories of tools became apparent in the form of tools which address commercial developments only, residential developments only, or a mixture of different development types, such as sub-divisions, mixed use developments etc (called 'other'). The fifteen tools selected for evaluation could be identified under these three categories as follows:

Commercial

- ABGR - Australian Building Greenhouse Rating
- Green Star

- LCADesign – Life Cycle Analysis of Design

Residential

- Sustainable Housing Code
- BASIX - Building Sustainability Index
- AccuRate
- NatHERS - Nationwide House Energy Rating Software
- BERS - Building Energy Rating Scheme
- FirstRate

Other

- Melbourne Docklands ESD Guidelines
- SPeAR® - Sustainability Project Appraisal Routine
- The Heilbronn Group (THG) Eco Index
- BREEAM - Building Research Establishment Environmental Assessment Method
- LEED - Leadership in Energy and Environmental Design
- NABERS - National Australian Building Environmental Rating System

For more detailed information on the fifteen evaluated rating tools refer to **Appendix A**.

5.3 Phase 1 Results: Rating Tool Characteristics

5.3.1 Introduction

The results of the Phase 1 evaluation presented in this section focus on Council's high priority evaluation criteria (see **Table 1**) as they were considered to describe the most important characteristics of a rating tool for BCC. The results for the medium and low priority evaluation criteria are provided in **Appendix A**.

5.3.2 Coverage of Tools for Sustainability Issues

Most rating tools up until recently (approximately 2 years ago) focused primarily on energy efficiency, including tools such as BERS, NatHERS, AccuRate and FirstRate. The majority of tools have extensive coverage of environmental indicators (with a focus on energy efficiency, water use and conservation and stormwater quality) and more recent tools such as NABERS, BASIX, Green Star and the THG EcoIndex have indicator sets that include social issues (eg: transport, access, community, indoor amenity etc).

Very few of the tools (Melbourne Docklands and SPeAR®) offer economic indicators such as financial viability, cost of materials and effect on local economic circumstances. In addition the costs involved in implementing methods and technology proposed by the tools to achieve a sustainable development (or high rating) are rarely factored into the tool assessment.

While some tools may cover certain aspects of sustainability, only one of the tools (SPeAR®) considered the full spectrum of sustainability issues together as a holistic and comprehensive assessment of environmental, social and economic performance.

5.3.3 Description of Tools Coverage

There appeared to be a clear distinction between the tools that address commercial developments, residential developments or a mix of development types. Very few of the tools were able to be used on all development

types and only one of the tools was able to be used on developments other than buildings. However, the majority of tools which address only one development type (for example, residential or commercial only) have been developed to provide scope for incorporation of other development types in the future. Tool creators responsible for these tools were also prepared to provide funding for expansion of their tools in the future.

Approximately 90% of the tools evaluated are for application on new developments. These tools tended to assess the performance of the building's design prior to construction and 55% also assessed the construction impacts. The focus of indicators in these tools required detailed design information about the project. Phase 2 highlights the importance of this finding during a gap analysis of the tools requirements against DAs provided by Council (see **Section 6**).

The tools that address existing developments are usually divided into measurement of base building impact (without tenants) and measurement of the building with tenant impact. Most of these tools were able to measure both of these impacts independently through their assessment of commercial buildings, however, tools rating residential developments offered the base building assessments only. This could be attributed to the large numbers of residential developments which create difficulty for monitoring purposes.

The majority of tools evaluated can be applied to Brisbane, although at varying degrees of detail. While some of these tools were specific to the urban centre of Brisbane, others provided less specific assessments based on Queensland data instead. Approximately 30% of the tools evaluated were only for use outside of Australia (eg: United Kingdom or United States) or in specific Australian states other than Queensland (for example, NSW and Victoria).

5.3.4 Pros and Cons of using Tool and its Limitations

Approximately 70% of the tools require extensive data collection on the impacts of the development. These tools are usually concerned with the detailed design phase of the development. Those that require minimal data collection address one specific aspect of sustainability such as energy or greenhouse gas emissions.

None of the fifteen tools evaluated offered flexibility for the user to change weightings on particular criteria in the tool. For example, developments in hotter climates may weight the natural ventilation criteria with more importance than other criteria. Some of the tools did, however, provide inbuilt automatic criteria weightings, which adjust to the climatic region where the tool is being used.

The evaluation highlighted a distinct difference between how the tool users are able to reach a set benchmarks or targets. Eight of the fifteen tools prescribe mandatory strategies for the user to adopt to meet a set benchmark or target. All of these tools provide a range of strategies for the user to meet set targets. The remaining seven tools rate the performance of a development against set benchmarks or targets and do not provide strategies for the user to adopt.

5.3.5 Benchmarking against Best Practice

Four of the fifteen tools are specifically benchmarked using the Brisbane context. These tools have been developed locally by agencies or organisations that are familiar with priorities for the sustainable development of Brisbane. The remaining eleven tools would require some form of modification to be applicable to best practice in Brisbane.

5.3.6 Ability of the Tool to Verify/Quantify/Measure Sustainability Issues

The majority of tools evaluated have some verification or accreditation process in place. This is usually delivered by the rating tool creators through training of assessors to carry out facilitation of the assessment process to verify the rating achieved by the tool user. However, once this initial verification is completed by a trained or accredited assessor, only half of the tools offer further verification of the rating by a third party (i.e.: the tool creators).

All of the Australian specific tools evaluated are able to be easily audited by Council. The information presented by these tools is easy to check due to their relevance to the Australian context using local, regional or national benchmarks of best practice. The information is also presented in a format that is uncomplicated and easy for Council understand and access. The tools which originate from overseas, use best practice benchmarks from their own countries (i.e.: UK and US) which would make auditing difficult for Council if these tools were utilised on developments in Brisbane.

5.3.7 Ability of Tool to Compare Between Developments

Indicators, ratings, scores or graphical performance outputs for all of the tools evaluated are able to be compared between developments using the same tool. For example, one Green Star rating or indicator can be compared against another Green Star rating or indicator. If this comparison were to be made, however, it would have to be between the same development type. For example, a Green Star rating could only compare one rating of a commercial development with the rating of another commercial development but could not compare the rating of a commercial development against the rating of, say, a residential development.

5.4 Shortlisting Process and Interactive Workshop

Against Council's high, medium and low priority criteria (see **Appendix A**) the evaluation identified the best performing tools as:

- BERS and BASIX for residential development,
- ABGR and Green Star for commercial developments; and
- Melbourne Docklands ESD Guide and SPeAR® for 'other' developments.

Following Arup Sustainability's evaluation, an interactive workshop process using Councils nominated and prioritised criteria priorities. The workshop was facilitated by the Arup team and included participants from different branches within Council including; Pollution Prevention, Health and Safety (PPH&S), City Planning (CP) Development and Regulatory Services (DRS) and City Design (CD).

A presentation was provided on each suite of tools under the categories of residential, commercial and 'other'. The presentation did not reveal the names of the tools, but provided a summary of the tools key characteristics against Council's nominated high priority criteria. Workshop participants were then asked to rank tools. Discussion followed the prioritisation process and listed below are the key outcomes of the workshop:

- There is no tool or suite of tools immediately available that satisfies Council's priorities.
- The following best performing tools were identified for further evaluation in Phase 2 of the study:
    - BASIX and Sustainable Housing Code for residential development;
    - Green Star for commercial development and;
    - SPeAR® and Melbourne Docklands ESD Guide for other developments.

It was decided that whilst BERS and ABGR achieved high scores that they were inappropriate on their own due to their narrow scope for measuring energy efficiency only. It was also considered that as Green Star calls up ABGR in the energy efficiency section that inclusion of both tools would constitute doubling up.

A summary of the benefits and disadvantages of these shortlisted tools based on the Phase 1 evaluation are provided in **Table 1** below.

Table 1: Summary Information of Shortlisted Tools in the Brisbane Context

TOOL	BENEFITS	DISBENEFITS
Green Star	• Queensland specific weightings • Tried & tested, particularly inter-state • 3rd party verification required (ex Council) • Has ongoing support & funding from the Green Building Council • Currently drafted into the City Centre Local Plan • Benchmarked tool and provides rating which helps in marketing of the building • Good interface and easy to use • Potential marketing benefits	• 'Topflight' commercial only (top 25%) • Does not address Brisbane's critical sustainability issues relating to residential development • No economic indicators
BASIX	• Specifically deigned for development assessment process • State ownership/leadership • Good software interface and easy to use	• Potentially places greater burden on Council resources • State needs to take ownership/leadership • Not a rating tool • Focused at detailed design and construction • Would need to be benchmarked for Brisbane • In initial testing phases in New South Wales • Has required considerable industry consultation • Scope of indicators would need rationalising • No economic Indicators
Sustainable Housing Code	• Developed for the Brisbane planning context • Benchmarked for Brisbane • Some testing undertaken (Springfield sustainable housing) • Focused at development assessment level • Good base of indicators for expansion/inclusion	• Not a rating tool • No economic indicators • Not currently software based • Focused at the detailed design phase of development assessment
Melbourne Docklands ESD Guide	• Integrated into development assessment process • Good framework and indicators	• Developed for high end development on existing brownfield site • Suited to high density development • Focused at detailed design, construction & operation • Would need to be benchmarked for Brisbane • Not software based • Only 1 economic indicator
SPeAR®	• Full sustainability coverage • Brisbane specific • Tried & tested • Expandable suite of indicators • Has proven flexibility by integration into a development assessment process overseas • Can be used at any stage of development • Good software interface and easy to use	• Not a rating tool • Not currently publicly available

5.5 Phase 1 Findings

The evaluation and prioritisation process conducted during Phase 1 resulted in some important findings about rating tools and their application, including:

- The fifteen tools evaluated in Phase 1 were easily categorised into Residential, Commercial and Other (including subdivision, light industrial, mixed use etc).
- Four of the five tools specifically used on residential developments cover energy efficiency impacts only. The remaining tool covers environmental and social impacts, but is designed specifically for the New South Wales context.
- While commercial tools are readily available for Brisbane, it can be argued that as the majority of development is residential (either subdivision, unit development or infill), there is a greater need for a tool(s) that can be applied to residential/ subdivision developments.
- The evaluation identified a limited number of tools available with the ability to assess the sustainability performance of subdivision development, and included SPeAR® and the THG Eco Index. Both of these tools are privately owned and operated yet both have the ability to be licensed for public use.
- Not all of the fifteen tools provide a single rating or score, with SPeAR®, BASIX and LCADesign having outputs that summarise performance and impacts across the various elements rather than having one singular score or rating.
- Only two of the tools evaluated have full sustainability coverage, namely SPeAR® and the Melbourne Docklands ESD Guide. Both tools have coverage of environmental and social indicators with SPeAR® having 26 economic indicators and Melbourne Docklands ESD Guide having 1 economic indicator.
- Only three tools cover all development types (residential, commercial and other), namely LEED, BREEAM (both of which are international tools and not applicable in Brisbane), and SPeAR®.
- Councils brief requested an evaluation of the use of the Sustainable Housing Code and Green Star to assess apartments/houses and commercial buildings respectively. Based on the results of the Phase 1 and 2 tasks, both tools individually scored well against Council's evaluation criteria and are considered in more detail in the recommendations in **Section 7**.
- A rigorous shortlisting process was undertaken to determine the best tools for use in Phase 2. This process involved independent evaluations of the tools by the Arup team using Council's high, medium and low priority evaluation criteria. This was followed by an interactive workshop with Council. The final tools identified as being most suitable for use in Brisbane were BASIX and Sustainable Housing Code for residential developments, Green Star for commercial developments and SPeAR® and the Melbourne Docklands ESD Guide for other developments. The Sustainable Housing Code and Green Star were not included in the Phase 2 evaluation as Council were familiar with them and had already used these tools on developments in Brisbane.

Table 2: Results of Arup Evaluation and Interactive Workshop Evaluation

RESULTS OF ARUP TOOL PRIORITY EVALUATION

	Residential						Commercial			Other				
	TOOL 1 BERS	TOOL 2 NatHERS	TOOL 3 FirstRate	TOOL 4 AccuRate	TOOL 5 BASIX	TOOL 6 Sus Housing Code	TOOL 1 ABGR	TOOL 2 GreenStar	TOOL 3 LCADesign	TOOL 1 SPeAR	TOOL 2 LEED	TOOL 3 BREEAM	TOOL 4 THG EcoIndex	TOOL 5 Melb Dockl. ESD Guide
High Priority	11	10	9	10	12	8	11	12	10	16	11	11	14	16
Medium Priority	8	7	7	7	9	4	11	13	7	8	7	7	9	11
Low Priority	4	5	0	0	1	5	6	2	2	1	1	1	1	2
TOTAL	**23**	**22**	**16**	**17**	**22**	**17**	**28**	**27**	**19**	**25**	**19**	**19**	**24**	**29**

RESULTS OF WORKSHOP EVALUATION

	Residential						Commercial			Other				
	TOOL 1 BERS	TOOL 2 NatHERS	TOOL 3 FirstRate	TOOL 4 AccuRate	TOOL 5 BASIX	TOOL 6 Sus Housing Code	TOOL 1 ABGR	TOOL 2 GreenStar	TOOL 3 LCADesign	TOOL 1 SPeAR	TOOL 2 LEED	TOOL 3 BREEAM	TOOL 4 THG EcoIndex	TOOL 5 Melb Dockl. ESD Guide
Ranking Definition	**Number of Votes**						**Number of Votes**			**Number of Votes**				
Ranking # 1(best)				X	XXXX	XX	XX	XXXX	X	XXXX			X	XX
Ranking # 2	X		X		XX	XXX	XXX	XXX	X	X	X			XXXX
Ranking # 3		XX	XX	XXX			XX		XXXXX	X		X	XXXX	
Ranking # 4	XXXX		X	X							XX	XXX		X
Ranking # 5		XXX	X	X	X						XXX	XXX	X	
Ranking # 6 (worst)	X	X	XX			XX				X	X		X	
PREFERRED TOOL					●	●		●		●				●

6 Phase 2 - Sustainability Rating Tools and the Regulatory Planning Process

6.1 Introduction

6.1.1 Disclaimer

Phase 2 of the study included the review and use of two real-life DAs to assist the undertaking of an information gap analysis against the indicators in three of the shortlisted tools. Council selected the two DAs and identified them as examples of 'sustainable development' based on the claims made by the applicants. These developments may not be representative of other 'sustainable developments' submitted to Council for assessment. The results of the gap analysis are provided in **Section 6.3**, and include comments by Arup Sustainability that relate to the level of information and integration of information contained in the two DAs. It should be noted that the two DAs have been prepared under the current regulatory planning framework of City Plan that requires an applicant to respond to the requirements of the current Codes contained in City Plan; they were not written to address the needs of any of the rating tools assessed in this study.

6.2 Short Listed Tools

The following short listed tools for inclusion in Phase 2 of the study were the result of an interactive workshop conducted by Arup Sustainability with Council. These tools scored best in the Phase 1 evaluation and had particular strengths in their ability to assess different types of development (residential, commercial and other), their applicability to Brisbane and/or their coverage of sustainability issues.

Residential

- BASIX
- Sustainable Housing Code

Commercial

- Green Star

Other

- SPeAR®
- Melbourne Docklands ESD Guide

Due to the fact that both Green Star and the Sustainable Housing Code have already been used on other developments and were well known to Council it was agreed that an assessment of these two tools against the DAs was not necessary. Council considers both tools suitable for adoption and this is discussed further in **Section 7.3.2**. Therefore BASIX, SPeAR® and the Melbourne Docklands ESD Guide were the final tools chosen for further evaluation against the two DAs. Each of these tools were researched in detail to understand the indicators, sub indicators and extent of information required to address each. The following information was referenced for each tool:

Table 3: Tool Software and Indicator Information

TOOL	INFORMATION
BASIX	Version 1.0 Draft Spreadsheet for Detached Houses Version 1.0 Draft Spreadsheet for Units Environment indicators x 54, social indicators x 7 and economic indicators x 0.
SPeAR®	SPeAR® Diagram, 2003 SPeAR® Training Manual (internal to Arup), October 2002 Environment & natural resource indicators x 60, social indicators x 34 and economic indicators x 26.
Melbourne Docklands ESD Guide	Melbourne Docklands ESD Guide, October 2002 Environment indicators x 23, social indicators x 10 and economic indicators x 1.

6.3 Development Applications

The two Development Applications (DA's) provided by Council have been called Site A and Site B for the purpose of this study and are summarised in **Table 5**. These DA's have been prepared in response to the Brisbane City Council planning approval process and are both currently in the preliminary approval phase. This phase of the development assessment process is highlighted in **Table 4** below.

Table 4: Description of Development Assessment Phases

DEVELOPMENT ASSESSMENT PHASES	DETAILS
Pre-Lodgement Discussions	Discussion with the planning team to gain an idea of Council's approach, requirements and position
Preliminary Approval Application	***Application for approval for the development – generally only large scale developments submit these applications, a small percentage of overall applications received by Council fall into this category***
Planning Assessment/ Development Permit Application	Assessment of the planning of the development – the majority of applications to Council fall into this category
Detailed Design Assessment	Details of the engineering and services etc of the development – currently where rating tools apply due to the level of information available at this phase of the development assessment process
Building Certification	Undertaken by private certifiers (not under Council Control)
Assessment of Compliance	Generally undertaken on a complaint basis

Table 5: Summary of Development Applications

DEVELOPMENT	DESCRIPTION	DA CONTENT
Site A	Inner city CBD location, mixed-use development comprising residential (units) and non-residential uses (offices, shops, restaurant).	• Architectural Plans, Elevations and Model Photographs • Landscaping Plan and Compliance Report • BCC Code Compliance Tables • Traffic Report • Acoustic Report • ESD Report • Engineering Report
Site B	Middle-outer ring residential subdivision development approximately 20km from the Brisbane CBD, including detached and attached housing located in a bushland setting.	• Structure Plan • BCC City Plan 2000 Code Address • BCC ESD Principles Checklist – response to 'Developing Brisbane: A Sustainable Approach' • Statement of Dwelling Design Intent: "Sustainable Architecture" • Ecological and Landscape Assessment Report • Engineering Concept Report

The aim of Phase 2 was to compare the requirements of indicators contained in the short listed tools with the information contained in the DA's provided by Council and to highlight information gaps. The tools used in the gap analysis against each DA are outlined in **Table 6** below.

Table 6: Gap Analysis Tools and Development Applications

DEVELOPMENT	TOOL FOR COMPARISON
Site A (mixed-use – units/commercial)	• Melbourne Docklands ESD Guide • SPeAR® - Sustainability Project Appraisal Routine
Site B (subdivision – detached/attached residential)	• Melbourne Docklands ESD Guide • BASIX – Building Sustainability Index

6.4 Information Gap Analysis

6.4.1 Methodology

Undertaking the gap analysis in Phase 2 had the following objectives:

- To understand the extent to which DA information for a sustainable development meets the requirements of information needed to address the indicators in the short listed tools, and to provide an estimate of the overall percentage of indicators addressed by DA (given that the DA's were not prepared to address the needs of the tool(s));
- To understand the suitability of tool indicators in the context of Brisbane's sustainable development needs;
- To understand the time implications for Council to review and check the tool indicators against DAs; and
- To understand the approximate time for the assessment of the development against the requirements of the tool by the applicant.

Information in the DA was compared against the tool indicators by working through each sub-indicator within the tool and judging the ability of the DA to provide the data required to meet the tool indicator. If the DA contained enough specific information or data to address the tool indicator it was given a 'yes', alternatively, if the DA did not contain enough information to address the tool indicator it was given a 'no' (eg: discussion on landscaping proposed, but not providing details on the number of plants to be planted – as requested by the tool). The number of 'yes' responses was then summed to give a percentage score for each headline indicator and in turn, a final total percentage was calculated to illustrate the extent to which the DA addressed the tool indicators. If the information contained in the DA was evident, but not detailed enough to specifically answer the tool indicators, this was noted. This assessment also revealed the extent of information missing from the DA and thus, the potential burden on applicants to complete the tool assessment.

6.5 Phase 2 Findings

6.5.1 Gap Analysis Results

The percentage of DA information addressing the indicators in each of the short listed tools is summarised in **Tables 7 - 10**. The percentages of DA information addressing each of the tools indicators ranged from 21% to 45%. These results are considered low and indicate that the DA's reviewed would require further detailed information if the nominated tools were to be applied at the early phases of development assessment. In some instances little effort would be required to provide the information needed to increase the number of indicators addressed by the DA's, but generally speaking the indicators contained within the tools require information that would only be available during the detailed design phase of the development assessment process. It should be noted again that the DA's provided to the Arup Sustainability team for this study respond to the information requirements of City Plan at the preliminary approval phase only.

Table 7: Information Gap Analysis – Site A and SPeAR®

SPeAR®			
INDICATOR	**DA INFO %**	**INDICATOR**	**DA INFO %**
ENVIRONMENT			
Air Quality & Microclimate	66%	Ecology & Cultural Heritage	40%
Land Use	80%	Design & Operation	28%
Water	66%	Transport	60%
NATURAL RESOURCES			
Materials	0%	Land Utilisation	60%
Water	75%	Waste	28%
Energy	40%		
SOCIETAL			
Health & Welfare	0%	Access	50%
User comfort/satisfaction	60%	Amenity	100%
Form & Space	100%	Inclusion	28%
ECONOMIC			
Social benefits & costs	66%	Competition Effects	0%
Transport	40%	Viability	0%
Employment/Skills	0%	**TOTAL**	**44%**

Table 8: Information Gap Analysis – Site A and Melbourne Docklands ESD Guide

MELBOURNE DOCKLANDS ESD GUIDE			
INDICATOR	**DA INFO %**	**INDICATOR**	**DA INFO %**
Site/Outdoor Space	25%	Energy	44%
Atmosphere	0%	Building Materials	0%
Water Cycle & Wastewater	0%	Indoor Environmental Quality	16%
Transport	100%	Waste	0%
Innovation	25%	**TOTAL**	**23%**

Table 9: Information Gap Analysis – Site B and BASIX

BASIX			
INDICATOR	DA INFO %	INDICATOR	DA INFO %
Social	50%	Energy	55%
Transport	100%	Materials	60%
Site Ecology	0%	Recyclables & Waste	25%
Stormwater	75%	Indoor Amenity	0%
Water	40%	**TOTAL**	**45%**

Table 10: Information Gap Analysis – Site B and Melbourne Docklands ESD Guide

MELBOURNE DOCKLANDS ESD GUIDE			
INDICATOR	DA INFO %	INDICATOR	DA INFO %
Site/Outdoor Space	50 %	Energy	14%
Atmosphere	0%	Building Materials	33%
Water Cycle & Wastewater	50%	Indoor Environmental Quality	50%
Transport	50%	Waste	0%
Innovation	0%	**TOTAL:**	**21%**

6.5.2 Suitability of Indicators

The information investigated in this study provides Council with an awareness of the limitations of most rating tools in attempting to define sustainable development because of the limited coverage of sustainability issues in some tools.

The indicators contained within each of the tools are considered highly suitable for use in Brisbane. Each of the indicator sets contained in the three tools were assessed in detail with many similar indicators/criteria already contained in various Council documents (eg: City Plan, the Developing Brisbane document, etc). Whilst the DA's did not address all indicators contained in the tools, it was considered that all indicators could be feasibly addressed at some point in time during the development assessment process based on the brief review of other DA's provided by Council which contained detailed design information.

BASIX and the Melbourne Docklands ESD Guide contained a number of environmental indicators that require detailed assessment and/or analysis which is commonly associated with detailed design works. BASIX for example requires a high level of detail responding to information requested on such issues as site ecology, indoor amenity and recyclables and waste and as reflected in **Table 9**. Similarly, the Melbourne Docklands ESD Guide requires detailed information about atmosphere, energy, water cycle and wastewater, building materials and waste (see **Tables 8 & 10**). In both cases this level of detail is not normally required of the applicant at the early phases of the development assessment process.

SPeAR® however contains a suite of indicators that can be applied to the various phases of development assessment, whether it be preliminary approval or operational works. This is due to the tools in-built flexibility where indicators and performance targets are reviewed for each individual project and are adjusted accordingly

to suit the stage of development. The issue of adopting SPeAR®, however is the broad range of factors considered and how willing Council would be to require applicants to address all of them.

For the above stated reasons, Council will need to further consider the most appropriate phase of the development assessment process for a tool or suite of tools to be applied and the range of factors to be considered in a tool.

6.5.3 Resource Implications Of Tool Use

It is likely that additional 'effort' would be required by the applicant if a comprehensive assessment using BASIX, Melbourne Docklands ESD Guide or SPeAR® was conducted during the early phases of development assessment. However, additional 'effort' would not be required by Council when checking inclusion of a tool assessment report as part of the applicant's DA under the current development assessment compliance checking process.

IMPACT ON APPLICANT

In the case of the applicant, the time required to gather additional information (eg: quantifiable indicators requesting specific figures) to enable the undertaking of an assessment using a tool (eg: BASIX, Melbourne Docklands ESD Guide or SPeAR®), but not conducting the actual assessment, would vary between indicators. The gap analysis of the Site B DA versus the Melbourne Docklands ESD Guide (see **Table 10**) provides an example of how various indicators within the tool require varying degrees of additional information to satisfy the tools data requirements. In this example, the types of public transport modes in close proximity to the development were provided in the DA, however the tool requests the specific minimum distance in metres from the development to the mode of transport. This additional information, whilst not reported in the DA, would be easy to calculate (approx. 5 minutes) and report on.

In contrast to this example, the BASIX tool requires detailed calculations of the number of trees to be retained on the development site to address the 'Site Ecology' indicator. For Site B, which is located on a large vegetated site, the additional effort to provide this level of information would be estimated at approximately 1 day. Therefore, depending on the characteristics of the site and proposed development, the additional effort required to provide the appropriate level of data to undertake an assessment could range from 5 minutes to 1 day+.

However, if the appropriate level of data was already available to the tool user, it is estimated that conducting a full tool assessment using BASIX or the Melbourne Docklands ESD Guide may take approximately two days to complete and a SPeAR® assessment estimated to take up to three days to complete given its more comprehensive sustainability coverage. If the applicant was required to address tool indicators through a consistent DA sustainability reporting framework, this may contribute to the applicant's preparedness (hence requiring less time and effort) when collecting tool and other information when creating a DA as part of the development assessment process.

IMPACT ON COUNCIL

Both of the preliminary approval DA's reviewed contained disjointed Town Planning Reports that did not seem to provide a logical flow of information. Whilst there was demonstrable effort to address sustainability issues in these two DA's, the information presented was incomplete and fragmented. This required the Arup Sustainability team to cross check numerous reports whilst undertaking the gap analysis.

In most cases, Council's development assessment officers would not be required to conduct a check of submitted DA's to the level of detail of the gap analysis outlined above. If a rating tool(s) assessment were to be included by applicants as part of the DA report, Council have advised that development assessment officers would initially undertake a simple check to ensure that an assessment using the relevant tool(s) was completed and related information supplied in the DA. Therefore the inclusion of a tool assessment report in a DA would require very little additional effort to review under the current compliance checking process. More detailed

checking procedures are conducted in some cases, however, comprehensive checks for all DA's would be time consuming for Council and not envisaged to be practical.

6.5.4 Conclusions and Recommendations

Based on the above findings, it is recommended that:

- BASIX and the Melbourne Docklands ESD Guide are not currently suitable for their direct application to the early phases of development assessment.
- SPeAR® is considered applicable for all phases of Council's current development assessment process due to its extensive coverage of sustainability issues and flexible range of indicators. However, given the extensive number of indicators offered by SPeAR® in comparison to BASIX and Melbourne Docklands ESD Guide, an assessment using the tool will result in resource implications for the applicant at the early phases of development assessment.
- An alternative approach/process for sustainability assessment of subdivisions is currently unavailable and needs to be considered. Some of the indicators in the Melbourne Docklands ESD Guide and BASIX are considered too detailed for application at the early phases of development assessment and SPeAR® has resource implications for the assessment given the broad range of issues it considered. As such it is recommended that Council consider the use of a range of suitable indicators from these tools to develop a subdivision tool or assessment process.
- It is worth noting that consent would be required for use of the above mentioned tools from the respective tool development bodies. In either case Council need to make a conscious choice regarding the indicator suite they choose to adopt and whether the tool reflects fuller sustainability coverage (such as in SPeAR® and Melbourne Docklands ESD Guide) or whether an environmental tool is preferred (such as BASIX).
- Council should consider the conditioning of sustainability concepts at the early phases of the development assessment. This is to avoid the situation where applicants propose a vast range of often expensive sustainability concepts, to obtain a preliminary approval and then in subsequent phases (eg: detailed design) are likely to remove these concepts due to the lack of economic feasibility, watering down the 'sustainability performance' of the overall development.
- A standard sustainability reporting format and guidelines be developed and provided to applicants

7 Recommendations

7.1 Overview

Arup Sustainability has identified one preferred recommendation based on the key findings of the study which have been outlined in previous sections of this report. The recommendation comprises three phases, (refer **Figure 2**) with a brief précis of each phase provided below. The philosophy behind the recommendation overall is that there is a progressive integration of sustainability throughout City Plan that gives Council the opportunity to leverage sustainability outcomes at every phase of the planning process from strategic and local planning, through to development assessment. Each of the three phases builds on previous tasks and progressively leads to an integrated and holistic approach to sustainability assessment.

Please note that the use of the word 'tool' in this section refers to rating tools (eg: SPeAR®, BASIX, BREEAM etc)

7.1.1 Phase 1 – Immediate System Improvements

This phase of the recommendation responds to Council's immediate need to improve consistency and transparency in dealing with applications for sustainable developments. This may take the form of a standardised format for DA's to be given to applicants and checklists for the Development Assessment Sustainability Team which builds on existing information such as 'Developing Brisbane: A Sustainable Approach'. Benchmarking of existing sustainable developments in Brisbane would also provide invaluable information for the Development Assessment Sustainability Team and is also included in Phase 1.

7.1.2 Phase 2 – Tools Adoption

This Phase of the recommendation involves the definition by Council of sustainability outcomes sought for the City and responds directly to the requirements of Council's brief (refer Task 4 – Recommendations) which is to "provide recommendations on a preferred sustainability tool or matrix of tools for different types of development or issues that can be applied to the regulatory assessment process in Brisbane" and "provide a recommendation on the Green Star/Sustainable Housing Code proposal". Phase 2 involves amending City Plan to mandate the use of Green Star to assess commercial developments and the Sustainable Housing Code to assess apartments and houses. A third tool to assess subdivisions and other types of mixed use developments is not available 'off the shelf' at present and would require Council to develop a new tool, wait for the market to develop one in response to the need for such a tool or for the likes of BASIX to be adopted by the State Government.

7.1.3 Phase 3 – Integration

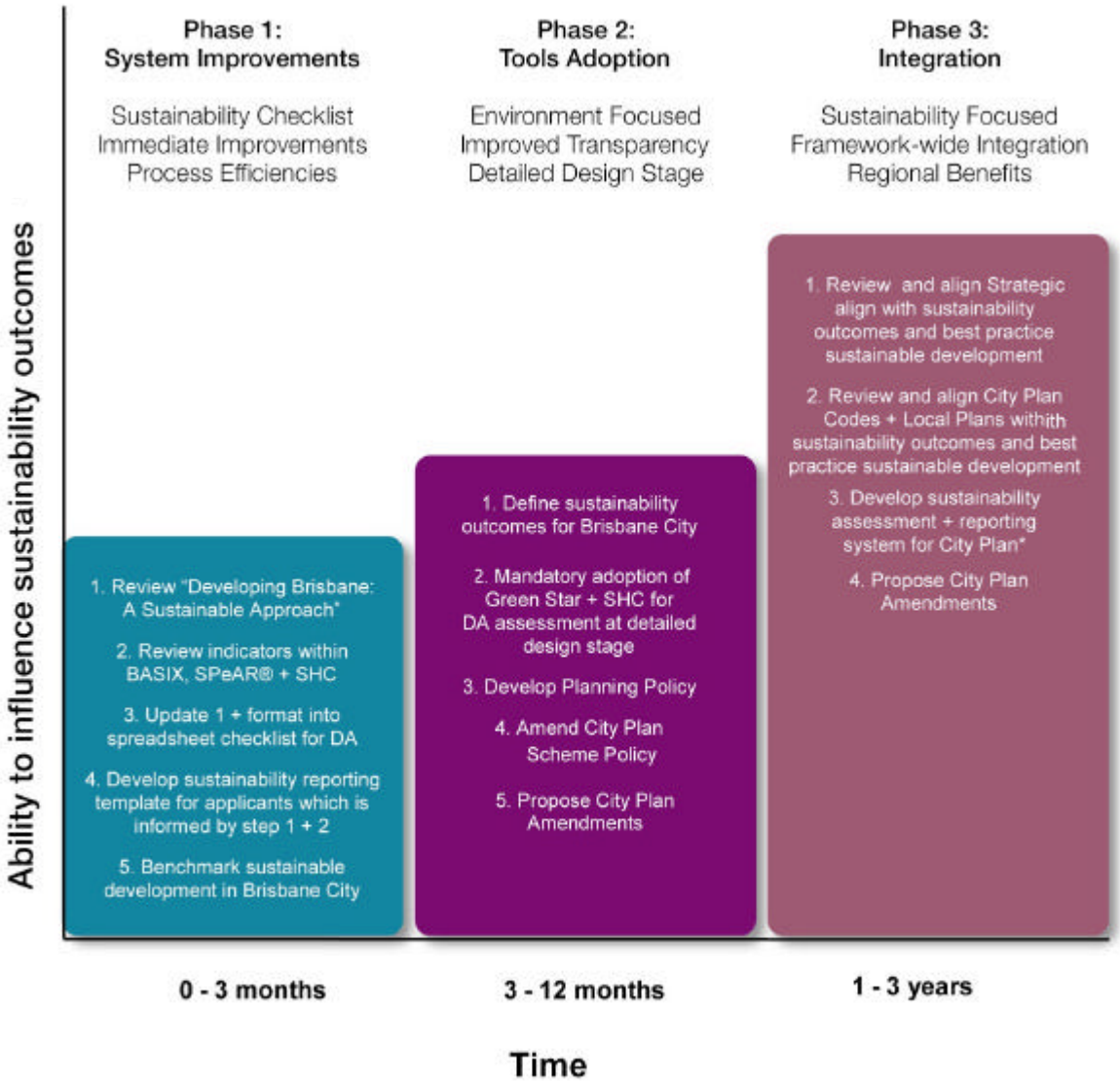
This Phase of the recommendation provides Council with a suite of tasks that integrate sustainability throughout the regulatory planning process, ensuring that all developments are subject to sustainability assessment and reporting and not just a select few. Phase 3 builds on the previous work undertaken in Phase 1 and 2 of the recommendation. The key tasks of Phase 3 include:

- Review and amend Council's Strategic Plan to align with Southeast Queensland's regional planning framework SEQ2021 and Council's sustainability outcomes identified in Phase 2 of the recommendation;
- Review and align the Area and Assessment Processes, Local Area Plans and City Plan Codes with the sustainability outcomes mentioned in the dot point above; and
- Develop a sustainability assessment and reporting system that comprises a suite of processes to assess the sustainability performance of amendments to the Strategic Plan, Area and Assessment

Processes, individual Local Area Plans, new Codes and amendments to existing ones and applications for all phases of development assessment.

At this stage in the development of this recommendation, consideration of the resulting nature and timeframes associated with necessary City Plan amendments has not been considered in detail. It is considered that this would need to be part of follow on work undertaken by Council to refine this recommendation and timeframes in line with the current processes being developed for integration into City Plan of the requirements of the Office of Urban Management.

Figure 2 – Outline Recommendation



* The sustainability assessment and reporting system includes aprocess of using a range of tools for the key stages in planning namely Strategic Planning, Local Area Planning & Development Assessment

7.2 Phase 1: System Improvements

Phase 1 of the recommendation involves a number of short term system improvements to the existing development assessment system. It is anticipated that these tasks would be completed within approximately 3 months of commencing (see **Figure 2**). These changes build on existing documents and processes currently implemented by Council and will be further developed through Phases 2 (3-12 months) and 3 (1-3 years) of the recommendation. Key tasks associated with Phase 1 are outlined below.

7.2.1 Develop Preliminary Sustainability Assessment and Reporting Framework

Building on Councils existing document, 'Developing Brisbane: A Sustainable Approach', it is recommended that this be reviewed and updated based on the findings of this commission. This will require reviewing the suitability of the eight core principles of sustainability contained within the document and comparing them with the indicator sets within BASIX, SPeAR® and the Melbourne Docklands ESD Guide.

Phase 2 of the commission found that the indicators contained within the three tools mentioned above were suitable for use in the Brisbane context (refer **Section 6.5.2**). Further, it was identified that these three indicator sets contained indicators suitable for all phases of the development assessment process. It is therefore recommended that as an initial task Council incorporate a number of the key sustainability indicators in BASIX, SPeAR® and the Melbourne Docklands ESD Guide (that relate specifically to early phases of the development assessment process) into the document 'Developing Brisbane: A Sustainable Approach'.

Following amendments to 'Developing Brisbane: A Sustainable Approach', Council should reformat this document into a matrix style checklist that is similar to the Code table format of City Plan and the format of many of the spreadsheets contained in rating tools. An example is provided below.

SUSTAINABILITY OBJECTIVE	PRINCIPLES	COMMENTS
Use Energy Efficiently	Utilise natural lighting systems such as skylights and skytubes.	Skylights have been incorporated into all dark areas such as bathroom, hallway and kitchen.

Council currently request selected applicants to respond to 'Developing Brisbane: A Sustainable Approach', but this is done in an ad hoc way and the level of detail of responses made by applicants differs. It is recommended that Council provide the revised document in a checklist format to all applicants when submitting an application to Council as part of the development assessment process. This checklist would not form any condition of assessment under City Plan, but rather be a form of communication to applicants as to what Council consider to be a suite of sustainability indicators that developments should consider and the sustainable outcomes Council are seeking.

Accompanying this checklist would be a standard sustainability reporting template that all applicants would use when submitting DA's for approval of developments that claim to be 'sustainable'. This template would provide a generic structure for applicants to report on sustainability issues of a development proposal. Consideration should be given to how this reporting structure could promote the integration of sustainability issues and ideas. The use of this template would be voluntary but strongly recommended to enable Council to make a timely and informed assessment of sustainability issues.

7.2.2 Benchmark Best Practice Sustainable Development for Brisbane City

Sustainable development demands a multi disciplinary and integrated approach and often requires an understanding and ability to manage trade-offs. The 'best' of everything individually does not necessarily provide a 'total' sustainable outcome.

This may be contrary to what many applicants understand as being sustainable development. For example, the Site B DA (reviewed in Phase 2 of the study) included a wide range of sustainability features, including solar PV generated dwellings. However, the development provides dual car accommodation for occupants, a necessity given the site that is located approximately 20km from the Brisbane CBD (a likely location of employment for residents). This example perhaps demonstrates the misconception that having all possible sustainability features (eg: Solar PV) within a development is the best outcome, when in fact a lack of understanding about the interactions and trade-offs, and inability to integrate sustainability effectively, results in an outcome contrary to what was sought (emission reductions sought from solar PV usage but potentially increased from two car usage).

Further, many of the rating tools reviewed in Phase 1 of the commission contained environmental indicators that require 'best practice' and often expensive sustainability features/solutions, yet almost all tools do not provide economic indicators nor methodologies for identifying interactions or trade offs between different levels of

sustainability performance. This shortfall in most rating tools is potentially resulting in the 'thinking' that sustainability is 'as much of the best as possible''.

It is therefore important for Council to clearly define and benchmark current best practice sustainable development standards for the City. This would involve the review of a sample of existing developments claiming to be sustainable in Brisbane, (identifying key and common elements of development planning, sustainable design, construction practices and those that appear to be marketed effectively) and documenting the findings as current best practice.

In the short term this would provide the Council Development Assessment Sustainability Team with a highly useful and benchmarked reference when reviewing and assessing sustainable developments. In Phase 2 of the recommendation this information can be used to help set targets within City Plan codes and any rating tools adopted.

7.3 Phase 2: Tools Adoption

This phase of the recommendation addresses the need to define sustainability outcomes for the City that will help in understanding the focus of any tool (or similar process) that may be adopted. There is also a discussion about which rating tools can be adopted by Council straight away and which development types require potentially new rating tools or processes to be developed (at least in the short term). Key tasks associated with Phase 2 are outlined below.

7.3.1 Define Sustainability Outcomes for Brisbane City

Promoting more sustainable development is a clear priority for Council. Vision 2010 describes the benefits and values of sustainable development in Brisbane City and provides broad targets and areas for action. Council has also defined a set of eight sustainable development criteria (nominated in the document "Developing Brisbane: A Sustainable Approach"), which it sometimes seeks applicants to address.

Alignment between these two documents was briefly assessed as part of this commission and it was found that a positive alignment was evident. For consistency and effectiveness, all similar planning documentation needs to align, including any rating tool adopted and promoted by Council for inclusion in the development assessment process.

The initial task in Phase 2 therefore is to review and identify the sustainability outcomes in Vision 2010, City Plan and other relevant documents to ensure that Council has an understanding from a sustainability perspective what targets, actions and commitments have been made and what BCC are seeking the community and industry to achieve in the area of land development.

This task should produce a concise document summarising the key sustainability outcomes for Brisbane City, possibly building on the existing document entitled 'A Framework for Delivering Environmental Sustainability', (which intends to introduce and more fundamentally integrate sustainability into all of Council's processes).

This initial task if accompanied by formal communication and consultation will also help raise both internal and external awareness of key issues that contribute toward sustainability in the City.

7.3.2 Mandatory Adoption of Green Star and Sustainable Housing Code by Applicants

It is recommended that Council encourage the mandatory adoption of Green Star and the Sustainable Housing Code in the City Plan for applicants to assess the performance of commercial and housing/apartment developments respectively. The mandatory adoption of these tools would be promoted initially to those applications assessed by the Development Assessment Sustainability Team, with consideration given to potentially promoting their use on all developments in the future if they are incorporated into the Phase 3 sustainability assessment framework (refer to **Section 7.4.4**). This would occur at the planning assessment and detailed design phases of development assessment. These are the only two short listed tools that Council can adopt immediately and without additional amendment. The reason for articulating use of the tools at these

phases is that the level of detail required by the tools is not necessarily commensurate with what Council currently requests at preliminary approval phase. Both Green Star and the Sustainable Housing Code have been reviewed and evaluated in detail as part of Phases 1 and 2 of this commission. **Section 5.4** of this report provides summaries of the benefits and disadvantages of each tool.

Council have already demonstrated their willingness to adopt Green Star as a tool to rate commercial buildings as part of the City Centre Local Plan provisions (currently at consideration of submission stage, following the first state interest and public notification stages). BCC has a thorough understanding of Green Star having recently used it to assess the performance of the Brisbane Square development. In undertaking this action, Council would need to maintain their links with the Green Building Council of Australia (GBCA) to ensure that they were abreast of any amendments to the tool and consequent impacts on developers and also that if they were seeking to influence aspects of the tool that the relationship is maintained with GBCA to achieve such outcomes.

With respect to promoting greater sustainability performance, the use of Green Star by applicants enables Council to encourage an accredited assessment against Green Star through the setting of performance targets (eg: minimum 4 star rating).

With respect of the Sustainable Housing Code (SHC), it is understood that this is also currently with the State Government for review. In parallel with this, the Queensland Department of Housing have taken an interest in BASIX (the other short listed residential tool). It appears at this stage that the Queensland State Government is likely to take a lead on a tool for assessing the sustainability performance of residential development, but further consultation may be required by Council to verify this statement. If the above is true, the fate of the SHC may be uncertain. Regardless of this, BCC will need to maintain their involvement on the development these tools. There are a number of potential areas BCC may wish to influence the State Government on these matters:

- Ensure whatever rating tools are adopted by the State that they have alignment with the sustainability outcomes of Brisbane City (as above);
- Ensure the tool is suited for the early phases of development assessment (to help leverage greater sustainable development outcomes); and
- Maintain an involvement in the process of tool development so that the findings of this study can be input.

If the State Government seek to adopt and develop BASIX further, it will need to be contextualised for the needs of Brisbane (or South East Queensland given a regional focus is likely to be taken). This work will take time to complete and in addition, consultation may also be required with the development industry and other stakeholders. The implications of this are that BASIX may not be available for at least a year. In the mean time with respect to what can be used by Council for the assessment of DA's at the early phases of the development assessment process for housing, it is recommended that the checklist developed in Phase 1 be utilised and, if necessary, refined to ensure alignment of requirements with that of the SHC.

7.3.3 Identify or Develop Sub-Division Tool

The outcomes of this study identified that the Melbourne Docklands ESD Guide and SPeAR® were the best performing tools in relation to the assessment of sub-divisions. Neither of these tools is available immediately for adoption by Council (see **Section 6.5.4**). Given this is the case and Council have an immediate need for a tool that can address sub-divisions, it is recommended that the checklist developed in Phase 1 be amended to reflect some of the more broad ranging indicators that address sub-division planning from tools such as Melbourne Docklands ESD Guide and SPeAR® (with permission from the tool development bodies). This will require some work on the part of Council, but will provide a usable short term application that can fulfil a current need.

7.3.4 Develop A Planning Scheme Policy in City Plan

A planning scheme policy (PSP) provides an opportunity for the expression of the sustainability framework developed in Phases 1 and 2 of this recommendation in the City Plan. A PSP is able to provide a basis for understanding:

- Council's approach and understanding of sustainability;
- Council's overarching requirements of applicants in addressing sustainability issues;
- Benchmarks that identify best practice;
- Standards that identify minimum requirements;
- Linkages that identify the key parts (notably codes) of the City Plan that regulate passive design, energy use, construction materials, water harvesting and recycling etc; and
- Any commercial rating tools that provide the basis for measuring and therefore comparing the achievement of sustainable outcomes in development proposals.

A PSP also allows for a customised framework for Brisbane City, so that performance against the City's key benchmarks or outcomes can be measured for each development proposal. This could be developed as a simple on line spreadsheet/database to record performance of every development against the benchmarks set up in the City Plan, and grouped together in the PSP. Alternatively a simple checklist could be developed to reflect the benchmarks developed in the City Plan.

In this way the PSP, including the accompanying spreadsheet or checklist is able to:

- Clarify the Council's expectations in terms of standards of sustainable design, including nominating minimum standards and best practice standards;
- Group the key indicators together in one place, so that a clear framework of ecological sustainability is presented to the community and development industry;
- Influence development outcomes form the earliest stages of project conceptualisation and design, particularly if the framework forms part of the mandatory reporting requirement for every DA; and
- Provide the Council with a way of monitoring sustainable development outcomes so that the performance of the system can be managed for gradual improvement overtime.

7.4 Phase 3: Integration

Phase 3 of the recommendation follows on from tasks completed previously in Phase 1 and 2. This phase outlines a number of tasks which aim to integrate sustainability throughout the regulatory planning process, ensuring that all developments are subject to sustainability assessment and reporting and not just a select few. Key tasks associated with Phase 3 are outlined in **Sections 7.4.1 – 7.4.5** below.

It is worth noting that the development assessment process is the last opportunity Council have to leverage change towards sustainability and as such at this stage certain options may already be closed out. Take the example of Site B reviewed in **Section 6**. This site was identified in the local plan as an investigation area for an emerging community, but was located 20km from Brisbane and was a constrained site given that it contained highly sensitive ecological habitat. The site was chosen by a developer as a suitable location for a sustainable development, and whilst this is a legitimate activity given its status in the local plan, only one of the rating tools that were reviewed as part of Phase 2 of the study actually queried site locational issues.

At the present time in Brisbane City there is pressure for constrained or potentially environmentally sensitive sites, such as Site B to be sub-divided and developed. The implications of this are that most rating tools used will not be able to determine whether a site is acceptable from a sustainability perspective and that the choice of site is actually left to the Planning Scheme to determine.

The benefits of the broader integration of sustainability into City Plan described in this section are as follows:

- Greater leverage for sustainable outcomes upstream (eg: at preliminary approval phase) in the planning process;
- Potential to align with the regional planning and sustainability outcomes being investigated by the Office of Urban Management;
- Better linkage to Council's development outcomes;
- Integrated into City Plan and tailored more to the needs of Council (i.e. from a resource allocation perspective);
- Many opportunities to use amendments to the Plan and processes as a means of sustainability education internally and externally;
- Provides BCC with a leadership position over how sustainability outcomes are brought about within the City;
- Starts the concept that all developments would be working towards being more sustainable;
- May not need the Development Assessment Sustainability Team over time as it would be integrated throughout Council;
- Over time process improvements may reduce the burden on Council's resources; and
- Embeds sustainability into the regulatory planning process.

7.4.1 The Review of the Strategic Plan

The first proposed action in Phase 3 is for BCC to undertake a review of the Brisbane City Plan Strategic Plan in response to the outcomes of the SEQ2021 regional planning process.

The SEQ2021 process for the Southeast Queensland region will deliver a broad regional plan intended to progress sustainability in one of the fastest growing parts of Australia. In so doing the SEQ2021 plan will require a review of the City Plan to reflect the broad strategic planning framework set up by the State Government. The SEQ2021 draft plan is due to be released in October this year.

Aligning regional sustainability initiatives with strategic planning for Brisbane will allow for the consideration of sustainability and how it might be expressed in the city. It is considered that this review could provide a unique opportunity to progress sustainable outcomes for the city from strategic planning to local planning and eventually development assessment.

7.4.2 Review of Areas and Assessment Processes

The next Phase 3 task is a review the Areas and Assessment Processes against the sustainability outcomes identified in Phase 2 (see **Section 7.3.1**). Areas are the land use categories used to determine the policy outcomes for different land use areas in the city, as well as identifying the level of assessment for different types of development. Areas are important for both land use policy, through Desired Environmental Outcomes and Intent statements, and in determining development processes.

Reviewing the Areas to ensure they are aligned to delivering sustainability outcomes provides a timely review of Brisbane's development priorities. This is an important consideration particularly in the Area Intent statements, where the broad development outcomes and parameters are spelt out. In addition, there is some opportunity to consider changing levels of assessment where certain sustainability outcomes are achieved – however, this could only be possible where those sustainability outcomes were clear and easily established at the commencement of the approval process.

7.4.3 Review of Local Plans

The third action proposed as part of the Phase 3 recommendations is to review the Local Plans to align with the sustainability outcomes identified in Phase 2 (**Section 7.3.1**).

The benefits of considering sustainability outcomes for local plans include:

- Opportunity for selected local neighbourhoods to achieve higher standards of environmental/ social/ economic performance. This may particularly apply where large changes are occurring in development standards, so that the increased development is coupled with higher sustainability benchmarks.
- Allows certain performance targets to be set that particularly apply to that neighbourhood/locality (with consideration given to influences external to the locality) – in relation to land use, transport, green space, community, water harvesting and reuse, passive design, energy use etc.

The process of local planning for sustainability is particularly suited to locations experiencing a high rate of change, such as parts of South Brisbane and West End, Kelvin Grove Urban Village and the like.

7.4.4 Review of City Plan Codes

The next proposed action in Phase 3 is for BCC to undertake a review of the City Plan Codes against the sustainability outcomes identified in Phase 2 (see **Section 7.3.1**).

Detailed provisions contained in the City Plan Codes provide the basis for regulating development outcomes in the City. As such, improved benchmarks within the codes to raise the standard of sustainable design could be achieved by:

- Better understanding minimum standard and best practice benchmarks (from the Phase 1 best practice review);
- Alignment with sustainability outcomes for Brisbane City identified through the review of SEQ2021; and
- Incorporating these standards into Area and code provisions as acceptable solutions, and if necessary, corresponding to new performance criteria.

7.4.5 Sustainability Assessment and Reporting System

Following on from the above activities, this final task is focused on the development of a sustainability assessment and reporting system. The key aim of this system is to apply Council's sustainability outcomes to land use planning within Brisbane through the regulatory planning framework. One of the principal ways in doing this is through the development of relevant sustainability assessment objectives and indicators and an assessment and reporting framework that aims to:

- Identify what sustainable development means for Brisbane;
- Identify where this development should be located to achieve sustainability; and
- Use a framework, including objectives and indicators that focus planners and developers on the key sustainability issues that will help achieve the stated sustainability outcomes for the city of Brisbane.

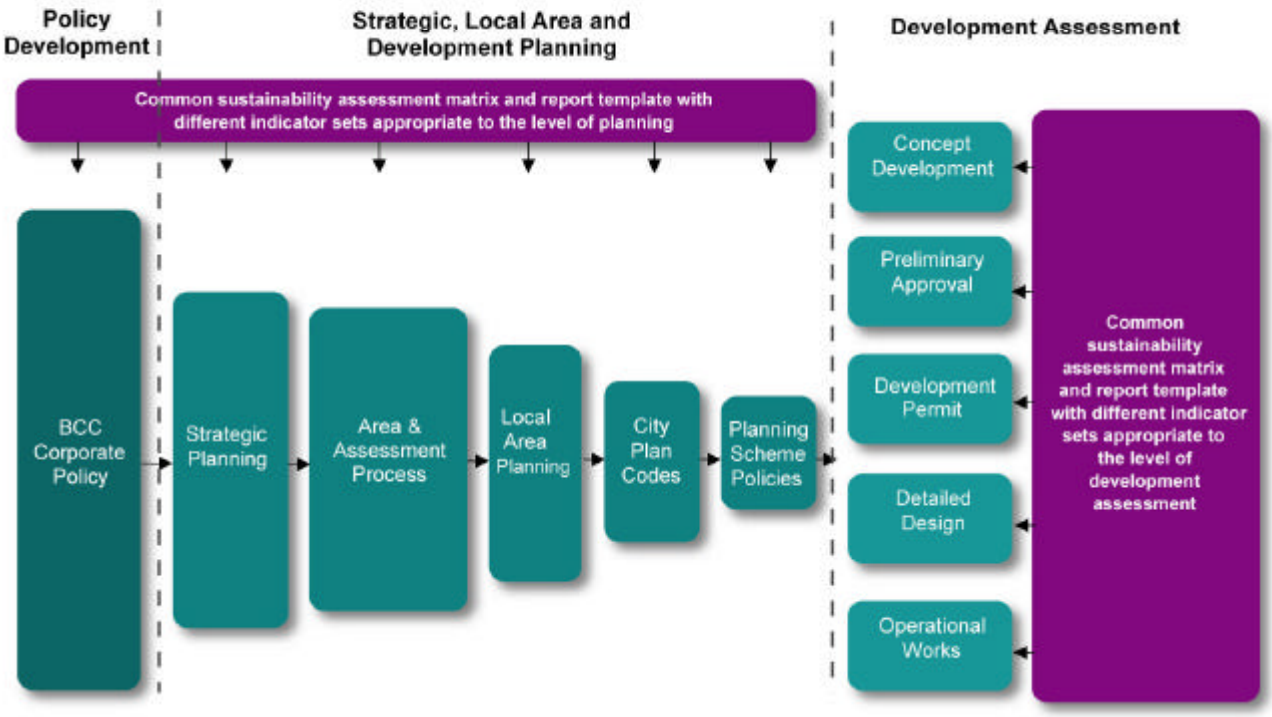
A sustainability assessment can achieve all three of the above mentioned aims. Performing a sustainability assessment (underpinned by objectives and indicators based on the sustainability outcomes for Brisbane city) ensures that sustainability remains central to Council's decision making processes. Reporting on the outcomes of a sustainability assessment (whether informally, formally, internally or externally) is just as important to ensure continual improvement.

An outline of the proposed sustainability assessment and reporting system is provided in the following sections.

LEVELS OF ASSESSMENT

The system is proposed to cover all key decision points of the regulatory planning process, from corporate policy development, through strategic planning to development assessment. As depicted in **Figure 3** below there are two key areas for integrating sustainability, namely all aspects of policy development and development assessment. It is recommended that sustainability assessment be undertaken in both areas using a similar process but applying different sustainability objectives and indicators.

Figure 3: Sustainability Assessment and Reporting System



Performing a sustainability assessment of key early planning documents such as a strategic plan review, code amendment or even a new corporate policy would enable the opportunity to establish the preferred sustainability 'vision' for the relevant code or policy. This would ensure that development assessment decisions based on the application of such codes or policies were consistent with the stated sustainability vision or direction.

ASSESSMENT PROCESS

The sustainability assessment process should:

- Be easy and quick to apply, whether undertaken by Council's staff internally or by an applicant at the development assessment phase;
- Raise awareness about what sustainability means for Brisbane, whether at a policy or strategic level or detailed design level;
- Promote optimisation and integration of different sustainability elements, not just requiring the best of everything environmental or social or economic, but more importantly seeking to achieve outcomes that recognize interrelationships between these three elements; and
- Encourage new ideas and concepts that can help achieve the sustainability outcomes for the city of Brisbane.

The sustainability assessment process may use a matrix or spreadsheet format containing relevant objectives and indicators, as most rating tools currently do. Different sets of objectives and indicators could be developed to cover the major decision points and documents produced, such as policy development, strategic planning, local area planning and City Plan Codes. The objectives and indicators for these documents may indeed overlap.

Similar to the policy and strategic planning level objectives and indicators, more detailed objectives and indicators should be developed to facilitate the integration, assessment and reporting of sustainability performance during the development assessment process. The matrix/spreadsheet assessment framework could provide the flexibility if needed for adopting it to formats similar to the City Plan Codes and/or existing rating tools.

Different indicator sets would be required and as a minimum it is recommended that one set be provided for preliminary approval, one set for development permit applications and one for detailed design. The indicator set for preliminary approval would build upon the checklist developed in the Phase 1 recommendation but should also incorporate some of the key preliminary approval level indicators from SPeAR®, BASIX and the Melbourne Docklands ESD Guide.

A suite of indicators for detailed design should also be developed and initially be based on the indicators contained in the SHC. Incorporation of additional indicators from BASIX and the Melbourne Docklands ESD Guide is recommended and where appropriate, incorporation of the requirements of existing rating tools (i.e. one indicator could be the achievement of a 4 star Green Star rating). In doing so, consistency and alignment would need to be maintained between the relevant data sets.

Acknowledging that a sustainability assessment alone will not deliver sustainability outcomes, supporting information should as a minimum include:

- Pre-lodgement sustainability checklists;
- Fact sheets for communication internally and externally;
- Sustainability reporting template for applicants;
- Review checklist for development assessment officers;
- Compliance/audit procedures;
- Training manual; and
- Industry awareness training package.

The tools and techniques developed above should ultimately aim to provide development assessment offices with the ability to:

- Identify sustainable developments earlier in the development assessment process and give priority to applications offering sustainable solutions;
- Participate early in the design process, to assist in solving problems and seek to move away from adversarial roles;
- Ensure timely decisions;
- Provide feedback to policy makers on policy barriers and opportunities; and
- Monitor and review performance of development on the ground.

To be effective and simple to apply, the objectives and indicators should be:

- Consistent with the stated sustainability outcomes for the city of Brisbane (Phase II recommendations, Task 1)

- Easy to measure with specific targets;
- Based upon readily available information to minimise cost associated with the assessment;
- Readily understood so that everyone involved in the assessments can identify with them and the issues to which they relate;
- Sensitive to the interactions between economic, social and environmental elements.

It is important that any matrix assessment method developed should be fully transparent and include both qualitative and /or quantitative indicators of sustainability. This ensures that the factors involved in the assessment process are clear to decision makers and this will facilitate comparative assessments of policy, planning options and developments.

The matrix framework and objectives and indicators could be designed to be transferable to other similar areas within Southeast Queensland to provide future consistencies and regional benefits in achieving sustainability outcomes.

8 Conclusion

This study involved a review of sustainability rating tools currently available in Australia and internationally to determine their applicability to Brisbane City Council's development assessment process.

Phase 1 of the study found that out of 15 tools reviewed, only two tools contained environmental, economic and social indicators, therefore by definition representing sustainability. These were the Melbourne Docklands ESD Guide and SPeAR® (Sustainable Project Appraisal Routine). The majority of the remaining tools tend to address environmental or energy issues only, with only a few including social issues.

While tools for assessing commercial buildings are readily available, it can be argued that because the majority of development in Brisbane City is residential (either subdivision, unit development or infill), there is a greater need for a tool(s) that can be applied to residential/ subdivision developments.

Both of the sustainability tools can be applied to residential developments. The remaining residential tools mostly cover energy efficiency impacts only, with one tool (BASIX) covering both environmental and social issues. A limited number of tools were found to be available with the ability to assess the sustainability performance of subdivision development and those available are privately owned and operated yet both have the ability to be licensed for public use.

Phase 2 of the study identified that the majority of rating tools are best applied to the later phases of the development assessment process (i.e. detailed design), and if used, the tools could take the applicant up to 3 days to complete (with the required data available). In addition, the selection of the DA's submitted to Council for developments claiming to be 'sustainable' were reviewed and found to report on sustainability issues in a disjointed manner, often not addressing a large percentage of the information or data required by a rating tool.

In order to assist the BCC to understand more clearly what constitutes a sustainable development, the use of rating tools or checklists guided by rating tool indicators may provide a short term solution. However, Phase 2 of the study also illustrated the need for a more extensive integration of sustainability into the BCC planning process for the long term.

The most prominent conclusion at the close of the study was that while rating tools provide a simple and effective way of measuring the performance of different aspects of sustainability, there is a fundamental need for Council to define sustainability priorities and outcomes specific to the planning process for the city of Brisbane.

Consideration of these issues will allow Council to move forward and address issues such as benchmarking sustainable development for Brisbane, deciding on the most effective method for regulating sustainability assessing requirements for commercial, residential and subdivision developments and ultimately delivering the outcomes for tangible and long term sustainability of development in Brisbane.

APPENDIX A
Phase 1 - Evaluation paper

Overview of Sustainability Rating Tools

Phase 1

Evaluation Paper

BRISBANE CITY

Arup**Sustainability**

Table of Contents

1 Introduction

Brisbane City Council (herein referred to as Council) commissioned Arup Sustainability in February 2004 to undertake an overview of sustainability rating tools available in Australia and selected tools available in the United Kingdom and the United States.

The purpose of the commission is to identify a simple sustainability rating tool or matrix of tools that can assist Council in assessing and promoting innovative and best practice development outcomes.

The commission contains two major phases, namely:

Phase 1	Evaluation of nominated rating tools and identification of a preferred tool(s); and
Phase 2	Application of the preferred rating tool(s) to Council's regulatory planning framework.

This Evaluation Paper presents the Phase 1 results of the two-phase study. It documents the evaluation process used by Arup Sustainability in recommending the preferred rating tools for Council and the future steps required in determining their applicability to Council's regulatory planning framework.

This Evaluation Paper has been structured into six sections, reflecting the process followed and information reviewed to develop the conclusions and recommendations of Phase 1 of the commission. **Section 1 and 2** provide an introduction and context for the study. **Section 3** details the Phase 1 methodology with **Section 4** providing a summary of the tools evaluated. **Sections 5 and 6** of the Evaluation Paper present the results of the evaluation and conclusions and recommendations.

2 Context

2.1 Need for the Study

Living in Brisbane 2010 is Council's vision for a more sustainable city. It provides a broad framework for delivering eight strategic sustainability directions including:

- **Clean and green**; which looks at improving the natural environment involving key projects such as investigating water conservation through the use of rainwater tanks.
- **Accessible**; which concentrates on connecting people with services, employment, education and recreation and using alternative modes of transport such as walking and cycling via key projects such as the Green Bridge Link.
- **Designed for subtropical living**; which focuses on maintaining the attractiveness of Brisbane as a place to live, work and play with key projects like the Centre for Subtropical Design that promotes subtropical architecture reflecting our climate and lifestyles.
- **Smart and prosperous;** which promotes innovation and new technologies, allows traditional industries to modernise and seeks out new kinds of jobs through key projects such as promoting flexible 'plug n work' facilities throughout the city providing access to greater resources.
- **Creative**; which embraces a culture of flexibility and openness to new ideas not only in art and culture, but also business, government and society through key projects such as the Museum of Brisbane.
- **Inclusive**; which promotes opportunities for Brisbane's ethnically and culturally diverse society to participate in community life through key projects such as 'Brisbane Serves', an online volunteering and skills resource database encouraging young people to become volunteers.
- **Active and healthy**; which provides opportunity for people to recreate and have fun, ultimately boosting energy and creativity and encouraged through key projects such as the Suburban Centre Improvement Project's that among other things develop sport and leisure precincts for local communities.
- **A regional leader and a world city**; which thinks strategically about our knowledge and resources and promoting innovation opportunities through key projects including the Australia Trade Coast initiative.

As part of its 'Clean and Green' initiatives, Council is seeking to promote innovative and best practice urban development in order to preserve environmental quality and reduce resource consumption of new and existing developments. Council acknowledges that Brisbane City faces rapid population growth over the next 20 years and the subsequent likely demands on residential housing and similar building types.

Brisbane City Council in its role of planning authority in Brisbane is seeking to influence development to achieve more sustainable outcomes. Council has the most influence on development outcomes through regulating planning applications, but would like to achieve as much influence as possible on achieving sustainable development throughout the early planning, planning approval, construction and operation phases of a project.

Currently, the rating tools that are applied through the Energy Efficiency Code and House Code tend to be rating tools for the detailed design phase of the project, and are not addressed at the early stages of the development. This is a disadvantage for Council, which is seeking a far greater role in the earlier stages of the development process where development outcomes can be more readily influenced.

Influencing development at the project conceptualisation and preliminary design stage is critical for maximising sustainability outcomes. As such, it is likely that the best influence on all stages of the development design and

approval process will be prominent and up front, and have the statutory force to be applied to all development, and as such, a strong influence at all stages of the development project process.

It may be that rating tools cannot achieve this type of influence alone, without some longer term commitment to providing a stronger statutory basis for achieving more sustainable development outcomes.

In the meantime there may be a rating tool that goes a long way towards ensuring sustainability factors are part of all stages of design development – from project conceptualisation through to operation.

2.2 Key Study Requirements

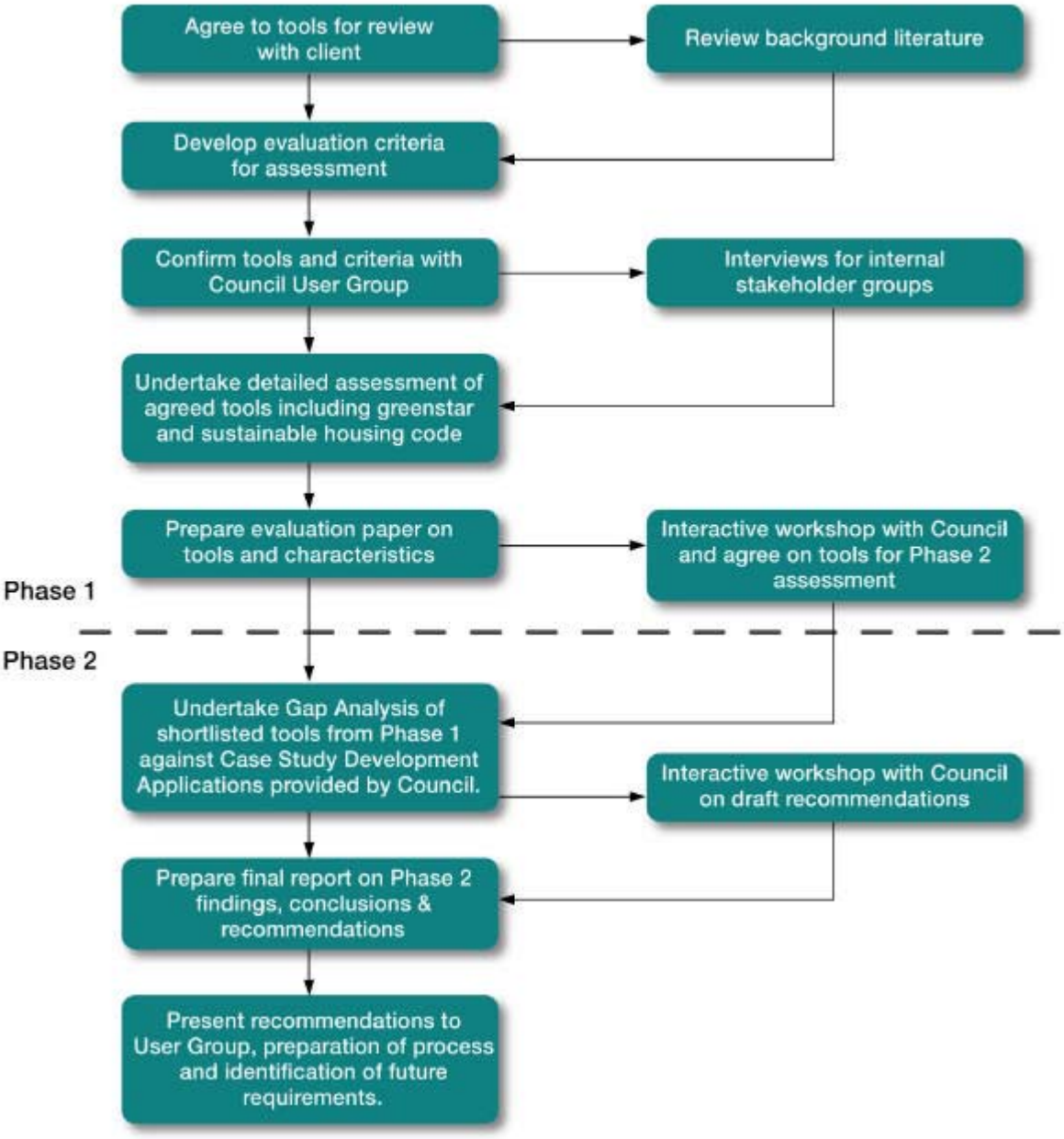
The main purpose Phase 1 of the study is to identify a sustainability rating tool that can assess how sustainable a development is in Brisbane City. In so doing Council is seeking a tool that:

- Can provide clear and unambiguous measurement of sustainability outcomes;
- Is easy to understand;
- Has a wide application –including but not limited to residential, commercial, industrial and subdivision developments; and
- Is transparent – it can be easily understood why a proposed development achieves a higher rating than others.

3 Evaluation Methodology

This section of the paper outlines the methodology used to evaluate the nominated tools. The methodology is graphically depicted in **Figure 1** and discussed in further detail below.

Figure 1 – Methodology



Tools for Evaluation

The first task of the study was to select a range of tools for evaluation. A total of 15 tools, which were a mix of energy, environment and sustainability tools, were selected for evaluation and are discussed in further detail in Section 4.

3.1 Phase 1 Evaluation Criteria

Following the selection of the 15 tools, a suite of evaluation criteria was developed to assist in the evaluation process. A preliminary suite of criteria was contained in Council's Project Brief and further expanded in Arup Sustainability's proposal.

After reviewing the nominated tools for evaluation, the set of twelve preliminary evaluation criteria were expanded into a suite of approximately fifty sub-criteria. This was done to enable a more detailed evaluation to be undertaken that would readily identify subtle differences between the tools that contained similar characteristics. The final suite of evaluation criteria used in the evaluation process is listed in **Table 1**.

In order to gather information in a uniform method, an electronic database was developed that contained the evaluation and sub-criteria as well as relevant questions/answers for each sub-criteria.

3.2 Phase 1 Evaluation of Tools

The evaluation process involved a detailed review of available information for each tool and reporting in the tool database against each of the nominated criteria. The evaluation was based upon the following information:

- Web-based versions of the tools that are publicly available on the internet;
- Existing print information about the tools (including journal articles, PowerPoint presentations, guidelines and reports);
- Arup's prior experience in using various tools; and
- Non-publicly available information available to Arup.

Council proposed a specific focus of the evaluation be an analysis of the viability of using a combination of Green Star (for commercial buildings) and the Sustainable Housing Code (for residential houses and apartments). This evaluation involved an assessment of both tools against the criteria nominated in **Table 1**. A workshop by the Arup Sustainability Team was also performed to determine whether both tools would be viable and practical.

With regard to the THG EcoIndex, an interview was held with Illira Margaritis (Environmental Resources Manager) and Peter Sippel (Director Spatial Resources) from The Heilbronn Group to obtain the relevant information about the EcoIndex tool. This interview was structured around each of the evaluation criteria and all relevant information was disclosed to the interview team.

An evaluation of Arup's SPeAR® (Sustainable Project Appraisal Routine) tool was also undertaken at the request of Council and was performed by an Arup staff member who had not previously used the tool. All relevant information about the tool was made available and used in the evaluation.

3.3 Evaluation Criteria Prioritisation

Due to the large number of criteria adopted for the evaluation process, it was considered important that Council establish priorities for the variety of evaluation criteria. Therefore, through a consensus process adopted by the Project Management Group (refer to **Table 2, Section 3.5**), each sub-criterion was given a prioritisation of High, Medium or Low. These priorities are also listed in **Table 1** on the following pages.

Council's prioritisation process was undertaken in parallel with Arup Sustainability's initial evaluation and database entry activities. These priorities were then provided to the Arup Sustainability Team for application to the evaluation.

Table 1 – Evaluation Criteria Breakdown

No.	EVALUATION CRITERA	SUB-CRITERIA	QUESTION ASKED	DATABASE INFORMATION	BCC PRIORITY RANKING (HIGH/ MED/ LOW)
1	Coverage Of The Tool For Sustainability Issues	Environmental Indicators	What are the environmental indicators in the tool? Eg: energy, water, natural environment, waste, building materials, indoor environment etc	Coverage (High/Medium/Low) List tool's environmental indicators	High
		Social Indicators	What are the social indicators in the tool? Eg: transport, indoor environment, community etc	Coverage (High/Medium/Low) List tool's social indicators	High
		Economic Indicators	What are the economic indicators in the tool? Eg: cost of building materials etc.	Coverage (High/Medium/Low) List tool's economic indicators	High
2	Précis Of Rating Tool	Creators	What organisation/body created the tool? Give contact/website information	Describe	Low
		Place of Origin	In which country was the tool developed?	Describe	Medium
		Keystone Tool/Original	Is tool cross-referenced with another tool or is it an original idea?	Describe	Medium
		Single Value Rating/Guideline	Does the tool give a single value/star rating or a set of guidelines?	Describe	High
		Voluntary/Mandatory	Is it voluntary or mandatory for tool to be used?	Describe	Low
		Type of Tool	What issues does the tool cover the most?	Environment/ Energy/ Sustainability/ Combination of the above (define)/ Other (define)	High

No.	EVALUATION CRITERA	SUB-CRITERIA	QUESTION ASKED	DATABASE INFORMATION	BCC PRIORITY RANKING (HIGH/ MED/ LOW)
3	Description Of Tool's Coverage	Type of Development	What development type does the tool cover?	Commercial (Retail, Office)/ Residential (House, Apartments)/ Subdivision/ Combination of the above (define)/ Other (define)	High
		Focus within Development	What area within the development does the tool focus on? Eg: whole building, building envelope/ core/ shell, one development with a number of uses	Whole of development/ Part(s) of development/ Multi-use development/ Combination of the above (define)/ Other (define)	High
		Stage of Development Life	At what stage of the development life is the tool applied? Eg: existing building, new building	Existing/ New/ Proposed	High
		Stage of Development Process	At what stage of the development process is the tool applied?	Design/ Construction/ Operation/ End of Life/ Combination of the above (define)/ Other (define)	High
		Type of users	What type(s) of people are able to use the tool?	Developers/ Consultants/ Council (DA Team)/ Council (Audit Team)/ Landlord/ Tenants/ Combination of the above (define)/ Other (define)	High
		Application scope	Where can the tool be applied?	Local (Brisbane)/ State/ National/ International/ Combination of the above (define)	High
		Applicability to Brisbane	What is the capability of the tool to be applied to Brisbane?	High/ Medium/ Low	High

No.	EVALUATION CRITERA	SUB-CRITERIA	QUESTION ASKED	DATABASE INFORMATION	BCC PRIORITY RANKING (HIGH/ MED/ LOW)
4	Pros And Cons Of Using The Tool And It's Limitations	Main User	Who is the predominant user of the tool?	Describe	Medium
		Tool Interface	How easy is it to use the tool's visual interface?	Easy/ Moderate/ Difficult	Medium
		Assessment Time	What is the anticipated time to complete the tool's assessment?	Describe	Medium
		Data Collection	How easy is it to collect data requested by the tool?	Easy/ Moderate/ Difficult	High
		Cost of Tool	What is the approximate cost of using tool?	<$100/ $100-$1000/ >$1000	Medium
		BCC DA Fee	What is the cost of BCC's DA fee for the development types covered by the tool?	Describe	Medium
		Effort vs Benefits	Are the benefits of the tool commensurate with the effort?	Yes/No	High
		Criteria Weightings	Can the user change the weighting/importance put on certain indicators within the tool?	Yes/No	High
		Intellectual Property	Does the creator retain IP of the tool?	Yes/No	Medium
		Access to Tool	How easy is it to access the tool? Eg: is tool available to public on a website or do you have to purchase tool from creator	Easy/ Moderate/ Difficult	Medium
		Mandatory Strategies	Does the tool mandate one specific strategy to meet a target or mandate a range of strategies to meet a target?	Describe	High

No.	EVALUATION CRITERA	SUB-CRITERIA	QUESTION ASKED	DATABASE INFORMATION	BCC PRIORITY RANKING (HIGH/ MED/ LOW)
5	Benchmarking Against Best Practice	Defining Best Practice	Are best practice benchmarks defined in the tool?	Yes/No	Medium
		Delivering Best Practice	How (via what vehicles) has tool's creator defined best practice? Eg: case studies, research papers, partnerships, standards, legislation etc	Describe	Medium
		Best Practice Applicability to Brisbane	Does the tool use Brisbane-specific definitions/ examples of best practice?	Describe	High
6	Ability Of The Tool To Verify / Quantify / Measure Sustainability Issues	Verification	Is the tool's output verified? Eg: associations/external parties/peer review, trained assessors/auditors	Describe	High
		Auditability	How easy is it for BCC to check the tools output?	Easy/ Moderate/ Difficult	High
		Economic Indicators	Are the economic indicators predominantly quantitative/ predominantly qualitative?	Predominantly Quantitative/ Predominantly Qualitative	Medium
		Environmental Indicators	Are the environmental indicators predominantly quantitative/ predominantly qualitative?	Predominantly Quantitative/ Predominantly Qualitative	High
		Social Indicators	Are the social indicators predominantly quantitative/ predominantly qualitative?	Predominantly Quantitative/ Predominantly Qualitative	Medium
7	Ability Of The Tool To Compare Between Developments	Tool Indicators	Can a comparison be made between the tool's indicators uitlised on the same development type? Eg: residential vs residential	Yes/No	High
		Final Rating/Score	Can a comparison be made between the final rating/score given to the same development types? Eg: residential vs residential	Yes/No	High

No.	EVALUATION CRITERA	SUB-CRITERIA	QUESTION ASKED	DATABASE INFORMATION	BCC PRIORITY RANKING (HIGH/ MED/ LOW)
8	Ability For The Tool To Be Updated To Reflect Improvements In Best Practice	Continual Funding	Is tool supported by funding or research partnerships?	Describe	Medium
		Regular Review	Is the tool regularly/randomly reviewed?	Scheduled/ Random/ Not Reviewed	Medium
		Stakeholder Engagement	Describe level of engagement (input into the tool during it's development) for each of these stakeholders: Developers, Consultants, Government, Industry, Public	Describe	Low
		Stakeholder Location	In what area are the majority of the stakeholders (who provided input into the tool) located?	Brisbane/ SEQ/ QLD/ Other States/ National/ International	Low
9	Degree Of Acceptance And Recognition By Development Industry Practitioners And Regulators Of Credibility And Reliability Of Tool	Brisbane	What is the degree of acceptance of the tool in Brisbane?	High/ Medium/ Low	Low
		SEQ	What is the degree of acceptance of the tool in South East Queensland?	High/ Medium/ Low	Low
		QLD	What is the degree of acceptance of the tool in Queensland?	High/ Medium/ Low	Low
		Australia	What is the degree of acceptance of the tool in Australia?	High/ Medium/ Low	Medium

No.	EVALUATION CRITERA	SUB-CRITERIA	QUESTION ASKED	DATABASE INFORMATION	BCC PRIORITY RANKING (HIGH/ MED/ LOW)
10	Current Usage Of The Tool In Australia	Brisbane	What is the level of use of the tool in Brisbane?	High/ Medium/ Low	Low
		SEQ	What is the level of use of the tool in South East Queensland?	High/ Medium/ Low	Low
		QLD	What is the level of use of the tool in Queensland?	High/ Medium/ Low	Low
		Australia	What is the level of use of the tool in Australia?	High/ Medium/ Low	Medium
11	Proposed Changes To The Rating System	Proposed Changes	What changes are proposed to the tool? Eg: changing/adding indicators, new tool to address other development types	Describe	Medium
12	Ease At Which Tool Can Be Communicated	Education and Marketing	How easy has it been for the creator to market the tool and educate stakeholders on how to use and interpret results of the tool?	Easy/ Moderate/ Difficult	Medium

3.4 Consultation

Consultation associated with the study was restricted to internal Council Staff only. External consultation was not part of the study scope. Those within Council consulted included:

Table 2 – Consultation Groups

GROUP	ATTENDEES	
Project Management Group	• Andrew Aitken (PPH&S) • Helen Caswell (CP) • Jennifer Nichols (CP)	• Kevin Cronin (DRS) • Steve Adams (CP) • Vanessa Swinson (PPH&S)
Sustainability Working Group	• Andy Krumins (Brisbane Water) • James Coutts (CP) • Jana Novak (Traffic & Transport) • Jeremy Sollars (Chairperson's Office, Urban Management) • Judy Kraatz (CD) • Kevin Cronin (DRS)	• Mark Ricketts (PPH&S) • Nelson Ross (CP) • Nick Clarke (PPH&S) • Peta Jamieson (Divisional Manager's Office, CED) • Sue Rickerby (Marketing)
Individual/Group Interviews	• Judy Kraatz (CD) • Mark Rickertts (PPH&S)	• Steve Adams, Jennifer Nicholls & Helen Caswell (CP)
Interactive Workshop	• Ian Christesen (PPH&S)	• Project Management Group

PPH&S – Pollution Prevention, Health and Safety
CP – City Planning
DRS – Development and Regulatory Services
CD – City Design
CED – Community & Economic Development

It must be noted that apart from a number of limited phone discussions, there was no one-on-one consultation with the creators of the nominated tools. Brief phone discussions were held with the following stakeholders to ask some brief questions:

- Department of Environment and Heritage (NABERS);
- Solar Logic (BERS);
- SEDA (ABGR);
- Green Building Council of Australia (Green Star);
- CSIRO (NatHERS); and
- Australian Building Codes Board (Building Code of Australia).

4 Tools Evaluated

4.1 Introduction

Rating tools have been developed over the last decade to address a number of sustainability issues which occur within the built environment. Energy efficiency and reducing the greenhouse gas emissions of buildings has been a popular focus of these rating tools. In 1993, the Australian government made commitments to energy efficiency and environmental improvement which manifested in the development of the Nationwide Housing Energy Rating Scheme (HERS). The aim of the scheme was to *"facilitate rating of the thermal efficiency of dwelling design and construction"* and to assist the building industry to identify the potential for energy efficiency in houses. The NatHERS software was developed from this process and lead to state-specific energy software tools such as FirstRate, BERS and the recent upgrade of NatHERS called AccuRate. These tools were focused on thermal performance of residential dwellings based on a computational 'engine' (CHENATH developed by CSIRO) with a user-friendly interface. But despite slight differences in scope, these tools are limited to energy-related issues.

However, since the emergence of the sustainability agenda focussing on the triple bottom line performance of environment economic and social issues together, a large number of tools have emerged which encompass aspects of these additional impacts. Moving beyond energy efficiency, benchmark environmental performance and design tools such as BREEAM and LEED were developed in the UK and USA in addition to the International Green Building Challenge's GBTool. These tools sought to address the horizontal and vertical aspects of the built environment to include different stages of development (design, construction, operation), different parts of development (interior and exterior) and different types of development (commercial, retail and industrial).

In Australia, these benchmarks have become adapted to create rating tools to suit our own environmental and societal conditions in the form of the Australian Building Greenhouse Rating (ABGR), National Australian Building Environmental Rating System (NABERS), Green Star, Building Sustainability Index (BASIX) and the Environment Performance Guide for Buildings (EPGB). Specialist consultancies have developed their own commercialised versions such as Arup's SPeAR® and The Heilbronn Group's EcoIndex. Efforts to integrate sustainability issues into the Development Assessment process have also commenced with Melbourne Docklands ESD Guide and South-East Queensland's Sustainable Housing Code.

The fields of life cycle assessment (LCADesign, LISA, ENVEST, ECOTECT), green building materials (EcoSpecifier) and zero energy developments (BEDZED) have also contributed their own versions of rating tools or similar to incorporate sustainability into the built environment.

For ease of evaluation, only 15 rating tools were chosen for assessment in this study. These tools were selected due to their relevance to the Australian context, coverage of sustainability issues, prominence in the market and their ability to deliver tangible outcomes for sustainable development. A brief overview of the selected tools is outlined below.

4.2 Sustainability Rating Tools

The following fifteen tools were selected for evaluation for this study. Due to the large number of tools it was necessary to divide the tools into distinct categories. The most effective method was to sort the tools by "development type" reflecting the most common development applications received by Council. The following three categories were chosen for the tools:

1. Residential Developments (eg: single dwellings, units/apartments)
2. Commercial Developments (eg: office buildings)
3. Other Development types (eg: mixed use, subdivision, industrial)

The following summary of the fifteen tools has therefore been divided into tools that address residential, commercial and other development types.

RESIDENTIAL TOOLS

BERS - Building Energy Rating Scheme

The Building Energy Rating Scheme (BERS) is a computer program developed by Solar Logic in Brisbane which simulates the thermal performance of Australian houses in climates ranging from Alpine to tropical. The current release of BERS for Queensland was developed with financial support from Brisbane City Council, (with funding from the former SEQEB), and the former Queensland Department of Public Works and Housing. It is designed for use on new residential dwellings.

The Queensland version of BERS gives star ratings from 0 to 5 specific to the state. The star ratings for locations outside of Queensland are the same as those used in the NatHERS software. Solar Logic provides training and accreditation of BERS assessors.

The Brisbane City Council City Plan for 2000, Energy Efficiency Code lists an acceptable solution for indoor comfort of residential buildings as a 3½ BERS star rating from an accredited assessor.

FirstRate

FirstRate is a house energy rating software tool developed by the Sustainable Energy Authority Victoria (SEAV). This tool's software was developed by correlating the energy use predictions of the CSIRO's Nationwide House Energy Rating Software (NatHERS) with building element properties. FirstRate is based on the results of around 55,000 simulations in each Australian climate zone. It is designed for use on all residential buildings irrespective of type or size.

Users must input house data into the tool such as such as building fabric, window design, insulation and orientation. Similar to NatHERS, FirstRate allocates a point score for various design features and provides an overall rating on a scale from 0 to 5 stars, with half star increments. An energy efficient house rates 4 stars or higher. However, the methods of data entry are different to NatHERS making FirstRate quicker and cheaper to use.

FirstRate is most widely used in the Australian states of Victoria, Western Australia and Australian Capital Territory (ACT). Only accredited energy raters in Victoria and Western Australia can issue certified ratings of house plans for submission to council. Accredited energy raters are accredited by SEAV to provide house energy ratings in Victoria. In Western Australia, the Sustainable Energy Development Office (SEDO) provides accredited assessors for house energy ratings. In ACT, the Planning and Land Authority provides accredited assessors for FirstRate assessments.

NatHERS - Nationwide House Energy Rating Software

NatHERS was developed by the CSIRO using federal funding (DPIE 1993-97) in cooperation with the Solarch group at the University of NSW as part of the Nationwide House Energy Rating Scheme. It provides a voluntary,

nationwide computerized simulation analysis tool for House Energy Rating. It is designed for all types of residential developments.

Unlike correlation tools like FirstRate, NatHERS actually carries out an annual simulation based on hourly typical climatic data for 28 different climate zones in Australia. Only building envelope and zoning related parameters can be input by the user with other assumptions being fixed. Points are awarded for each of the design elements which translate into a star rating from 0-5. A NatHERS Users Training Program was designed and developed by John Ballinger in 1998 and provides guidance on the use and application of NatHERS.

In NSW and SA only accredited assessors can conduct NatHERS Home Energy Ratings. In New South Wales, the Association of Building Sustainability Assessors or ABSA (formerly HMB: Housing Energy Rating Management Body) established by SEDA, provides training for individuals to become accredited house energy rating assessors. NSW Councils require that all new dwellings must receive a 3.5 star energy rating from an accredited House Energy Rating assessor. In South Australia, Housing Energy Rating (HER) Company provides accredited assessors.

NatHERS has very limited application in the medium high-rise construction sector, however over the past three years several Australian councils (such as Willoughby and Ballina Shire Councils) have introduced mandatory NatHERS 4-star building average apartment rating requirements to obtain development approval for high-rise construction. The CSIRO with funding from the AGO (Australian Greenhouse 0ffice) have developed the new version of NatHERS called AccuRate, which aims to resolve some of the shortcomings of NatHERS.

AccuRate

Developed by the CSIRO, AccuRate energy simulation tool is a new upgraded version of NatHERS. Improvements to the software include ventilation, materials proxies, custom constructions and streamlined user interface. AccuRate has not yet been released and is currently still in its beta test phase.

In New South Wales, the Association of Building Sustainability Assessors (or ABSA) is developing protocols for the accreditation of AccuRate software which will be in place before any new tools are approved. ABSA and SEDA are currently discussing rollout of the tool with the Australian Greenhouse Office and release is scheduled for late 2004.

BASIX - Building Sustainability Index

BASIX is a web-based planning tool that assesses the potential performance of a development against a set of sustainability indices. It was developed by the NSW Department of Infrastructure, Planning and Natural Resources (Planning NSW) to ensure that new homes meet with the NSW Government's water and energy efficiency targets. Samples of the tool spreadsheets are currently available online for public comment, but the tool has not yet been released in it's final version. BASIX is designed for all new residential dwelling types including multi-unit apartments.

When mandated, proposals for new residential development must be submitted with a BASIX Certificate. The proposed development must satisfy the requirements of the online BASIX assessment in order to receive a Certificate. During the development of BASIX the tool creators partnered with seven NSW Councils in 2002 to examine how BASIX could help local councils achieve greater consistency in their requirements of development proponents and deliver more sustainable dwellings in NSW. This allowed for incorporation of local council's needs into the tool and a consistent approach to development approval process across the state of NSW.

BASIX will be introduced in stages through the development approval system, under the Environmental Planning and Assessment Act (1979). The first stage of BASIX focuses on water, stormwater, energy and indoor amenity. When all the stages are introduced the full BASIX tool will cover water, stormwater, energy, indoor amenity, landscape, waste, materials, transport and social indices. BASIX will become mandatory first in Sydney from July 2004 and one year later in July 2005 for the state of New South Wales.

Sustainable Housing Code

South-East Queensland Region Of Councils (SEQROC) developed the Sustainable Housing Code (SHC) which is a set of sustainability performance criteria specific to housing development in Queensland. The code was developed in response to a need for review of energy efficiency provisions in the Brisbane City Council City Plan. It is designed for all new residential developments including single-family homes, semi-detached houses, townhouses, row houses, terrace houses, and multi-storey residential developments.

The SHC is currently in draft form but is intended for adoption by the Queensland Department of Local Government and Planning for inclusion as a model code in the Queensland Development Code. The intention to implement at a State level stems from building industry concern for consistent standards across Queensland.

Sustainability issues covered in the SHC include greenhouse gas emissions, energy, water, waste, lifecycle affordability, accessibility, safety, and security. Buildings must achieve a set level of points from a range of alternatives appropriate for Queensland's sub-tropical climate, safety and security.

COMMERCIAL TOOLS

ABGR - Australian Building Greenhouse Rating

ABGR is administered and supported by several Australian Government agencies such as Sustainable Energy Development Authority (New South Wales), Sustainable Energy Authority Victoria, Sustainable Energy Development Office (Western Australia) and Queensland Environmental Protection Agency. It is a nationwide, voluntary greenhouse gas-emission rating tool for new and existing office buildings.

ABGR provides 5 star levels with 4 stars being best practice, and 5 stars being the national benchmark that requires an innovative approach. Ratings are unable to be promoted without an accreditation by an ABGR third party accredited assessor.

Green Star

The Green Building Council of Australia (GBCA) developed Green Star, a national, voluntary office design-rating tool that has been built on the existing rating systems LEED and BREEAM. Green Star pilot rating tool was launched in March 2003 and has undergone a stakeholder feedback process on pilot versions. The current version of Green Star is designed for new and refurbished office buildings. It is intended that additional versions are due to be released in late 2004 and will address tenancy fit out and existing office buildings. Beyond 2005 additional versions of the Green Star tool will cover other building types (retail, industrial, residential) and phases of development (design, base-building refurbishment, fit-out and operation).

The Green Star tool covers issues of energy, management, water, indoor environmental quality, transport, ecology, materials, emissions and innovation. Each issue is assessed using criteria which are summed and weighted to give a final score and star rating. Six stars recognises and rewards international leadership, five stars recognises and rewards Australian excellence and four stars recognises and rewards best practice in building environmental initiatives.

The star rating cannot be promoted without accreditation by trained assessors and official certification from the Green Building Council of Australia. Certified assessors are also necessary to provide third party independent certification on behalf of the GBCA.

LCADesign – Life Cycle Analysis of Design

The Australian Cooperative Research Centre for Construction Innovation is the developer of LCADesign, an automated eco-efficiency assessment of commercial buildings. This tool provides detailed environmental and cost measures automatically for different materials, products and designs of a building from 3D CAD drawings. LCADesign prototype is currently being developed and commercial launch is scheduled for late 2004.

LCADesign measures environmental impacts as defined through international standards, such as resource depletion, air and water pollution, waste, economics and human input. The assessment involves compiling an

input and output inventory, evaluating potential impacts of those inputs and outputs (via indicators) and interpreting the results in relation to the objectives of the study. The final output is a graphical representation of environmental impacts.

OTHER TOOLS

Melbourne Docklands ESD Guidelines

Developed by the Docklands Authority and VicUrban, the Melbourne Docklands ESD Guide is a rating reward scheme to allow environmental commitments of precincts and buildings within the Melbourne Docklands to be measured, certified and awarded. The guidelines were prepared to build on policies initially set in the Melbourne Docklands Environmental Management Plan (1995), Environmental Management System (2000) and in Part 4 of the Melbourne Planning Scheme (1996).

The guidelines cover issues of sustainable sites, air, water, transport, energy, materials, indoor environmental quality, waste and innovation. These issues are translated in the performance indicator table which references both the LEED and BREEAM systems. The indicators assess each building in the Docklands on a points system to evaluate a final Level of Achievement: 2 ticks (Certificate of Achievement), 3 ticks (Award of Merit) and 4 ticks (Award of Excellence).

The requirements set out in the guidelines are integrated into the development agreement design approval process and the approval process under the Melbourne Planning Scheme (1996) facilitated by the Victoria Department of Infrastructure with input from the City of Melbourne.

SPeAR® - Sustainability Project Appraisal Routine

The Sustainability Project Appraisal Routine, or SPeAR®, is a tool for assessing (and improving) sustainability performance developed by Arup. It can be used on any development type (buildings, infrastructure etc) at any development phase (new, existing, refurbishment).

SPeAR® offers four sections of sustainability (environment, social, economic and natural resources) which are divided into a 22 headline indicators and 150 sub-indicators. Performance for each of these indicators are assessed on a numeric scale and given a final score represented as a coloured graphical output, or “rose diagram”.

The intention of this tool is not to give a rating, but rather to focus on continual improvement over time. It is very broad in scope and application and can only be used by trained Arup assessors.

The Heilbronn Group (THG) Eco Index

The Eco Index is a performance based rating tool developed by The Heilbronn Group which measures the potential impacts on the social and biophysical environment of a development. A relatively new tool, the Eco Index is the central component of a process called the THG Sustainable Integration Program. It is designed primarily for greenfield residential developments.

The Eco Index assessment covers three classes of development, namely environment, social and infrastructure divided into fifteen sub-classes. Each sub-class is rated on a numeric scale and the final result is a series of graphs illustrating performance.

The Heilbronn Group provide trained assessors who can provide the assessment. A agricultural-specific version of this tool has also been released called Agri-Index.

BREEAM - Building Research Establishment Environmental Assessment Method

BREEAM was developed by the UK-based Building Research Establishment (BRE Pty Ltd) and is globally the most widely recognised voluntary method for reviewing and improving a building’s environmental performance. The method was developed in 1990 and has been increasingly accepted as the benchmark for best practice in environmental design and management by the UK building and design industries. BREEAM is used for all

building types including offices, retail developments, industrial buildings, residential homes (EcoHomes), and details of bespoke schemes. Assessments can be carried out on new or existing buildings.

BREEAM covers issues of management, energy use, health & wellbeing, pollution, transport, land use, ecology, materials and water. Credits are awarded in each area according to performance and set of environmental weightings then enables the credits to be added together to produce a single overall score. The building is then rated on a scale of Pass, Good, Very Good or Excellent, and a certificate awarded that can be used for promotional purposes. Assessments are carried out by independent assessors who are trained and licensed by BRE.

Adapted versions of BREEAM have been developed internationally including UK, Hong Kong, Singapore, New Zealand, Norway, Greece, Spain, France, Holland and Canada. However, BREEAM is not a nationally recognised tool in Australia although elements informed the development of Green Star.

LEED - Leadership in Energy and Environmental Design

The United States Green Building Council (USGBC) established LEED in 2000 in response to the need for a voluntary national US standard for sustainable buildings. LEED for New Construction and Major Renovations (LEED-NC) was launched in 2003. LEED for Existing building operations (LEED-EB), Commercial interiors projects (LEED-CI), Core and shell projects (LEED-CS) and Homes (LEED-H) are currently in their pilot versions of development.

LEED covers sustainable site development, water, energy efficiency, materials selection and indoor environmental quality. To earn a LEED certification, the applicant project must satisfy all of the prerequisites and a minimum number of points to attain a LEED rating level of Gold, Silver or Platinum. Certification may not be of significant value, however, without achieving one of the higher ratings and a project may only be certified when construction is completed. The USGBC provide training for accredited assessors who carry out the assessment and certification process. LEED is not a nationally recognised tool in Australia although elements informed the development of Green Star.

NABERS - National Australian Building Environmental Rating System

NABERS was developed by Australia's Commonwealth Department of Environment and Heritage (DEH) in 2003 to provide a voluntary, performance-based environmental rating system for buildings. Currently in it's infancy, the Australia-specific rating tool has undergone a public consultation process and DEH is now processing submissions for commercialisation of the tool. Spreadsheets are available for viewing and stakeholder feedback on the DEH website where users can input data and complete a trial assessment and generate a rating score. NABERS will provide separate ratings for commercial office whole building, commercial office base building, commercial office tenancy and residential (multi-unit only, not designed for single homes). NABERS places no restrictions to the design or operation of a building, instead it is a performance-based system, measuring the actual environmental performance of the building over a fixed time period and comparing it against a series of benchmarks based on averaged Australian statistics for many of the indicators. NABERS is most appropriate for rating existing buildings, and is not generally appropriate for use in a regulatory context for new construction.

Assessment covers operational impacts including energy, refrigerants (greenhouse and ozone depletion potential), water, stormwater runoff and pollution, sewage, landscape diversity, transport, indoor air quality, occupant satisfaction, waste and toxic materials. Requested data for each environmental indicator is entered into a series of worksheets to receive points which sum towards a final score, printed as a certificate. No accreditation or certification process is in place at this point in time.

4.3 Voluntary Codes and Guidelines

In addition to rating tools, a number of voluntary guidelines and codes have been developed to assist builders, architects, developers and governments in integrating sustainability initiatives into design, construction and

operation of buildings. Some examples include: Australian Greenhouse Office "Your Home" Manuals, Housing Industry Association's 'GreenSmart Program' and Queensland Department of Housing 'Smart Housing Program'. See Appendix A for more information.

5 Evaluation Results

The following section describes the results of the evaluation of rating tools against Council's twelve evaluation criteria. The evaluation is focused on the high priority sub-criteria in order to maintain simplicity of the results and suitable feedback.

A description of the key findings from the evaluation is outlined in Section 6.

5.1 Evaluation Criteria 1: Coverage of the tool for Sustainability Issues

Sub-Criteria	BCC Priority
Environmental Indicators	High
Social Indicators	High
Economic Indicators	High

Evaluation Criteria 1 (EC1) relates to the tool's coverage of indicators across all three aspects of sustainability, namely environment, social and economic. As indicated in **Table 1**, the tools range from energy efficiency rating tools only, through to tools with broader indicator sets that cover many different facets of each aspect of sustainability (ie. environment, social and economic).

Most rating tools up until recently (2 years ago) focused primarily on energy efficiency, including tools such as BERS, NatHERS, AccuRate and FirstRate. More recent tools such as NABERS, BASIX, Green Star and the THG EcoIndex have indicator sets that include social issues (eg: transport, access, community, indoor amenity etc), and in rare cases, include economic indicators (Melbourne Docklands and SPeAR®).

Table 3 – Indicator Coverage by Tool

TOOL	ENVIRONMENT	SOCIAL	ECONOMIC
ABGR	⊙CO^2 emissions		
AccuRate	⊙Energy		
BASIX	⊙	⊙	
BERS	⊙Energy		
BREEAM	⊙	⊙	
FirstRate	⊙Energy		
Green Star	⊙	⊙	
LCADesign	⊙		
LEED	⊙	⊙	
Melbourne Docklands ESD	⊙	⊙	⊙
NABERS	⊙	⊙	
NatHERS	⊙Energy		
SPeAR®	⊙	⊙	⊙
Sustainable Housing Code	⊙	⊙	
THG EcoIndex	⊙	⊙	

5.2 Evaluation Criteria 2: Précis of Rating Tool

Sub-Criteria	BCC Priority
Tool Creator	Low
Place of Origin	Medium
Keystone Tool/ Original Tool	Medium
Single Value or Rating/ Guideline	High
Voluntary/Mandatory	Low
Type of Tool	High

Evaluation Criteria 2 gives a summary of the rating tool and it's application. The majority of tools assessed in this process were developed in Australia, however the most renowned and widely applied tools BREEAM (developed in UK) and LEED (developed in US) were included in the process for the benefit of comparative analysis.

High priority has been placed on the final output of a tool (evaluation is illustrated in **Table 4**). Single Rating tools are those that give a specific tangible measure of performance in the form of star bands (eg: Green Star has 6 star bands), a numeric value (eg: BASIX gives a final score) and a performance rating (eg: LEED gives Gold, Silver or Platinum certification). A minority representation did not give a single value, but rather a summary of performance (SPeAR®) or minimum number of credits to be achieved (Sustainable Housing Code).

In addition to a rating or guideline, a number of the tools provide a graphical output of performance in the form of Excel graphs (BASIX, THG EcoIndex) or coloured diagrams (LCADesign, SPeAR®) as illustrated in **Figures 2 - 4**. This allows for the user to view areas of poor and good performance to identify opportunities for improvement.

Table 4 – Output by Tool

TOOL	SINGLE RATING	GUIDELINE/ OTHER
ABGR	⊙ Star Rating	
AccuRate	⊙ Star Rating	
BASIX	⊙ Rating Number	
BERS	⊙ Star Rating	
BREEAM	⊙ Performance Rating	
FirstRate	⊙ Star Rating	
Green Star	⊙ Star Rating	
LCADesign	⊙ Rating Number	
LEED	⊙ Performance Rating	
Melbourne Docklands ESD	⊙ Performance Rating	
NABERS	⊙ Rating Number	
NatHERS	⊙ Star Rating	
SPeAR®		⊙ Performance Summary
Sustainable Housing Code		⊙ Credit Points
THG EcoIndex	⊙ Rating Number	

Figure 2 – Graphical Ouput of BASIX

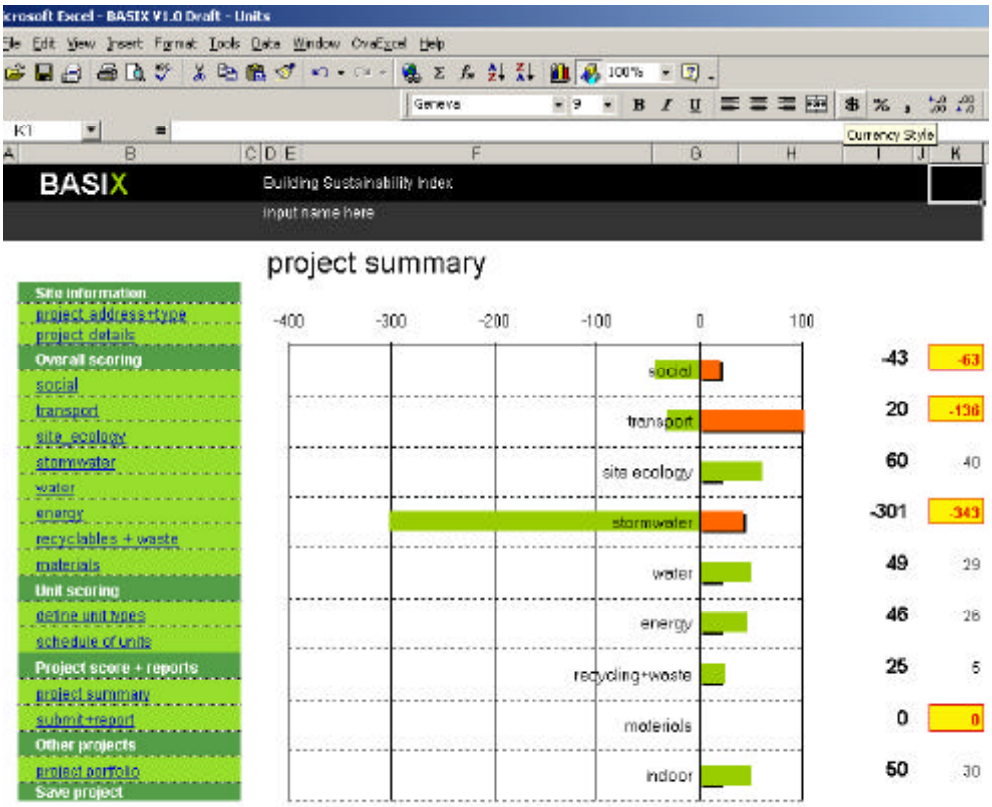


Figure 3 – Diagrammatical Output of LCADesign

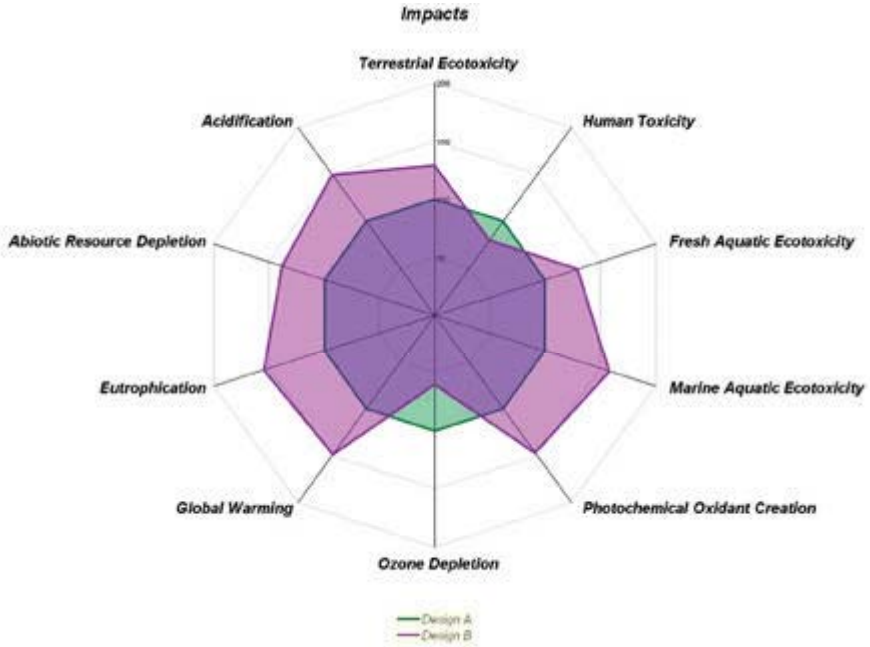
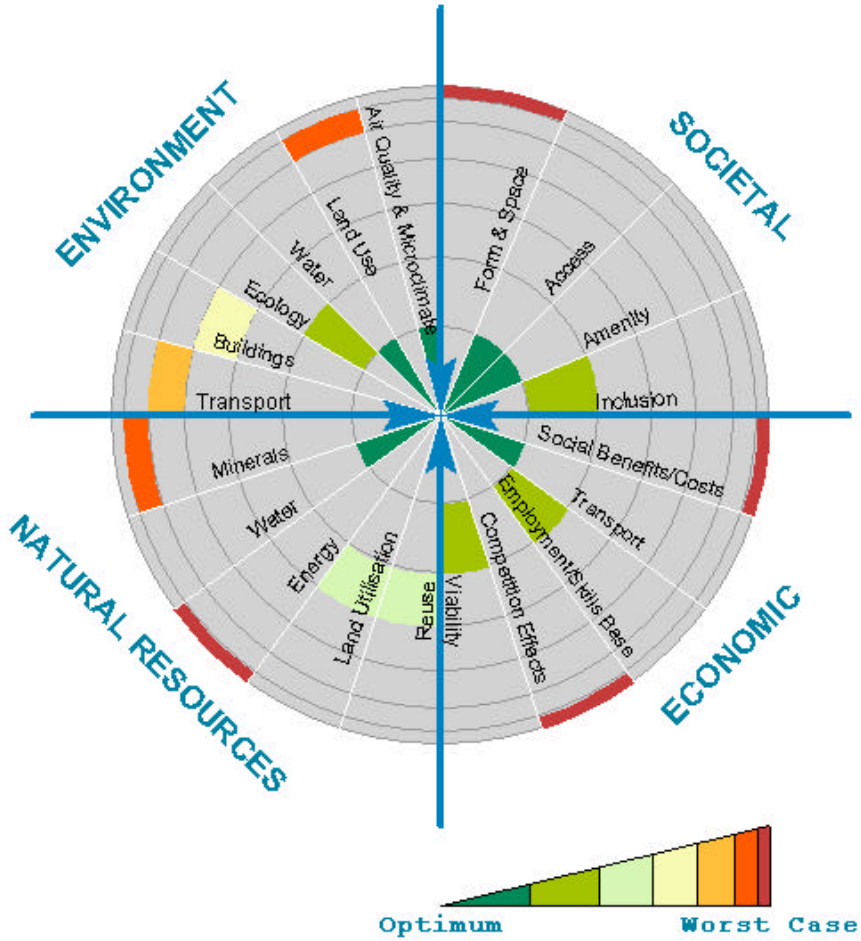


Figure 4 – Diagrammatical Output of SPeAR®



Evaluation Criteria 2 covered other aspects of the tool such as identification of new tools based on existing or "keystone" tools or tools which have been developed using fundamental or "original" principles and concepts. The energy efficiency tools (FirstRate and BERS) are based on NatHERS as a keystone tool but have been adjusted to specific local conditions (eg: BERS for Queensland). AccuRate is the upgraded version of NatHERS.

In many cases, the tools have been cross-referenced within each other or use other tools outside of this assessment:

- Green Star and Melbourne Docklands ESD Guide used BREAAM and LEED as a guide in their development;
- Green Star uses intellectual property from the VicUrban Melbourne Docklands ESD Guide to develop local system conditions for Victoria within tool;
- BASIX calls upon LCAid for building materials indicators;
- Green Star calls upon ABGR for energy ratings; and
- Melbourne Docklands calls upon NatHERS and ABGR for energy ratings.

Evaluation of EC2 also included classification of tools into "environmental", "environmental and social" and "sustainability" tools. Only two of the tools (SPeAR® and Melbourne Docklands ESD Guide) could be classified as "sustainability" tools due to their coverage of all three environmental, economic and social issues. All other tools were classified as either "environmental" or "environment and social" tools. It should be noted that the energy rating software tools are limited in their application of environmental issues compared to more encompassing tools such as BREEAM, LEED, BASIX and Green Star that also include a wide range of social issues in their assessments.

5.3 Evaluation Criteria 3: Description of Tool's Coverage

Sub-Criteria	BCC Priority
Type of development	High
Focus within development	High
Stage of development life	High
Stage of development process	High
Type of users	High
Application scope	High
Applicability to Brisbane	High

Evaluation Criteria 3 allowed for a more extensive analysis of the tool's coverage. Tools were evaluated according to which type of developments they were able to assess (see **Table 5**). A distinction was obvious between residential rating tools (NatHERS/ AccuRate, FirstRate, BERS, BASIX and Sustainable Housing Code) and commercial rating tools (ABGR, Green Star and LCADesign). Five of the fifteen tools were able to cover both commercial and residential developments (BREEAM, LEED, NABERS, Melbourne Docklands ESD Guide and SPeAR®). The majority of tools new to the market, however, have funding and scope for upgrading to include other types of development (Green Star, THG EcoIndex, LEED, BREEAM and ABGR). For more detail see Evaluation Criteria 11: Proposed Changes to the Rating System.

Table 5– Development Type by Tool

TOOL	COMMERCIAL	RESIDENTIAL	OTHER*
ABGR	⊙		
AccuRate		⊙	
BASIX		⊙	
BERS		⊙	
BREEAM	⊙	⊙	⊙
FirstRate		⊙	
Green Star	⊙		
LCADesign	⊙		
LEED	⊙	⊙	⊙
Melbourne Docklands ESD	⊙	⊙	⊙
NABERS	⊙	⊙	
NatHERS		⊙	
SPeAR®	⊙	⊙	⊙
Sustainable Housing Code		⊙	
THG EcoIndex		⊙	⊙

*Other development includes subdivision, industry, retail etc

The majority of residential tools evaluated are designed for assessment on new buildings (usually applied at the design stage). The National Australian Building Environmental Rating System (NABERS) was the only tool specifically designed for measuring the performance of existing buildings (see **Table 6**). It was also interesting to note that this tool was the only one to assess performance of existing residential buildings. The other tools which were able to assess existing buildings were focussed on existing commercial buildings only such as ABGR, BREEAM, LEED and Green Star.

Table 6 – Stage of Development covered by Tool

TOOL	NEW BUILDING	EXISTING BUILDING
ABGR	⊙	⊙
AccuRate	⊙	
BASIX	⊙	
BERS	⊙	
BREEAM	⊙	⊙
FirstRate	⊙	
Green Star	⊙	⊙
LCADesign	⊙	
LEED	⊙	⊙
Melbourne Docklands ESD	⊙	
NABERS		⊙
NatHERS	⊙	
SPeAR®	⊙	⊙
Sustainable Housing Code	⊙	
THG EcoIndex	⊙	

The extent of development coverage by the tools is closely related to whether the tool assesses new or existing buildings. It is fair to say that the majority of tools are design tools due to the fact that these tools assess new buildings (with the exception of NABERS). Five of the fifteen tools cover the construction impacts of a development (see **Table 7**).

The "operation" phase of a development can be divided into two types of impacts: building impacts (base building) and human impacts (tenancy). Tools such as BREEAM, LEED, ABGR and NABERS provide assessments of both of these impacts for their commercial versions, allowing tenants to assess their impacts regardless of the impacts of their base buildings. Melbourne Docklands ESD Guide and THG EcoIndex provide only measurements for base building impacts due to the focus on residential developments.

Table 7 – Extent of Development Coverage by Tool

TOOL	DESIGN	CONSTRUCTION	OPERATION
ABGR	⊙		⊙BB & T*
AccuRate	⊙		
BASIX	⊙		
BERS	⊙		
BREEAM	⊙	⊙	⊙BB & T*
FirstRate	⊙		
Green Star	⊙		
LCADesign	⊙		
LEED	⊙	⊙	⊙BB & T*
Melbourne Docklands ESD	⊙	⊙	⊙BB*
NABERS			⊙BB & T*
NatHERS	⊙		
SPeAR®	⊙	⊙	⊙BB & T*
Sustainable Housing Code	⊙		
THG EcoIndex	⊙	⊙	⊙BB*

* BB = Base Building, T = Tenancy

The majority of tools evaluated are able to be applied to Brisbane without modification (see **Table 8**). While able to be used "off the shelf", a number of these tools may not fill other criteria such as relevance to Brisbane climate and specific needs/requirements of Brisbane City Council such as a focus on residential developments. Green Star, for example, is a tool which is capable of being applied to Brisbane due to its ability to be adjusted to Queensland climatic and societal conditions and best practice benchmarks. It does not, however, provide best practice benchmarks and climatic conditions for Brisbane City and is therefore not as effective for Brisbane developments as a Brisbane-specific tools such as THG EcoIndex, Sustainable Housing Code and SPeAR®.

Those that require change in order to be applicable in Brisbane are overseas-based tools (BREEAM and LEED) or area specific tools such as BASIX (specific to New South Wales) and Melbourne Docklands ESD Guide (specific to Melbourne and Victoria).

Table 8 – Adaptability for Use in Brisbane

TOOL	NO CHANGE REQUIRED	CHANGE REQUIRED
ABGR	⊙	
AccuRate	⊙	
BASIX		⊙
BERS	⊙	
BREEAM		⊙
FirstRate		⊙
Green Star	⊙	
LCADesign	⊙	
LEED		⊙
Melbourne Docklands ESD		⊙
NABERS	⊙	
NatHERS	⊙	
SPeAR®	⊙	
Sustainable Housing Code	⊙	
THG EcoIndex	⊙	

5.4 Evaluation Criteria 4: Pros and Cons of Using the Tool and it's Limitations

Sub Criteria	BCC Priority
Main User	Medium
Tool Interface	Medium
Assessment Time	Medium
Data Collection	High
Cost of Tool	Medium
BCC DA Fee	Medium
Efforts vs Benefits	High
Criteria Weightings	High
Intellectual Property	Medium
Access to Tool	Medium
Mandatory Strategies	High

Evaluation Criteria 4 allowed for assessment of the benefits and shortcomings of each tool. The sub indicators aimed to evaluate to the usability and flexibility of the tool for application to the Brisbane City Council Development Assessment process.

Council's request for the responsibility of tool's use to be upon the developer (rather than local government) is fulfilled by all of the tools. The majority of tools require a trained assessor to conduct or facilitate the tool assessment process with the exception of Melbourne Docklands ESD Guide and Sustainable Housing Code which are guided by (or intended to be guided by) the regional planning framework.

Most tools use a spreadsheet interface with several worksheets for each indicator with a project summary worksheet on completion of the assessment (BASIX, NABERS and Green Star). NatHERS, FirstRate, BERS, SPeAR® and LCADesign use more advanced energy or graphical software as the user interface. Exceptions are Sustainable Housing Code and Melbourne Docklands which provide documented guidelines with minimum performance standards. Data input and navigation of the user interface has been evaluated as simple and straightforward for all of the online/spreadsheet/software tools.

The tools which require minimal collection of data are those which assess a single issue such as energy efficiency or greenhouse gas emissions (ABGR, FirstRate, BERS, AccuRate, NatHERS). The star ratings for these tools are based on calculations of building dimensions or interior features which the user inputs against set values (such as climatic data) which have been preset in the software. The remaining ten tools all require more effort due to a greater number and variety of indicators and results in the need for greater collection of environmental, social and sometimes economic data (see **Table 9**).

Table 9 – Ease of Data Collection

TOOL	EASY DATA COLLECTION
ABGR	⊙
AccuRate	⊙
BASIX	
BERS	⊙
BREEAM	
FirstRate	⊙
Green Star	
LCADesign	
LEED	
Melbourne Docklands ESD	
NABERS	
NatHERS	⊙
SPeAR®	
Sustainable Housing Code	
THG EcoIndex	

Assessment time for each of the tools varied between a number of hours (FirstRate, NatHERS, BERS) to days or weeks (LCADesign, SPeAR®, NABERS, ABGR) or months (BREEAM, Melbourne Docklands ESD Guide, Green Star). This is closely related to ease of data collection, verification processes and coverage of the tool for design, construction and operation stages of the development. Those tools which required extensive data collection such as BREEAM have an assessment time of one month compared a short one hour data collection process for an energy tool such as FirstRate.

The tools which have commercial ownership such as SPeAR®, LCADesign, Green Star, THG EcoIndex, BREEAM and LEED are accessed through purchasing the tool (usually at a cost over $1000) and intellectual property is retained by the creator. Tools available to the public such as NABERS, BASIX and Sustainable Housing Code have been developed by government agencies and are free (for relevant locations) and easy to access on the Internet.

Ability for the user to change the criteria weightings within the tool (for example, a greater importance placed on energy indicators compared to water indicators reflected in the scoring system) was of high priority for Council. None of the fifteen tools offered flexibility for the user to change criteria weightings. However, some of the tools, such as Green Star and AccuRate, have inbuilt functions for the user to customise the tool to their local/regional location in Australia. This automatically adjusts the tool's criteria weightings based on minimum standards (legislative or otherwise) and best practice for indicators in that area. For example, hot weather conditions in northern Australia place importance on natural ventilation indicators and drought affected areas on the eastern coast place importance on water indicators. This allows for an area-specific assessment using adjusted weightings on the same set of baseline indicators.

Rating tools which assess the performance of a building or tenancy give a rating on how well the development has performed against a set of best practice benchmarks (delivered as a star rating or graphical representation of performance). These tools do not offer mandatory strategies to achieve this, but rather assess the performance of assumed or generic impacts associated with commercial or residential developments. These include BERS, NatHERS, AccuRate, LCADesign, FirstRate, ABGR and NABERS. However, ABGR and FirstRate do move beyond the performance assessment and provide advice and hints on how to reduce emissions and improve energy efficiency of the building.

Other tools prescribe mandatory strategies and rate how well these have been implemented to meet set benchmarks of minimum performance and best practice (delivered as a star rating or graphical representation of performance). All of these tools provide a range of strategies for the user to meet set targets. These include BASIX, Sustainable Housing Code, Green Star, SPeAR®, LEED, BREEAM, THG EcoIndex and Melbourne Docklands ESD Guide.

5.5 Evaluation Criteria 5: Benchmarking Against Best Practice

Sub-Criteria	BCC Priority
Defining Best Practice	Medium
Delivering Best Practice	Medium
Best Practice Applicability to Brisbane	High

BERS, SPeAR®, Sustainable Housing Code and THG Eco Index are tools which have been specifically benchmarked using best practice in Brisbane (see **Table 10**). These tools have been created in Brisbane or South East Queensland by local organisations. BERS software, for example, is based on NatHERS software but adjusted to suit the tropical conditions in Queensland. THG Eco Index has been primarily designed for greenfield residential developments (including subdivision). Tools such as these are highly relevant to Brisbane's climatic and demographic contexts and have potential for local, regional and Queensland wide application. The remaining twelve tools (with the exception of LEED and BREEAM) also provide relevance in the broader national context (ABGR, AccuRate, LCADesign) or to other Australian states (BASIX, Melbourne Docklands ESD Guide) and would require modification to become specific to the local context of Brisbane.

All of the tools define or describe the best practice benchmarks upon which they are based. This is usually delivered in the form of guidance notes, technical background spreadsheets within the user interface or is referenced within the tool.

Table 10 – Best Practice Applicability to Brisbane

TOOL	USES BRISBANE SPECIFIC BEST PRACTICE EXAMPLES
ABGR	
AccuRate	
BASIX	
BERS	⊙
BREEAM	
FirstRate	
Green Star	
LCADesign	
LEED	
Melbourne Docklands ESD	
NABERS	
NatHERS	
SPeAR®	⊙
Sustainable Housing Code	⊙
THG EcoIndex	⊙

5.6 Evaluation Criteria 6: Ability of the tool to Verify/Quantify/Measure Sustainability Issues

Sub-Criteria	BCC Priority
Verification	High
Auditability	High
Economic Indicators	Medium
Environmental Indicators	High
Social Indicators	Medium

Ease of verification and auditiability of the evaluated tools was a high priority for Council. The majority of tools have a system of accreditation and verification in place (see **Table 11**). In these cases, the rating tool body usually provides training for individuals to become accredited and facilitate the certification and verification processes. However, only half of the tools offer additional third party verification: ABGR, BREEAM, Green Star, LEED, SPeAR®, Melbourne Docklands ESD Guide and THG EcoIndex. These tools require verification by the rating tool body before the user can commercially promote the tool's rating. This process is carried out in addition to trained assessor accreditation of a development. In the case of the Melbourne Docklands, the developers must fulfil requirements of the ESD Guide and report to the Docklands Authority as part of the Environmental Management Plan process in order to receive certification.

With the exception of BREEAM and LEED, all of the tools evaluated are suitable for Council to audit. The information presented by these tools is easy to check due to their relevance to the Australian context using local, regional or national benchmarks of best practice. The information is also presented in a format which is uncomplicated and easy for Council understand and access. LEED and BREEAM use overseas-specific benchmarks and target and were determined as being invalid for Council auditing due to their irrelevance to Australia.

Quantitative environmental indicators were prominent in ten of the fifteen tools allowing for easy measurement of impacts against minimum performance standards. Those that were mostly qualitative (Sustainable Housing Code, LEED, BREEAM, THG Eco Index) required documentation or tangible evidence of meeting set targets or minimum standards to achieve credits or points towards a final rating. Economic and social indicators within the tools were mostly qualitative. However, tools such as BASIX, Green Star, LEED, Melbourne Docklands ESD Guide and NABERS were able to put a measure to the social indicators within the tool such as area of mixed use space, number of car parking spaces, number of bicycle spaces, yearly distance travelled, amount of indoor pollutants etc.

Table 11 – Verification and Auditability of Tool

TOOL	THIRD PARTY VERIFICATION REQUIRED	SUITABLE FOR COUNCIL AUDITING
ABGR	⊙	⊙
AccuRate		⊙
BASIX		⊙
BERS		⊙
BREEAM	⊙	
FirstRate		⊙
Green Star	⊙	
LCADesign		⊙
LEED	⊙	
Melbourne Docklands ESD	⊙	⊙
NABERS		⊙
NatHERS		⊙
SPeAR®	⊙	⊙
Sustainable Housing Code		⊙
THG EcoIndex	⊙	⊙

5.7 Evaluation Criteria 7: Ability of the tool to Compare Between Developments

Sub-Criteria	BCC Priority
Tool Indicators	High
Final Rating/Score	High

Evaluation Criteria 7 is concerned with the ability of the tool to allow comparisons between the tools indicators for the same development type and comparisons between the final rating/score for the same development type. For example, can an indicator relating to water metering in one tool can be used to compare a single residential dwelling and a multi-unit residential dwelling? Similarly, can a five star rating from a tool be used to compare two different commercial buildings?

The evaluation found that the majority of tools allow for comparisons between tool indicators and final ratings. If the tool does not give a final rating (such as SPeAR® and LCADesign) it is still possible to compare the performance summary between assessments of the same development. Comparison of the tool indicators and final outputs between different development types was not possible for any of the tools evaluated.

5.8 Evaluation Criteria 8: Ability for the Tool to be Updated to Reflect Improvements in Best Practice

Sub-Criteria	BCC Priority
Continual Funding	Medium
Regular Review	Medium
Stakeholder Engagement	Low
Stakeholder Location	Low

Evaluation Criteria 8 allowed for an assessment of tool updates and upgrades to reflect best practice. The evaluation of the fifteen tools determined that all tools have some form of funding from government, industry associations or tool creators. Those tools currently used (or planning to be used) within the regulatory planning framework such as BERS, FirstRate, NatHERS, AccuRate, Sustainable Housing Code, BASIX and Melbourne Docklands ESD Guide have funding from government agencies for updating and upgrading. Tools which are owned and developed by private organisations such as SPeAR®, BREEAM and THG EcoIndex are continually funded as commercial projects. Industry associations who have developed tools such as Green Star and LEED are committed to continual funding and upgrades of their tools. It has been assumed that recently released or soon to be released rating tools such as Green Star, NABERS and LCADesign will be funded for a reasonable trial period. ABGR appears to have continual support from government agencies and profit from verification and accreditation processes.

Ten of the fifteen tools were developed with a high level of engagement with stakeholders. In most cases stakeholders included tool users, government, industry and/or the public. Of those bodies that did provide a high level of engagement in their tool development, BERS, NatHERS, the Sustainable Housing Code, ABGR, Green Star and LCADesign involved consultation with stakeholders located in Queensland.

5.9 Evaluation Criteria 9: Degree of Acceptance and Recognition by Development Industry Practitioners and Regulators Of Credibility and Reliability of Tool

Sub-Criteria	BCC Priority
Brisbane	Low
SEQ	Low
QLD	Low
Australia	Medium

The relative degree of acceptance of the tools in Brisbane, Southeast Queensland, Queensland and Australia was reviewed based on Arup's knowledge and experience in using the various tools, participation on various industry representative groups and limited consultation with the relevant administering bodies. **Table 12** below outlines the location of where the tools have a high level of acceptance.

Table 12 – Degree of Acceptance in Australia

TOOL	HIGH DEGREE OF ACCEPTANCE NATIONALLY
ABGR	⊙
AccuRate	Not yet released
BASIX	⊙
BERS	
BREEAM	⊙
FirstRate	
Green Star	⊙
LCADesign	Not yet released
LEED	⊙
Melbourne Docklands ESD	
NABERS	Not yet released
NatHERS	⊙
SPeAR®	
Sustainable Housing Code	Not yet released
THG EcoIndex	

5.10 Evaluation Criteria 10: Current Usage Of The Tool In Australia

Sub-Criteria	BCC Priority
Brisbane	Low
SEQ	Low
QLD	Low
Australia	Medium

The relative degree of use of the tools in Brisbane, Southeast Queensland, Queensland and Australia was reviewed based on Arup's knowledge and experience in using the various tools, participation on various industry representative groups and limited consultation with the relevant administering bodies. **Table 13** below outlines the location of where the tools have a high level of use.

Table 13 – Current Levels of Use in Australia

TOOL	HIGH LEVEL OF USE NATIONALLY	WHERE TOOL IS USED
ABGR	⊙	National
AccuRate	Not yet released	National
BASIX	Not yet released	NSW
BERS		QLD
BREEAM		International
FirstRate		National
Green Star		National
LCADesign	Not yet released	National
LEED		International
Melbourne Docklands ESD		VIC
NABERS	Not yet released	National
NatHERS	⊙	National
SPeAR®		National
Sustainable Housing Code	Not yet released	QLD
THG EcoIndex		QLD

5.11 Evaluation Criteria 11: Proposed Changes To The Rating System

Sub-Criteria	BCC Priority
Proposed Changes	Medium

A number of the tools evaluated are proposed to undergo modifications in the future. Following limited consultation with various tool creators, a summary is provided in the table below outlining proposed changes to the nominated rating systems.

Table 13 – Proposed Changes to the Rating Tool

TOOL	PROPOSED CHANGES
ABGR	Coverage for health and retail buildings
AccuRate	Not yet released
BASIX	Not yet released
BERS	Upgraded climatic data for Queensland Upgraded to be Windows-based Coverage for small commercial buildings
BREEAM	Continually updating to cover new sectors in built environment
FirstRate	No proposed changes evident
Green Star	Coverage for retail, industrial & residential
LCADesign	Inclusion of cost indicators and expansion of assessment to include family homes, roads, sewage networks or any major construction project
LEED	Coverage for existing buildings, commercial interiors, core and shell developments & homes
Melbourne Docklands ESD	No proposed changes evident
NABERS	Not yet released
NatHERS	Upgrading to Accurate
SPeAR®	Currently piloting in Queensland an urban development indicator set to be finalised mid 2004
Sustainable Housing Code	Not yet released
THG EcoIndex	Inclusion of economic indicators is proposed

5.12 Evaluation Criteria 12: Ease At Which Tool Can Be Communicated

Sub-Criteria	BCC Priority
Education and Marketing	Medium

This evaluation criteria relates to how the tools output can be communicated and the ability to market the tool and educate stakeholders on how to use the output and interpret the results. Each tool was evaluated using this criteria and a response given as to whether it was easy, moderate or difficult to communicate the tool.

Most tools seem to have the ability to easily communicate the tools output based on the summary graphs and charts produced by the various assessments. The interfaces were viewed for ABGR, NABERS, Green Star and BASIX, SPeAR® and THG EcoIndex all of which were easily communicated to potential users. AccuRate, LCADesign and the Sustainable Housing Code have not been available for viewing and the ease of education and communication of these tools was not completed for these evaluation criteria. The Melbourne Docklands ESD Guide was a detailed document, which was easily communicated and understood. The success of older, more widely used tools such as the energy efficiency tools in Australia (NatHERS, FirstRate, BERS) and overseas-based tools (BREEAM and LEED) is evidence itself of the ease at which these tools have been communicated to tool users and the public.

6 Conclusions

6.1 Tool Overview/Evaluation

The results of Arup Sustainability's evaluation is summarised in **Table 15** overleaf. This evaluation includes the application of Council's priorities. The key findings from the tool overview/evaluation included:

- The tools could be readily categorised into Residential, Commercial and Other (including subdivision, light industrial, mixed use etc).
- Not all tools provide a rating or score.
- Only two tools have full sustainability coverage.
- Four of the five residential tools cover energy efficiency only (NatHERS, BERS, AccuRate and FirstRate)
- The potential use of Green Star for assessing commercial buildings and the Sustainable Housing Code for assessing houses and apartments should be considered further in Phase 2 of the commission.
- Only three tools cover all development types (residential, commercial and other), two of which are international tools and not applicable in Brisbane (BREEAM, LEED and SPeAR®)

6.2 Interactive Workshop with Council

Following Arup Sustainability's evaluation, an interactive workshop process using Councils nominated criteria priorities was undertaken. The workshop was facilitated by the Arup team and included the participants listed in **Table 2, Section 3**.

A presentation was provided on each suite of tools under the categories of residential, commercial and other. The presentation did not reveal the names of the tools, but provided a summary of the tools key characteristics against Council's nominated high priority criteria.

Following the presentation of tools each participant (individually) was asked to rank the suite of tools, for example from 1 (being most preferred) to 6 (least preferred) for the residential tools. Cards summarising each tool were provided to each participant and the preference number indicated in the top right corner.

All cards were collected and fixed to a display board in order of preference. The tool name was then revealed for each tool (eg. Tool 1 = BERS, Tool 2 = NatHERS, etc).

The outcomes of this interactive workshop are summarised at the bottom of **Table 15** overleaf. Discussion followed the prioritisation process and listed below are the key outcomes of the workshop:

- There is no tool or suite of tools immediately available that satisfies Council's priorities (refer **Table 1**, **Section 3**– Evaluation Criteria Breakdown) and overall needs (refer **Section 2.2** – Key Study Requirements).
- The following tools were identified for further evaluation in Phase 2 of the study:
- Residential Development: BASIX and the Sustainable Housing Code;
- Commercial Development: Green Star; and
- Other Development (eg: mixed use): SPeAR® and Melbourne Docklands ESD Guide.

Phase 2 of the study will involve an evaluation of the tools in the regulatory planning framework context. A number of Brisbane-based sustainable development proposals that have submitted applications to Council have been identified for review against the information requirements of the shortlisted tools.

Table 15: Evaluation Results

RESULTS OF ARUP TOOL PRIORITY EVALUATION

	Residential						Commercial			Other				
	TOOL 1 BERS	TOOL 2 NatHERS	TOOL 3 FirstRate	TOOL 4 AccuRate	TOOL 5 BASIX	TOOL 6 Sus Housing Code	TOOL 1 ABGR	TOOL 2 GreenStar	TOOL 3 LCADesign	TOOL 1 SPeAR	TOOL 2 LEED	TOOL 3 BREEAM	TOOL 4 THG EcoIndex	TOOL 5 Melb Dockl. ESD Guide
High Priority	11	10	9	10	12	8	11	12	10	16	11	11	14	16
Medium Priority	8	7	7	7	9	4	11	13	7	8	7	7	9	11
Low Priority	4	5	0	0	1	5	6	2	2	1	1	1	1	2
TOTAL	**23**	**22**	**16**	**17**	**22**	**17**	**28**	**27**	**19**	**25**	**19**	**19**	**24**	**29**

RESULTS OF WORKSHOP EVALUATION

	Residential						Commercial			Other				
	TOOL 1 BERS	TOOL 2 NatHERS	TOOL 3 FirstRate	TOOL 4 AccuRate	TOOL 5 BASIX	TOOL 6 Sus Housing Code	TOOL 1 ABGR	TOOL 2 GreenStar	TOOL 3 LCADesign	TOOL 1 SPeAR	TOOL 2 LEED	TOOL 3 BREEAM	TOOL 4 THG EcoIndex	TOOL 5 Melb Dockl. ESD Guide
Ranking Definition	**Number of Votes**						**Number of Votes**			**Number of Votes**				
Ranking # 1(best)				X	XXXX	XX	XX	XXXX	X	XXXX			X	XX
Ranking # 2	X		X		XX	XXX	XXX	XXX	X	X	X			XXXX
Ranking # 3		XX	XX	XXX			XX		XXXXX	X		X	XXXX	
Ranking # 4	XXXX		X	X							XX	XXX		X
Ranking # 5		XXX	X	X	X						XXX	XXX	X	
Ranking # 6 (worst)	X	X	XX			XX				X	X		X	
PREFERRED TOOL					●	●		●		●				●

Table 15: Evaluation Results (Cont)

HIGH PRIORITY CRITERIA

Evaluation Criteria	Sub Criteria	Question	Residential						Commercial			Other					
			TOOL 1 BERS	TOOL 2 NatHERS	TOOL 3 FirstRate	TOOL 4 AccuRate	TOOL 5 BASIX	TOOL 6 Sus Housing Code	TOOL 1 ABGR	TOOL 2 GreenStar	TOOL 3 LCADesign	TOOL 1 SPeAR	TOOL 2 LEED	TOOL 3 BREEAM	TOOL 4 THG EcoIndex	TOOL 5 Melb Dockl. ESD Guide	TOOL 6 NABERS
EC 1:Coverage Of The Tool For Sustainability Issues	Environmental Indicators	Tool covers environmental indicators	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	Social Indicators	Tool covers social indicators					●	●		●		●	●	●	●	●	●
	Economic Indicators	Tool covers economic indicators										●				●	
EC2: Précis Of Rating Tool	Single Value Rating/Guideline	Ouput is a rating	●	●	●	●	●		●	●	●		●	●	●	●	●
	Type of Tool	Full sustainability coverage										●				●	
EC3:Description Of Tool's Coverage	Type of Development	Full coverage of development (commercial, residential, other)										●	●	●		●	
	Focus within Development	Covers impacts/issues within AND outside the building					●	●		●	●	●	●	●	●	●	●
	Stage of Development Life	Covers new buildings	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	Stage of Development Process	Covers design, construction, operation										●			●	●	
	Type of users	Must be used by consultants/trained assessors only	●	●	●	●	●		●	●	●	●	●	●	●		●
	Application scope	The tool can be applied in Brisbane (no change required)	●	●		●		●	●	●	●	●			●		●
	Applicability to Brisbane	The tool can be adapted to Brisbane context easily					●									●	
EC4: Pros And Cons Of Using The Tool And It's Limitations	Data Collection	Easy data collection	●	●	●	●			●								
	Criteria Weightings	User can change criteria weightings															
	Mandatory Strategies	Tool offers range of strategies to meet target					●	●		●		●	●	●	●	●	
EC5: Benchmarking Against Best Practice	Best Practice Applicability to Brisbane	Tool uses Brisbane-specific definitions/ examples of best practice	●					●				●			●		
EC6: Ability Of The Tool To Verify / Quantify / Measure Sustainability Issues	Verification	Tool requires verification from a non-assessor/third party							●	●		●	●	●	●	●	
	Auditability	Easy for BCC internal staff to audit tool assessment (given training)	●	●	●	●	●	●	●		●	●			●	●	●
	Environmental Indicators	Environmental indicators >50% quantitative	●	●	●	●	●		●	●	●					●	●
EC7:Ability Of The Tool To Compare Between Developments	Tool Indicators	Comparison can be made between tool indicators for the same development type	●	●	●	●	●		●	●	●	●	●	●	●	●	●
	Final Rating/Score	Comparison can be made between final rating for the same development type	●	●	●	●	●		●	●	●	●	●	●	●	●	●
		TOTAL	11	10	9	10	12	8	11	12	10	16	11	11	14	16	10

Table 15: Evaluation Results (Cont)

MEDIUM PRIORITY CRITERIA			Residential						Commercial			Other					
Evaluation Criteria	Sub Criteria	Question	TOOL 1 BERS	TOOL 2 NatHERS	TOOL 3 FirstRate	TOOL 4 AccuRate	TOOL 5 BASIX	TOOL 6 Sus Housing Code	TOOL 1 ABGR	TOOL 2 GreenStar	TOOL 3 LCADesign	TOOL 1 SPeAR	TOOL 2 LEED	TOOL 3 BREEAM	TOOL 4 THG EcoIndex	TOOL 5 Melb Dockl. ESD Guide	TOOL 6 NABERS
EC2: Précis Of Rating Tool	Place of Origin	Developed in Australia	●	●	●	●	●	●	●	●	●	●			●	●	●
	Keystone Tool/Original	Tool is cross referenced with another tool	●		●	●				●						●	
EC4: Pros And Cons Of Using The Tool And It's Limitations	Tool Interface	Easy tool interface	●		●	●	●		●	●	●	●			●		●
	Intellectual Property	Creator of tool retains IP	●	●	●	●			●	●	●	●	●	●	●		
	Access to Tool	Tool is publicly available					●	●	●	●						●	●
EC5: Benchmarking Against Best Practice	Defining Best Practice	Best practice benchmarks are defined	●	●	●	●	●	●	●	●		●	●	●	●	●	●
	Delivering Best Practice	See above															
EC6: Ability Of The Tool To Verify / Quantify / Measure Sustainability	Economic Indicators	>50% economic indicators are quantitative														●	
	Social Indicators	>50% social indicators are quantitative					●			●						●	●
EC8: Ability For The Tool To Be Updated To Reflect Improvements In Best Practice	Continual Funding	Tool has continual funding	●		●	●	●	●	●	●	●	●	●	●	●	●	●
		Tool research is supported by on-going partnership								●					●	●	
	Regular Review	Tool is reviewed at least annually				●	●		●	●	●	●	●	●	●	●	
EC9: Degree Of Acceptance And Recognition By Development Industry Practitioners And Regulators Of Credibility And Reliability Of Tool	Australia	High degree of acceptance in Australia		●			●		●	●			●	●			
EC10: Current Usage Of The Tool In Australia	Australia	High level of use in Australia		●					●								
EC11: Proposed Changes To The Rating System	Proposed Changes	Changes are proposed to the tool (planning for improvements)	●	●					●	●	●	●	●	●	●	●	
EC12: Ease At Which Tool Can Be Communicated	Education and Marketing	Tool has been easily communicated to stakeholders and users	●		●		●		●	●	●	●	●	●	●	●	
		TOTAL	8	7	7	7	9	4	11	13	7	8	7	7	9	11	6

Table 15: Evaluation Results (Cont)

LOW PRIORITY CRITERIA																	
			Residential						Commercial			Other					
Evaluation Criteria	Sub Criteria	Question	TOOL 1 BERS	TOOL 2 NatHERS	TOOL 3 FirstRate	TOOL 4 AccuRate	TOOL 5 BASIX	TOOL 6 Sus Housing Code	TOOL 1 ABGR	TOOL 2 GreenStar	TOOL 3 LCADesign	TOOL 1 SPeAR	TOOL 2 LEED	TOOL 3 BREEAM	TOOL 4 THG EcoIndex	TOOL 5 Melb Dockl. ESD Guide	TOOL 6 NABERS
EC2: Precis of Rating Tool	Voluntary/Mandatory	Tool is used in a mandatory way elsewhere	●	●												●	
EC8: Ability For The Tool To Be Updated To Reflect Improvements In Best Practice	Stakeholder Engagement	High level of engagement with stakeholders in tool development and upgrades		●			●	●	●	●	●	●	●	●		●	
	Stakeholder Location	Stakeholders located in Queensland	●	●				●	●	●	●				●		
EC9: Degree Of Acceptance And Recognition By Development Industry Practitioners And Regulators Of Credibility And Reliability Of Tool	Brisbane	High degree of acceptance of tool in Brisbane	●	●				●	●								
	SEQ	High degree of acceptance of tool in SEQ		●				●	●								
	QLD	High degree of acceptance of tool in Qld						●	●								
EC10: Current Usage Of The Tool In Australia	Brisbane	High usage of tool in Brisbane	●						●								
	SEQ	High usage of tool in SEQ															
	QLD	High usage of tool in Qld															
		TOTAL	4	5	0	0	1	5	6	2	2	1	1	1	1	2	0

APPENDIX A
Other Guidelines/Codes

VOLUNTARY CODES/GUIDELINES - QUEENSLAND

SMART HOUSING - 2004

CREATOR

Created by seven Queensland government agencies including Department of Housing, Building Services Authority, Department of Emergency Services, Department of Families, Environment Protection Agency, Department of Health and Queensland Police Service.

FORMAT

Not an accredited program, but well recognised across Queensland. Other parts of program are Smart Housing Awards & Smart Housing display homes and project examples.

AIM

To help Queenslanders to plan and build homes that are more sustainable over time.

HISTORY OF DEVELOPMENT

Each agency contributes expertise, advice & feedback, promotes program and provides links to relevant organisations. "Smart Housing Library" on Queensland Department of Housing website gives access to a wide range of resources behind the Smart Housing elements eg: housing standards & policies, information for Smart Housing Professionals, background documents by government and industry specific to the Smart Housing elements.

DEVELOPMENT COVERAGE

Residential

USER

Designers, developers and builders. "Smart Housing Professionals" are builders & designers who have knowledge of elements and practised implementing elements into homes, but have not been trained/accredited (list of professionals on website). The Queensland Department of Housing does not endorse, recommend or guarantee the work of any of the professionals listed. Neither is it intended as a comprehensive list. The list is provided for those who may wish to enquire further about incorporating 'Smart Housing' elements into a house construction or renovation project. Other industry professionals may be equally able to work with the elements of Smart Housing. A GreenSmart builder may be able to assist in building a Smart House.

COVERAGE OF SUSTAINABILITY ISSUES

Social

- Safety
- Security
- Universal design
- Access

Environment

- Water

- Waste
- Energy

Economic

- Construction costs
- Running costs
- Living costs
- Maintenance costs

GUIDELINES TOWARDS A MORE SUSTAINABLE SUBDIVISION - 2003

CREATOR

Created by Federal Government Department of Public Works. Author is Ron Apelt from Built Environment Research Unit

FORMAT

Guidelines. Not a certified rating tool or process.

AIM

To provide practical guidelines to assist individuals to incorporate the principals of ESD (derived from National Strategy for ESD) into land developments.

HISTORY OF DEVELOPMENT

Created from over 150 references (websites, books, magazines, journals, conference proceedings etc)

DEVELOPMENT COVERAGE

Any land development involving buildings, but written with a residential subdivision in mind.

USER

Individuals

COVERAGE OF SUSTAINABILITY ISSUES

- Climatic Data and Design Process
- Subdivisional Design
- Building and Landscape Design
- Materials, Appliances

SUSTAINABLE URBAN DEVELOPMENT CRITERIA - 2003

CREATOR

Urban Development Institute of Australia Queensland Division (part of UDIA Sustainable Urban Development Program in conjunction with QLD EPA & BCC)

FORMAT

Set of guidelines which user should aim to meet but no mandatory targets or scores awarded.

AIM

Proposals should aim to satisfy as many of the selection criteria as possible

HISTORY OF DEVELOPMENT

Unknown

DEVELOPMENT COVERAGE

All urban development

USER

Produced for the information of UDIA members seeking to develop sustainable development projects

COVERAGE OF SUSTAINABILITY ISSUES

Environment

- Energy
- Water
- Land
- Waste
- Materials

Social

- Community Engagement
- Facilities & Services

Economic

- Community Contribution
- Viability

ENERGY EFFICIENT HOME DESIGN GUIDELINES - 2003

CREATOR

Queensland Environmental Protection Agency

FORMAT

Set of guidelines provides advice – not accredited/mandatory, no training

AIM

Provides advice on building or retrofitting a home to achieve year round comfort and reduce energy bills.

HISTORY OF DEVELOPMENT

Publication produced with assistance from Energy Authority NSW

DEVELOPMENT COVERAGE

Residential

USER

Builders, designers/architects

COVERAGE OF SUSTAINABILITY ISSUES

Energy Efficiency

- Location
- Orientation
- Layout
- Windows
- Insulation
- Materials
- Ventilation
- Landscape
- Heating
- Lighting

QUEENSLAND RESIDENTIAL DESIGN GUIDELINES - 1997

CREATOR

Department of Local Government & Planning with funding assistance from National Office of Local Government within Commonwealth Department of the Environment, Sport and Territories (ceased to exist in 1997).

FORMAT

Guidelines produced as part of program to implement Australian Model Code for Residential Development (AMCORD) – not accredited, no training.

AIM

To provide a document which is more practically suited to Queensland conditions than AMCORD – designed to promote a degree of consistency across local governments in their approach to residential development and to respond to market demands by promoting flexibility and taking a performance-based approach to development assessment.

HISTORY OF DEVELOMENT

Developed in collaboration with housing and industry associations

DEVELOPMENT COVERAGE

All residential (single detached, attached, integrated development, subdivision)

USER

Local government (intended to be referenced as a code under IPA)

COVERAGE OF SUSTAINABILITY ISSUES

Social

- Neighbourhood Design
- Public Open Space

- Access
- Character
- Streetscape

Environmental

- Drainage
- Water Quality
- Bushfire Protection
- Stormwater Harvesting

VOLUNTARY CODES/GUIDELINES - AUSTRALIA

GREENSMART PROGRAM - 2004

CREATOR

Housing Industry Association (sponsored by Lend Lease, funding from AGO and DEH)

FORMAT

Program offers Training and Accreditation for homebuilders in all Australian states. Consumers using accredited "GreenSmart Professionals" are applicable for the GreenSmart Home Loan with Macquarie Bank which allows for cheaper mortgages. Other parts of the program are the GreenSmart Awards & GreenSmart Village (display homes and actual homes).

AIM

Industry-driven initiative that aims to encourage a mainstream application of sustainable development principles to today's housing

HISTORY OF DEVELOMENT

Uses and recommends AGO Your Home Technical Manual. GreenSmart Training & Accreditation Course based on HIA's PATHE (Partnership Advancing the Housing Industry) guides for waste management, energy management, stormwater management and insulation for different regional climates – these were developed in partnership with government and industry bodies

DEVELOPMENT COVERAGE

Residential

USER

Builders, designers, product manufacturers, consumers

COVERAGE OF SUSTAINABILITY ISSUES

Environment

- Energy
- Water
- Waste
- Construction
- Site Management

BDP ENVIRONMENT DESIGN GUIDE - 2004

CREATOR

Australian Council of Building Design Professionals, published by Royal Australian Institute of Architects

FORMAT

Not a guideline/tool, rather a publication.

AIM

Quarterly subscription service (journal) on environmental design providing a source of cross-disciplinary environmental design information

HISTORY OF DEVELOPMENT

Each note within the guide is authored by a professional in the field and is reviewed by practitioners and experts to ensure accuracy and accessibility. Case studies are also included in the guide which displays best practice in environmental design

DEVELOPMENT COVERAGE

All

USER

Architects, engineers, landscape architects, planners and quantity surveyors, local government and educational bodies

COVERAGE OF SUSTAINABILITY ISSUES

Covers a broad range of relevant environmental issues and design solutions.

Your Home Technical Manual & Factsheets -2003

CREATOR

Australian Greenhouse Office

FORMAT

Set of guidelines - not mandatory or accredited

AIM

Suite of consumer and technical guide materials and tools developed to encourage the design, construction or renovation of homes to be comfortable, healthy and more environmentally sustainable

HISTORY OF DEVELOPMENT

Very extensive coverage of hundreds of references from government, industry, associations, academia, legislation, websites, codes, guidelines etc

DEVELOPMENT COVERAGE

Residential

USER

Consumer, designer/architect, builder, manufacturer. Consumer guide provides information to help the individual get started, technical manual contains specific information and practical solutions.

COVERAGE OF SUSTAINABILITY ISSUES

Environment & Social

- Passive Design
- Water Use
- Materials Used
- Energy Use

- Site Issues
- Other Issues – Communities, Transport, Health & Safety, Adaptability

AUSTRALIA'S GUIDE TO GOOD RESIDENTIAL DESIGN - 1997

CREATOR

Royal Melbourne Institute of Technology, Faculty of the Constructed Environment (assistance from Energy Victoria, REIA, Builders, Architects, Moreland City Council, Building Designers Association, National Office of Local Government)

FORMAT

Set of guidelines, no training/accreditation.

AIM

To assist individuals, community and Australia in understanding important principles underlying good design, both in how we build and the way we use our land.

HISTORY OF DEVELOPMENT

Explains principles of good design developed in Australian Model Code for Residential Development (AMCORD)

DEVELOPMENT COVERAGE

Residential

USER

Individuals, builders, designers

COVERAGE OF SUSTAINABILITY ISSUES

Environmental & Social

- Good Design
- Single House
- Multi-Unit Housing
- Energy
- Safety
- Urban Design