

Attachment 1: Unconfirmed minutes of the Sustainability Advisory Committee Meeting, 16 June 2005.

CITY OF JOONDALUP

Minutes of meeting of the **SUSTAINABILITY ADVISORY COMMITTEE** held in Conference Room 2, Joondalup Civic Centre, Boas Avenue, Joondalup on **THURSDAY 16 JUNE 2005.**

ATTENDANCE

Committee Members:

<i>Ms Marilyn Horgan</i>	Chairperson
<i>Mr Steve Magyar</i>	Deputy Chairperson
<i>Mr Michael Anderson</i>	Community Representative
<i>Mr Kieron D'Arcy</i>	Community Representative
<i>Mr. Michael Anderson</i>	Community Representative
<i>Prof Sherry Sagers</i>	Community Representative
<i>Mr David Wake</i>	Community Representative

Officers:

Manager, Strategic and Sustainable Development	R HARDY
Team Leader, Sustainable Development	S EVANS
Sustainable Development Officer	B REAY

APOLOGIES

<i>Mr Geoff Down</i>	Community Representative
<i>Mr Will Carstairs</i>	Community Representative
<i>Mr Vincent Cusack</i>	Community Representative
<i>Prof Adrienne Kinnear</i>	Edith Cowan University Representative
<i>Mr Martin Brueckner</i>	Community Representative

GUESTS

Ms Marilyn Zakrevsky	Conservation Advisory Committee representative.
Mr Ralph Henderson	Conservation Advisory Committee representative.

The Chairperson declared the meeting open at 1740 hrs.

DECLARATIONS OF FINANCIAL INTEREST/INTEREST THAT MAY AFFECT IMPARIALITY

Nil

CONFIRMATION OF MINUTES

MINUTES OF THE SUSTAINABILITY ADVISORY COMMITTEE MEETING HELD ON 5 MAY 2005

MOVED Mr Wake SECONDED Mr Magyar that the Minutes of the Sustainability Advisory Committee meeting held on 5 May 2005 be confirmed as a true and accurate record of proceedings.

The Motion was Put and

CARRIED

ONGOING BUSINESS ITEMS FROM PREVIOUS MEETINGS

Nil

ITEMS OF BUSINESS

ITEM 1 PRESENTATION OF THE DRAFT STATE OF ENVIRONMENT REPORTING TEMPLATE FROM THE SWAN CATCHMENT COUNCIL [00906]

WARD – All

PURPOSE

To report on and seek comment on the draft State of the Environment (SOE) reporting template being developed for Local Government.

EXECUTIVE SUMMARY

The Swan Catchment Council is currently developing a SOE template for Local Government. The template provides consistency in environmental reporting for Local Governments throughout the Swan Region and links with the reporting requirements of the State Government and the Swan Natural Resource Management (NRM) Strategy.

The requirement to develop a framework for SOE reporting is a high priority action identified in the Sustainability Advisory Committee work plan and the Committee has agreed that a representative from the Swan Catchment Council to give a presentation on the draft SOE reporting template.

DETAILS

The Sustainability Advisory Committee endorsed a Strategic Work Plan in 2004. The Work Plan identified high priority actions including the development of a framework to report against the current state of the environment (Strategy 3.1).

Specific tasks were developed within this strategy including the investigation and research into SOE reporting for the input of the committee in this process.

The Swan Catchment Council is currently developing a SOE template for Local Government (Attachment 1). The template links with reporting requirements of the State Government and the Swan Region Natural Resource Management (NRM) Strategy. At the Sustainability Advisory Committee meeting held on 5 May 2005 it was agreed that a representative from the Council would give a presentation to the Committee on the draft SOE reporting template.

The Swan Catchment Council is a community based regional group involved in the coordination and delivery of natural resource management activities in the Swan region. It addresses community needs by working closely with government and its agencies, Local Government, industry, community and catchment groups to promote collaboration on key environmental issues.

The Swan Region NRM Strategy was compiled by the Swan Catchment Council in 2004, and presents a 50-year action plan for a coordinated approach to NRM. The Strategy aims to ensure that the natural resources of the Swan Region will be protected and managed sustainably for the enhancement of the quality of life for present and future generations. The Swan Region Strategy was developed using the Pressure-State-Response model, which provides consistency with the accepted SOE Reporting format.

The Strategy, and its Investment Plan, will provide direction for future investment in NRM by the Australian Government, the Western Australian State Government and the regional community.

As part of the consultation process, a Local Government Forum was held by the Swan Catchment Council in December 2003 to further engage Local Government in the development of the Strategy. A workshop followed the formal part of the forum, at which Local Governments were encouraged to network and identify NRM partnership projects within the Region.

One of the outcomes of the workshop was an identified need by the Local Governments to have consistent templates for voluntary environmental reporting structures, eg. Local Environment Strategies, State of the Environment Reporting.

The Sustainability Advisory Committee can provide significant professional comment on the draft template for SOE reporting.

ATTACHMENTS

- Attachment 1: Draft State of the Environment template.
- Attachment 2: Regional framework for State of the Environment Reporting.
- Attachment 3: Summary of consultation process for the draft State of the Environment Report.
- Attachment 4: Local Government NRM Activity Maps: State of the Environment Report.

VOTING REQUIREMENTS

Simple Majority

OFFICERS RECOMMENDATION

That the Sustainability Advisory Committee:

1. **NOTE** the presentation and report on the draft State of the Environment reporting template;
2. **COMMENT** on the draft State of the Environment reporting template.

A representative of the Swan Catchment Council presented the Committee with the draft SOE reporting template. A background was presented to the Committee outlining what the Swan Catchment Council is and its role in the development of the Swan Region NRM Strategy. An overview was also provided on the draft SOE template and its

alignment with the NRM Strategy, the State Government SOE reporting and the Federal Government objectives.

Discussion ensued. The Committee raised concerns that the City of Joondalup needs to be using specific indicators to assess the SOE promptly. The Committee also requested clarification as to how SOE may merge or align with other strategic documents within the City. The Committee was informed that the City of Joondalup's Strategic Plan 2003 – 2008 will be reviewed shortly and that any pre-determination of what that review will determine would be premature.

The Committee agreed that SOE reporting is an important process that should be considered and that a regular review and monitoring process is necessary.

The draft SOE reporting template enables flexibility to report against natural resources relevant to each local government whilst aligning with regional objectives and the strategic direction of the state and federal government. The Swan Catchment Council representative emphasised, that funding for natural resource management would be directed towards regional projects that align strongly with the Swan Regional Strategy. This is best done through a SOE reporting framework utilising the draft template.

The Conservation Advisory Committee representative, Mr Henderson leaves the meeting at 1820 hrs.

The Committee queried several terms within the SOE template to gain an understanding of the intended context. In particular it was questioned why the term biodiversity is separated into terrestrial (land) and aquatic (ocean and marine). The Swan Catchment Council representative explained that the biodiversity was so significantly different that they were separated for management purposes. Members of the Committee commented that this was seen as unnecessary. The Swan Catchment Council representative noted these comments informally.

The Committee agreed that further consideration for SOE reporting at the City of Joondalup should occur on the most appropriate way to progress SOE reporting within the City of Joondalup. Initially the recommendation(s) were as follows:

RECOMMENDATION

MOVED Mr Magyar SECONDED Ms Goeft that the Sustainability Advisory Committee REQUESTS the Chief Executive Officer ENSURES that sufficient work will be undertaken on the State of Environment reporting, such that it can inform the review of the City of Joondalup's Strategic Planning processes.

MOVED Mr Magyar SECONDED Prof Saggars that the Sustainability Advisory Committee:

- a. THANK the Swan Catchment Council for its work on the State of the Environment template; and**
- b. REQUEST Council to ENDORSE the City's further involvement with State of the Environment Reporting.**

With the approval of the MOVER and SECONDER it was requested that the words “REQUEST Council” be added at the beginning of point (b).

The Motion was Put and

CARRIED

GENERAL BUSINESS

The Committee discussed minor issues including:

1. Tabled Article – ‘Brace yourself for the end of cheap oil’

An article from the New Scientist Magazine (2 August 2003) detailing the likelihood of a peaking in oil production and the associated implications for society was tabled – Attachment 5 refers.

2. Report – *Balancing Act*, A triple bottom line analysis of the Australian Economy.

The Committee was informed of a report jointly authored by the University of Sydney and the CSIRO entitled *Balancing Act*, A triple bottom line analysis of the Australian Economy.

3. Australian Story – Of droughts and flooding rains.

The Committee was informed of the recent television show ‘Australian Story’ that dealt with the restoration of streams and wetlands to the way they were before European settlement.

Other minor issues that were discussed included the recycling of corks and mobile phones and the information contained on the City’s website.

DATE OF NEXT MEETING

The next meeting of the Sustainability Advisory Committee will be held in Conference Room 3, Joondalup Civic Centre, Boas Avenue, Joondalup on Thursday 28 July 2005 at 1730 hrs.

CLOSURE

There being no further business, the Chairperson declared the meeting closed at 1915 hrs.

Attachment 1: Draft State of the Environment template.

Environmental reporting templates for Local Governments within the Swan Region

STATE OF THE ENVIRONMENT REPORTING

A suggested template for the compilation of voluntary State of the Environment Reports



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Swan Catchment Council Environmental Reporting Templates

VOLUNTARY STATE OF THE ENVIRONMENT REPORTING

Contents

- 1. Background**
- 2. Local Government State of the Environment Reporting**
- 3. Why is the Swan Catchment Council involved in developing a Local Government State of the Environment Report?**
- 4. Linking the Swan Region Strategy to Local Government State of the Environment reporting**
- 5. How to use this template**
- 6. Further information**
- 7. State of the Environment Templates**
 - Land
 - Water
 - Biodiversity (Terrestrial)
 - Coastal – Marine
 - Air
 - Cultural Heritage
 - Regional Capacity

Appendix I Local Government Case Studies

Appendix II Briefing Note for State of Environment Reporting

Appendix III Legislation, policies and plans relating to Local Government Natural Resource Management

Appendix IV Swan Region Strategy Output Measures

1. Background

An assessment of the current state of the environment provides a commonly used a method of environmental reporting and planning. State of the Environment reports provide the basis for the measurement of progress in natural resource management (NRM) by using a number of reliable indicators to assess the baseline condition of the environment. In this way, a summary of the current environmental condition of our natural resources is compiled, identifying issues and investigating the management options for those issues.

The framework for State of the Environment reporting is usually represented in the “Pressure – State – Response” model, developed at the international level by the Organisations for Economic Cooperation and Development (OECD). It is this model that is used by both the Australian and State Governments in compiling their State of the Environment reports.

The latest Western Australian State of Environment Report was compiled by the Department of Environmental Protection in 1998. This is currently being updated for completion in 2006, in conjunction with the update of the Australian Government State of the Environment Report. Information gathering is occurring, and Local Governments have been invited to contribute to this process. [check with Brad Jakowyna – DEP]

2. Local Government State of the Environment reporting

In Western Australia, Local Government State of the Environment reporting is not mandatory, however many of the Local Governments are recognising the value of this reporting tool. Within the Swan Region, approximately 20% of the Local Governments have voluntarily compiled a State of the Environment report. These format of these reports range widely, from a desktop study of existing corporate reports, to a process of extensive community consultation and local issues identification.

Advantages to Local Governments voluntarily compiling a local State of the Environment report includes:

- provides a summary of the current condition and pressures on natural resources in a local environment.
- provides a baseline for Local Governments to progress with target setting for the desired condition of their local area.
- provides a record of current NRM activities undertaken by Local Governments, industry and the community in their local area
- environmental reporting format is consistent with national, state and regional reporting.

Appendix I includes three examples of Local Government State of Environment reports currently being undertaken or recently completed in the Swan Region. The style of these reports varies greatly, and includes:

- City of Armadale – The initial State of the Environment Report was compiled in [per Ron Van Delft]
- City of Swan – [per Trina Anderson]
- Shire of Mundaring – [per Lesley Thomas]

3. Why is the Swan Catchment Council involved in developing a Local Government State of the Environment Report?

The Swan Catchment Council recognises Local Government as one of the most important stakeholders in natural resource management within the Swan Region. Representatives were widely consulted and contributed greatly to the development of the *Swan Region Strategy for Natural Resource Management (2004)*.

Two major environmental reporting gaps have been identified by Local Government within the Swan Region:

1. A lack of clarity on the relationship between local level natural resource management activities conducted by Local Governments, and the regional targets within the *Swan Region Strategy*, and
2. A lack of consistent environmental reporting structures that can be used by Local Government throughout the Region.

Local Governments in the Swan Region are strongly encouraged to link their local level natural resource management activities to the regional activities detailed in the *Swan Region Strategy for Natural Resource Management (2004)*.

Advantages to the Local Governments includes:

- Access to regional partnership and funding opportunities
- Support from the Swan Catchment Council for regional-based natural resource management activities
- Opportunity to guide the decision making in the regional investment plan
- Access to regional partnerships and funding opportunities
- Time and cost saving by linking Local Government activities across the Swan Region
- Access to support from the Swan Catchment Council regional structure

The Swan Catchment Council has released this State of the Environment reporting template, developed in consultation with the City of Armadale, Shire of Mundaring, City of Swan, Eastern Metropolitan Regional Council, and the Environmental Protection Authority. The process is supported by the Western Australian Local Government Association [*check ALL*].

A discussion paper in Appendix II provides background details for the Local Governments considering compiling voluntary State of the Environment Report. [*SCC Briefing Note*] The Swan Catchment Council State of Environment Reporting Template, read in conjunction with the *Swan Region Strategy for Natural Resource Management*, or the Summary Document, provides the basis for a Local Government to build their local based State of the Environment Report.

This is the first of a number of templates to be developed by the Swan Catchment Council to assist Local Governments to link their voluntary environmental reporting to the Swan Region Strategy for Natural Resource Management. Other proposed templates include local environment strategies and inventories of current Local Government natural resource management activities.

4. Linking the Swan Region Strategy to Local Government State of the Environment reporting

The Local Government State of the Environment reporting template is closely linked to the *Swan Region Strategy for Natural Resource Management* (the Strategy) and its Summary report.

The Strategy was compiled using the Pressure – State – Response model, which enables the Swan Catchment Council to focus on addressing the causes of the environmental pressures in the Region rather than the symptoms. It provides a foundation for consistency with both an environment management systems approach and an Australian and State Government approach to State of the Environment reporting.

This template provides Local Governments with the opportunity to link their local level planning and activities with the regional natural resource management targets and actions detailed within the Strategy, in a clear and concise manner. This information is presented regionally, and enables the Local Governments to identify those issues of relevance to their local area, and the actions being taken locally to address those issues.

The model is applied to the following natural resources:

- Land
- Water
- Biodiversity
- Coastal and Marine
- Air
- Cultural Heritage
- Regional Capacity

The common pressures across all assets are identified as threatening processes, and relate to the Fundamental Pressures of a State of the Environment Report:

Fundamental Pressures in the Swan Region

- Population growth and urbanisation
- Limited knowledge and awareness
- Incompatible planning and development
- Unsustainable resource use and inappropriate management

5. How to use this template

The Swan Catchment Council State of the Environment reporting template can be used by Local Governments in the Swan Region as a framework under which their local State of the Environment report can be developed. The template must be read in conjunction with the *Swan Region Strategy for Natural Resource Management (2004)*, or its Summary Document.

While recognising that many environmental issues are of a regional scope, there are also local natural resource management issues that can be unique to the Local Government. One example is the protection of Threatened Ecological Communities specific to a Local Government area. This

template allows for local level actions (current and proposed) to be identified against regional actions.

The template lists the regional assets identified in the Strategy, current pressures on those assets, and the management action targets to address those pressures. The Local Government can then link these pressures and actions to their local natural resource management activities.

The Strategy determined a number of indicators for measuring the state of the environment, based on the Australian Government reporting framework for the Natural Heritage Trust and National Action Plan for Salinity and Water Quality. These indicators can be used as the basis for the Local Government measurement of local baseline environmental condition.

The roles and responsibilities of Local Governments form an important component of the State of the Environment Report. Local Government is subject to an increasing number of statutory responsibilities for environmental issues, within both State and Federal legislation. In addition, there are regional planning processes and local community expectations on Local Governments to manage and protect the environment.

Appendix III provides a summary of the international, national, state and regional policies and plans that may have implications on Local Government NRM activities within the Swan Region.

[Provide example of using table?]

6. Further information

You can download this template from the Swan Catchment Council website as a Microsoft Word document.

Supporting publications:

- Swan Region Strategy for Natural Resource Management, December 2004
- Swan Region Strategy for Natural Resource management, Summary, December 2004
- Swan Region Strategy for Natural Resource Management, Analysis of Public Submissions, December 2004
- Swan Region Strategy for Natural Resource Management, Investment Plan, (In Prep.)

For more information contact the Swan Catchment Council Local Government NRM Liaison Officer.

7. State of the Environment templates – Swan Region [to be completed]

ASSET	REGIONAL PRESSURE	¹ SWAN REGION STRATEGY RESPONSE	LOCAL PRESSURE (list sites if relevant issue)	LOCAL TARGET	CURRENT RESPONSE	PROPOSED RESPONSE	² LOCAL INDICATORS
Land	Salinisation	<ul style="list-style-type: none"> • LM 1.1 • LM 1.2 • LM 1.3 					
	Contamination	<ul style="list-style-type: none"> • LM 2.3 • LM 2.4 					
	Erosion and sedimentation	<ul style="list-style-type: none"> • LM 2.1 • LM 2.2 • LM 2.3 					
	Soil acidification						
	Waterlogging						
	Acid Sulfate Soils						
Water	Salinisation of Inland Waters						
ETC...							

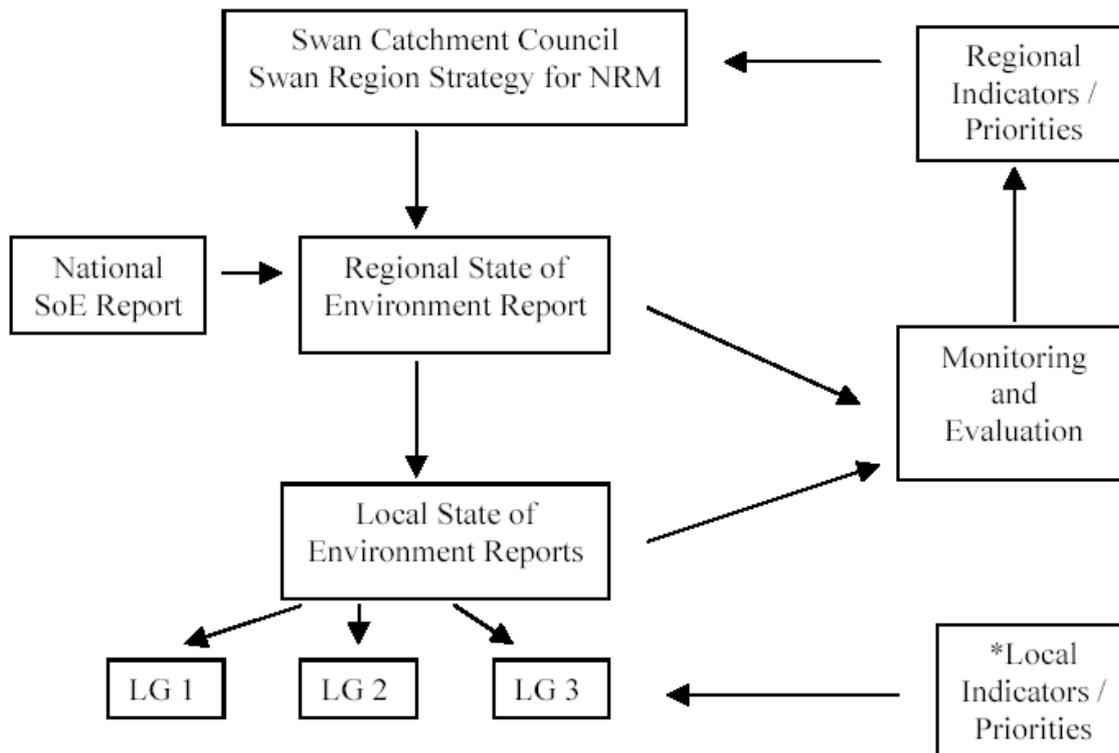
Attachment 2: Regional framework for State of Environment Reporting

Swan Catchment Council

Regional State of Environment Reporting

Local Government NRM Coordinator

June 2004



*linked to Regional Indicators and Priorities

PROCESS

Swan Region Strategy (SRS) is based on the State of Environment Reporting format Pressure – State – Response model, with regional indicators and priorities

The regional SoE is compiled from the SRS, and using the regional indicators, provides a regional monitoring and evaluation framework

The local government authorities compile local level SoE reports, using local indicators and priorities. These are linked to the regional indicators and priorities.

Monitoring and evaluation is conducted by the local governments. This can be fed through the regional M&E framework. This framework will provide regional reporting mechanisms for the Swan Region.

Attachment 3: Summary of consultation process for the draft State of the Environment Report
Swan Catchment Council

Local Government State of Environment Report

Local Government NRM Coordinator

June 2004

Local Government Engagement Process

- **December 2003** - Workshop coordinated by Swan Catchment Council (SCC) for local government authorities in Swan Region to identify shared NRM projects and potential partnerships.

Participating local governments identified a need for a consistent reporting format for NRM reporting, e.g. Local Government State of Environment reports, Local Environment Strategies

Response

- Local Government NRM Coordinator to identify opportunities to develop consistent NRM reporting formats for Local Government

- **March 2004** – Initial discussions with WALGA re developing a regional State of Environment (SoE) with application as a template for local government reporting. The Swan Region Strategy has been compiled using the SoE pressure – state – response model. The Swan Region pilot SoE will have statewide application for other regions and local governments.

Response

- partnership formed with WALGA

- **May 2004** - Approaches from several local governments at various stages of developing local level SoE – see Table 1

Response

- Interest expressed from local governments to use template and regional priorities and indicators in local level reporting structure.

- **June 2004** - Briefing Note regarding the Regional State of Environment report was submitted to Swan Catchment Council (SCC) meeting for information.

Response

- SCC support for the project.

- **December 2004** – Draft template developed and circulated for peer review to five local governments, WALGA, one regional council and Department of Environmental Protection State SoE team

Response

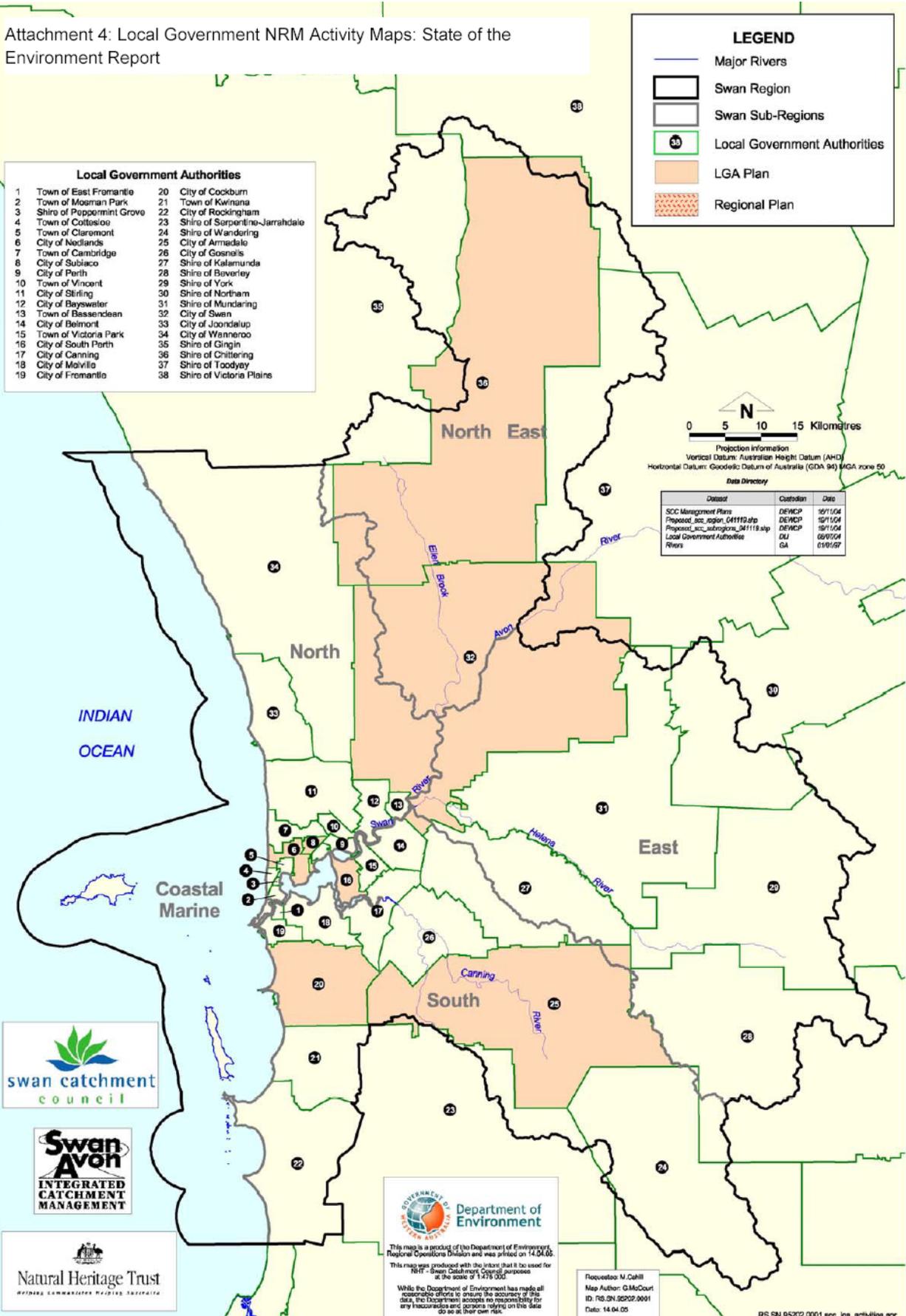
- Comments returned from one local government, one regional council and DEP

- **February 2005** – update on progress provided to SCC for information
- **May 2005** – Second draft template, including amendments, circulated. Meeting with Armadale, EMRC, DEP. City of Joondalup expressed interest in process

Response

- template to be updated, then circulated wider for peer review
 - presentation to City of Joondalup Sustainable Advisory Committee scheduled

Attachment 4: Local Government NRM Activity Maps: State of the Environment Report





Is the rate at which we can produce oil about to peak?

Brace yourself for the end of cheap oil

BOB HOLMES AND NICOLA JONES

A MOMENT of truth is fast approaching – perhaps sooner than we can prepare for it. “The world faces at best a global recession. At worst, war, famine and mass migration,” says Richard Hardman, trustee of the London-based Oil Depletion Analysis Centre and a former president of the UK Geological Society. He is talking about the day we no longer have enough oil to meet energy needs. The result is likely to be skyrocketing fuel prices and economic chaos – far worse than the worldwide recession caused by the oil shocks of the 1970s.

But this crisis isn’t centuries away. The crunch point comes not when we have run all the oil wells dry, but when demand outstrips production. And a growing number of experts are warning that this is likely to happen within the next few years. “There is a growing consensus that we are heading for an imminent peak [in oil production], if not already past it,” Hardman says.

In previous crises, new reserves always seem to have been found to make up the shortfall. But the declining rate at which new fields are being discovered suggests it won’t happen this time, at least not for conventional oil (see Graphic, page 10). We now find just one barrel of oil for every four we consume. And with production already declining in the US and the North Sea, the world must rely increasingly on the politically volatile Middle East and other parts of the developing world (see Graphic).

So how long have we got? To estimate when the world will run short of oil, you need to know how much oil there is overall. In principle, this should be easy to calculate: geologists know which kinds of rock are likely to hold oil and they know where these reservoirs are and how big they are. “They know all the regions where it’s possible to find oil by now,” says Kjell Aleklett, physicist at Uppsala University, Sweden, and

president of the Association for the Study of Peak Oil & Gas. “There are no new regions to be found.”

Oil companies keep detailed information about individual basins secret, but most of the educated guesses made over the past few decades fall close to the same estimate: the world’s oil reserves began with a total of about 2 trillion barrels (see Graphic) of which some 900 billion have now been used.

The 1.1 trillion barrels that remain represent about a 40-year supply at current consumption levels of about 25 billion barrels per year. At first glance this seems a comfortable cushion, but don’t be fooled – we won’t get the chance to use it all at anything like our present rate. The flow rate from any single oil well begins to decline as soon as production starts, because the pressure in the reservoir drops. Companies can maintain the flow for a while by injecting water to boost the pressure, but the flow inevitably dwindles and the last of the oil must be wrung out.

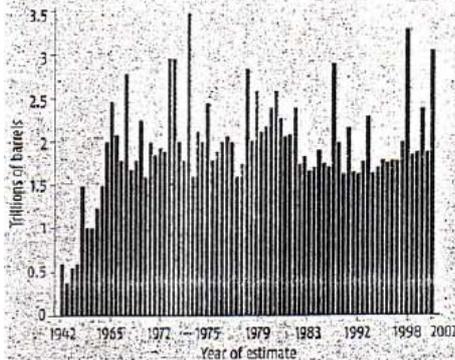
Good half of the pie

This means that the rate of production follows roughly a bell-shaped curve. The peak, whether from a single basin, a region, or the entire world, comes when about half the oil has been extracted – once most of the wells are in and before they taper off too much. After that, the rate falls inexorably. “It’s not that you’ve eaten half the pie; you’ve eaten the good half of the pie,” says Ali Samsam Bakhtiari, an expert with the National Iranian Oil Company. If production rates fall while demand continues to rise, oil prices are likely to spike or fluctuate wildly, raising the prospect of economic chaos, problems with transporting food and other supplies, and even war as countries fight over what little oil is available. “That’s when all hell breaks loose,” says James MacKenzie, an energy analyst at the World Resources Institute in Washington DC. ▶

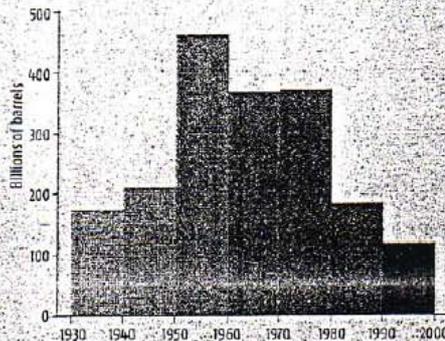
Energy special Oil

AN IMMINENT CRISIS

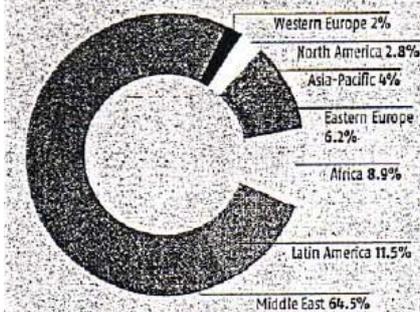
MOST ESTIMATES OF THE WORLD'S INITIAL OIL RESERVES FALL CLOSE TO 2 TRILLION BARRELS THIS HAS NOT CHANGED SINCE THE 1960s



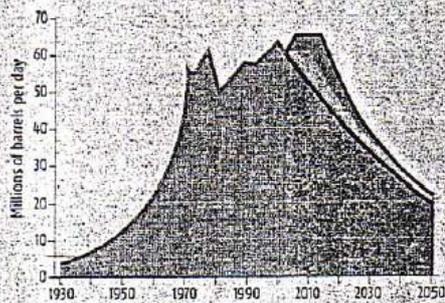
OIL DISCOVERIES HAVE BEEN DECLINING SINCE THE 1960s



**CONVENTIONAL OIL RESERVES 2003
WE ARE MORE DEPENDENT THAN EVER ON THE MIDDLE EAST FOR OIL**



**THE RICHEST YEARS OF OIL PRODUCTION MAY BE BEHIND US
THIS CHART SHOWS GEOLOGIST COLIN CAMPBELL'S ESTIMATE
WORLD OIL PRODUCTION — WORST — MEAN — BEST-CASE SCENARIOS**



If the general consensus of a 2-trillion barrel reserve is correct, the world has almost finished the good half of the pie and this day of reckoning is not far off. Indeed, many prominent analysts, including McKelvey, foresee oil production peaking in the next 5 to 15 years, far too short a time to find alternative fuels, especially for transportation, and barely long enough to bring effective conservation measures into play.

Some believe the peak is already here. "I am 99 per cent confident that 2004 will be the top of the mathematically smoothed curve of oil production," says Kenneth Deffeyes, a geophysicist at Princeton University. And he believes his highest single year may already have passed. "2000 may stand as a blip above the curve and be in the Guinness Book of World Records." Other leading analysts, including Colin Campbell, founder of the Association for the Study of Peak Oil & Gas, have reached the same conclusion

WHY OIL IS KING

We use energy for three main things: electricity production, heating and transport. For the first two, we have options such as solar and wind power, or natural gas. But oil is still the world's number one dependency, and for transport at least, there is currently no viable alternative. "If we took a blank piece of paper and tried to design the perfect car fuel, within 20 minutes we'd come up with petrol," says David Cope, director of the UK's Parliamentary Office of Science and Technology. "To find an alternative we are going to have to make horrible compromises." Our addiction is set to get

worse as developing countries become more industrialised. In China, domestic energy use at the moment is equivalent to just one light bulb burning continuously per person. That demand is expected to increase exponentially over the next few years, and it's not just in China. Central America, India and pretty much all developing regions, except Africa, are catching up fast.

Increasing energy efficiency must be a priority. But while energy is being used more efficiently in the developed world, demand, stoked by the west's bigger-is-better culture, stubbornly refuses to decline.

(see Graphic). These analysts use variations of a method pioneered by geophysicist Marion King Hubbert, now something of a folk hero for correctly predicting in 1956 the US production peak in the 1970s, despite widespread dismissal of the idea at the time.

Not even the optimists believe we have much more than 20 years to prepare for the peak, if demand grows at its historical norm of 2 per cent per year. In a recent analysis, the United States Geological Survey (USGS) controversially estimated the world's extractable oil at more than 3 trillion barrels. Based on that figure, the US Department of Energy calculates that oil production may not peak until 2037.

As well as predicting the discovery of new fields, USGS analysts tracked changes in estimated reserves for 33,000 known fields and found that they crept upwards over time, either because earlier estimates were too conservative or because technological improvements allowed the companies to extract more oil. Applying this reasoning worldwide, they forecast that known fields should yield 612 billion barrels beyond current expectations.

But will new technology wring enough oil out of existing fields to maintain production rates? "I don't buy it," says David Pursell, an energy analyst with Simmons & Company International, an investment banking firm in Houston, Texas, that specialises in the energy sector. "You've got to spend a ton of capital to get an extra 1 or 2 per cent out."

Others who favour later dates, such as Shell and Exxon, include less accessible, dirtier sources such as heavy oil. But using these sources would release even more carbon dioxide into the atmosphere than conventional oil, a price that many feel is too high (see page 11). "The most important problem we face with oil is not its availability but its carbon," says MacKenzie. "We have to move away from fossil fuels if we are to deal with the climate issue."

Whatever the exact timing of the peak, we still need to find a new source of energy. "In the end there's no way to know who's right, but it doesn't matter," says Jeremy Rifkin of the Foundation on Economic Trends in Washington DC. "We're only arguing about 20 years. If we think oil is a problem now, just wait 20 years. It'll be a nightmare." ●