

A Sustainability Enhancement Framework for the Dundee Central Waterfront Development

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The paper presents ongoing research to develop a Sustainability Enhancement Framework for the major Dundee Central Waterfront urban re-development project. The enhancement concept recognises a need to ensure that sustainability is considered in decision making at all stages of major projects to ensure a more sustainable outcome overall. The paper will describe a set of procedures, developed by the authors and drawn from IT and knowledge management fields, to ensure the effective incorporation of the sustainability throughout the Waterfront Project decision making processes. The procedures include the production of Information Flow Diagrams to identify the wide range of stakeholders involved in the project and their means of interaction and Decision Flow Maps to identify and categorise the use of the information by the stakeholders. The paper will review current sustainability indicators related to infrastructure provision in the UK and Europe, emerging indicators from Scottish Executive, EU commission and research groups and will present a set of indicators suitable for enhancing the sustainability of the Waterfront Project. Two related sets of Indicators are proposed - Strategic 'Sustainable Development Benchmark Indicators' to monitor the overall sustainability of Waterfront Development as it progresses and 'Project level Indicators' to help make each decision within individual projects relatively more sustainable. Conclusions are drawn on the appropriateness of the indicators for assessing sustainable infrastructure provision and on the success of implementing the Sustainability Enhancement Framework

Key Words: Knowledge management, stakeholder participation, sustainability metrics and indicators

1 INTRODUCTION

The scale and importance of the Dundee Central Waterfront Development requires adherence to the principles of sustainable development and this must be demonstrated to the Scottish Executive, European funding bodies, private investors and the public. Sustainable development assessment provides a mechanism for the transparent inclusion in the decision making process of all the facets of a development through its use of diverse social, economic and environmental indicators. Currently, whilst there is a considerable body of research into sustainability assessment, there are no standard methodologies for its application to major regeneration projects.

The 30yr multi-million Dundee Central Waterfront Development to re-integrate the central waterfront with the city centre provides a unique opportunity not only to demonstrate the application of the principles of sustainable development, but also to develop and promote a methodology for wider use. The Central Waterfront development is an example of a major urban development project where typically strategic decisions are made early in the project, in this case in the form the Dundee Central Waterfront conceptual masterplan (Dundee City council, 2001). Whilst the master plan provides the basic direction for the sustainability of the development, the waterfront development itself will comprise of a number of sub project over the life of the development.

Decisions taken at various levels; outline design; option appraisal; detailed design, will influence the overall sustainability of the whole development. Therefore, an approach was developed which recognised that, in addition to monitoring overall sustainability of a large scale regeneration development, there was a requirement to develop a mechanism for ensuring that each sub project was undertaken in the most sustainable way.

This paper reports the findings of a scoping study which aimed to identify stakeholders involved in Dundee Central Waterfront Development, demonstrate how they interact, to review current sustainability indicators in the UK and Europe related to infrastructure and to identify emerging indicators from Scottish Executive, EU Commission and research groups. From these activities a list of indicators suitable for monitoring the sustainability of Dundee Central Waterfront was developed. Consequently, the scoping study provided the basis for the development of a procedure, which puts sustainable development theory into practice. The sustainable enhancement procedure identified ways to use sustainable development indicators to drive decision processes in the Waterfront Development in the most sustainable way. It will also provide a monitoring tool for demonstrating the sustainable development of the Dundee Central Waterfront.

2 SUSTAINABLE DEVELOPMENT

Sustainable development is a vision of progress, which integrates immediate and longer term needs, local and global needs, and regards society, environment and economics as inseparable and interdependent. However for many, sustainable development is often seen as a complex issue that is not definable in practical terms. The difficulty lies in defining sustainable development consistently due to its very broad nature; often any definition occurs in political statements that are rather general and open-ended. More focused definitions reflect the specifics of diverse fields ranging from agriculture, ecology, economics, construction, particular stakeholders and countries and therefore differ considerably (Dalal-Clayton and Bass, 2001).

In addition, interchanging terminology make the concept more difficult. For instance, the difference between sustainability and sustainable development has to be defined. Forum for the Future (2005) distinguishes between sustainability and sustainable development - sustainable means something has the 'capacity for continuance' and sustainability is therefore a 'quality'. Sustainable development is the process over time by which we achieve sustainability.

In its own definition of sustainable development, Forum for the Future emphasises this "*A dynamic process which enables all people to realise their potential and improve their quality of life in ways which simultaneously protect and enhance the Earth's life support systems*". The definition also highlights a key point often missing from other definitions, that a sustainable society is for *all people* and policy towards sustainable development should ensure that everyone has the opportunity to fulfil their potential and enjoy a high quality of life and is about equity, fairness and justice (Parkin, 2000)

Therefore, if any development can be described as sustainable, it must integrate economic, social and environmental issues. Although a large body of work has been undertaken to conceptualise sustainable development and there is a wide awareness of it, it is generally accepted that the real challenge lies in understanding how to put it into practice, i.e. to operationalise sustainability.

3 METHODOLOGY

The approach taken to enhance the sustainable development of Dundee Central Waterfront was the development of a sustainability enhancement framework and a monitoring tool. These approaches are based on the use of indicators in two different ways, firstly, to strategically monitor the overall sustainability of the development and secondly as a key part of the decision process. The core part of the enhancement framework approach is to identify and develop indicators that are appropriate and aligned with the current decision making process.

Indicators were developed to strategically monitor the overall sustainability of the Central Waterfront Development as it progresses. These benchmark

indicators will be used to monitor the whole development over time and to inform the Dundee Central Waterfront management group and funding bodies. The sustainability enhancement framework ensures that sustainable development has been considered at the project level to enhance the overall sustainable development of the Dundee Central Waterfront using indicators at the project level as part of the decision process.

An important aspect of the success of the enhancement framework is to ensure that it is formally imbedded in the decision process. Figure 1 shows the activities undertaken in scoping study and their outputs.

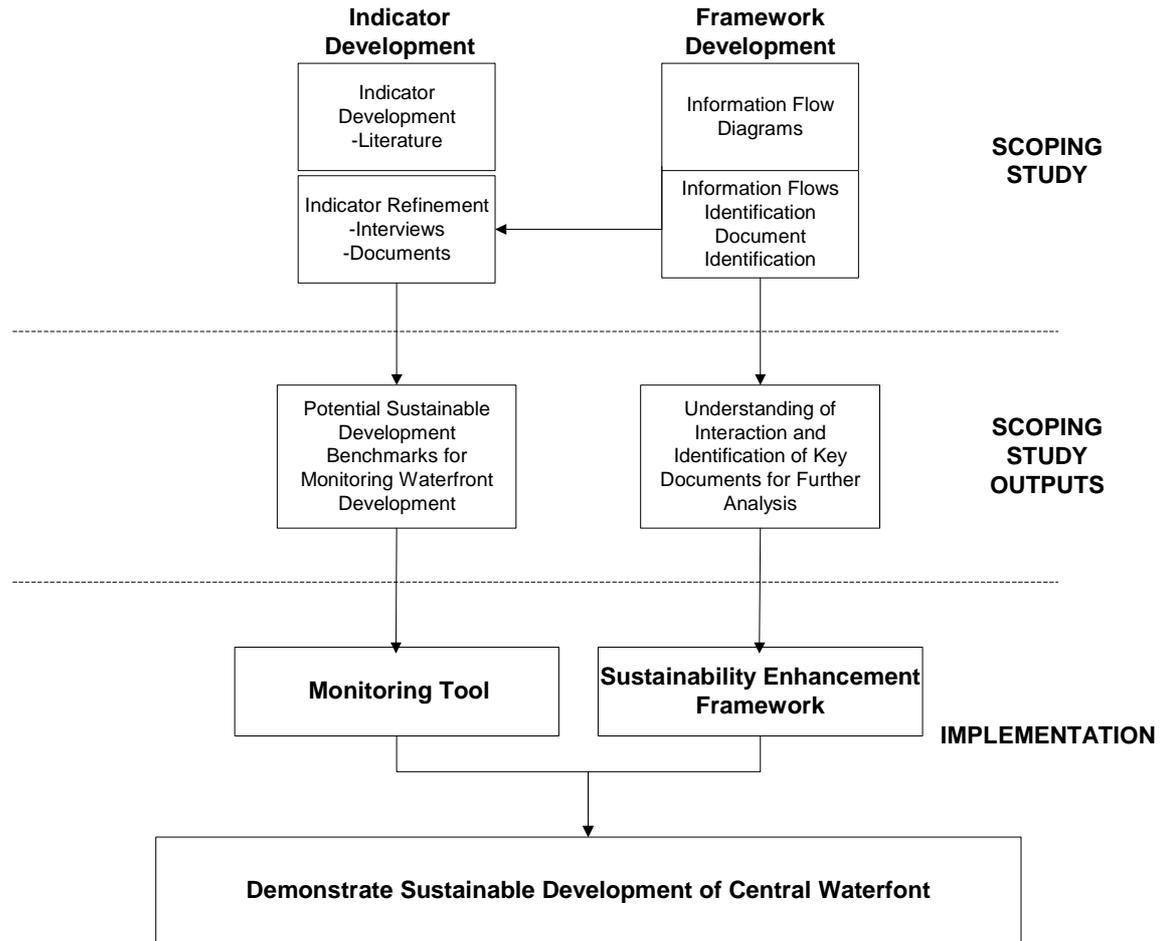


Figure 1: Activities undertaken in Phase 1 Scoping Study

3.1 Process of indicator development

The process of indicator development is shown in Figure 2 and consists of three main activities, literature review, interviews and document analysis. Indicators were developed using this process for both the benchmark indicators and the sustainability enhancement framework.

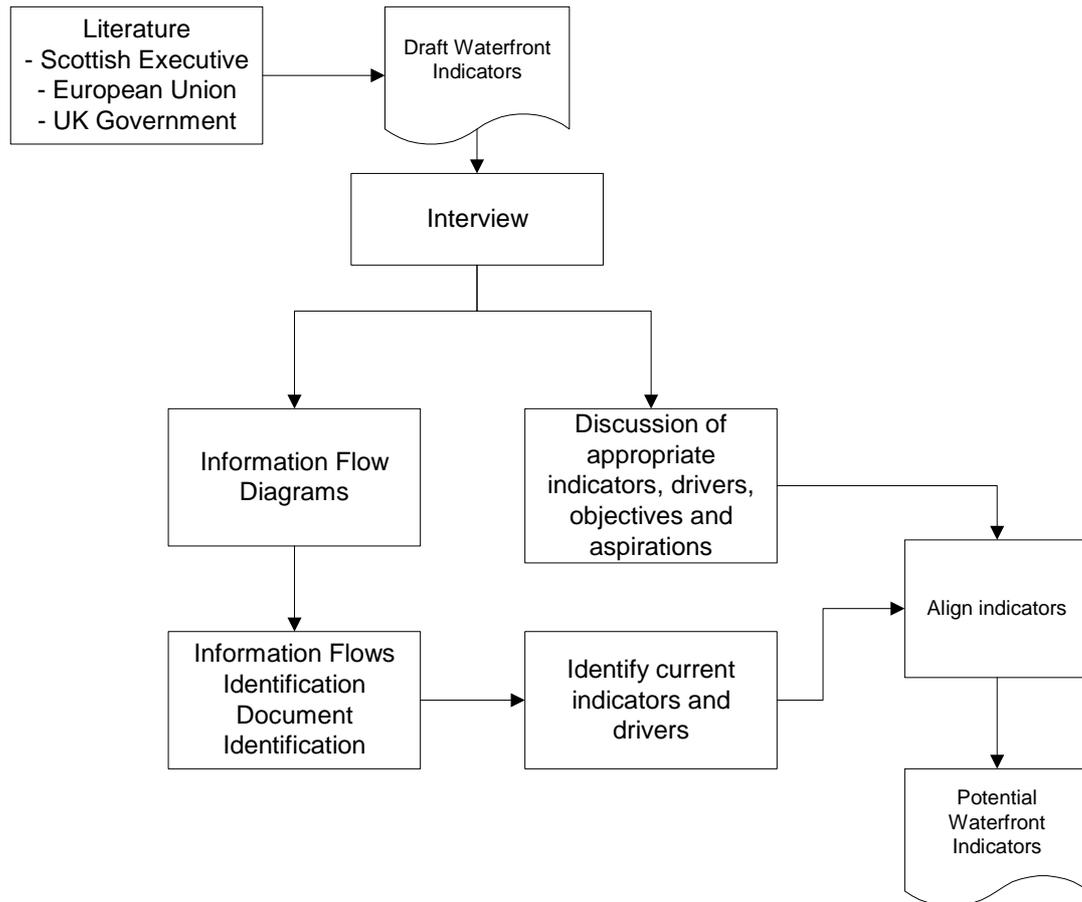


Figure 2: Process of indicator development

3.2 Literature review

3.2.1 Scottish Executive strategy for sustainable development

The scoping study reviewed sustainable development policy from EU, UK Government, Scottish Executive and Local Government, with respect to how objectives and aspirations have been interpreted into policy. Of direct relevance to the Dundee Central Waterfront Development is the Scottish Executive's position as stated in 'A Partnership for a Better Scotland (Scottish Executive, 2003) "We want a Scotland that delivers sustainable development; that puts environmental concerns at the heart of public policy and secures environmental justice for all of Scotland's communities". The Scottish Executive further committed itself to this goal and the principles of sustainable development by publishing "Choosing our future –Scotland's sustainable development strategy" (Scottish Executive 2005) with four priorities for Scotland in response to the challenge of sustainable development. Figure 3 shows the context of the delivery of sustainable development in Scotland.

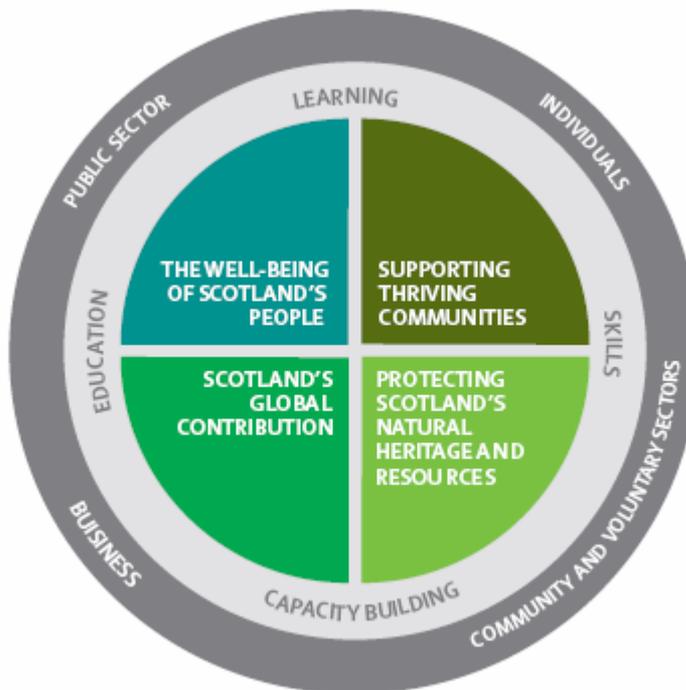


Figure 3: Governance and Delivery -the context for sustainable development
(Source: Scottish Executive 2005a)

3.2.2 Local Government Requirements

The main statutory guidance on Best Value and sustainable development is set out in s1(5) of the Local Government in Scotland Act 2003 (Scottish Executive, 2004). The legislation builds on work that Councils are currently undertaking, including their activities as part of Local Agenda 21 and Ministers consider that the legislation provides a special opportunity to embed sustainable development at the heart of local government in Scotland (Sustainable Scotland Network, 2005). It is also consistent with conclusions from the Earth Summits at Rio de Janeiro and Johannesburg in which local authorities have the vital role in delivering sustainable development. S1 of the Local Government in Scotland Act 2003 sets out the duty of local authorities to secure Best Value. S1(5) states that:

'The local authority shall discharge its duties under this section in a way which contributes to the achievement of sustainable development.'

This statutory requirement for local authorities to engage with sustainable development is new. Its location in the first section of the Act, which sets out the overall duty of Best Value – to secure continuous improvement in all aspects of local authority functions – emphasises its importance (Sustainable Scotland Network, 2005). The Local Government in Scotland Act 2003 establishes sustainable development as one of three cross-cutting themes, sitting alongside equal opportunities and joint working.

3.2.3 Indicators

The Potential Benchmark Indicators for the Central Waterfront Development have been developed from the literature reviewed. These are developed to reflect the UK Government Sustainable Development Strategy and the Scottish Executive Sustainable Strategy. A very large number of indicators are used across government to monitor the outcomes of policies. Experience from the 1999 Strategy suggests that the 147 indicators were in practice too difficult to use to determine overall progress (Scottish Executive, 2006). The other approach tried at that time was to have 15 headline indicators. These were used in the reporting process but could only provide an overview. A balance between these approaches is therefore needed.

In response to this, the UK Government Strategy has established a set of 68 indicators consisting of 20 UK Framework Indicators and a further 48 indicators to monitor progress. The framework indicators are relevant for Scotland and will be collected and reported by UK Government. The Scottish Executive have their own set of indicators 'Sustainable Development Indicator Set' (Scottish Executive, 2006) based on the policy in 'Choosing the future' (Scottish Executive, 2005a), their previous indicator set "Meeting the needs" (Scottish Executive, 2005b) was reported from 2003-2006. All three sets of indicators have been used to develop Central Waterfront Development Benchmark Indicators.

Each indicator document and policy document was reviewed and the relevant indicators shortlisted. Each indicator on the shortlist was reviewed to identify its appropriateness to the Waterfront Development, in relation to its scale, geographical area, units of measurement, and focus and direction. Indicators were then grouped into three categories, Economic, Environmental and Social. A definition for each indicator was then assigned together with draft units.

During the literature based development stage, the indicators were designed to align as closely as possible with Scottish Executive indicators to provide a basis for tangible reporting to the Scottish Executive, whilst providing clear and easily understood indicators for internal monitoring at the strategic level.

Where Executive/UK government indicators did not exist, specific indicators were developed. These were based on the authors' experience of sustainable indicator development (Smith 2002, Butler et al 2003, Foxon, et al, 2002) and on a range relevant sustainable urban development research papers. Unfortunately, most of the papers presented a conceptual understanding of the urban environment and identified key components of sustainability (McAlister 2005, Bartlet and Guthrie 2005, Boyko, et al., 2005) rather than presenting indicators. However, these key components were developed into indicators, which balanced Economic, Environmental and Social aspects of sustainable development.

3.3 Interviews

The draft literature based Benchmark Indicators were then refined through the process of interviews with key stakeholders with reference to the specific drivers, aspirations and objectives of the Dundee Central Waterfront Development. Interviews were held with members of staff to discuss the indicators and seek their views on their relevance. Each indicator was addressed in turn to verify relevance and improve their definition.

In addition, the interviews began to identify stakeholders' involvement in the Waterfront Development. The interviews collected data to illustrate the network of stakeholders for each role holder through the development Information Flow Diagrams. Each of the numbered information flows had a number of documents associated with it e.g. data, reports, meeting minutes. The Information Flow Diagram process was thus used to identify documents within the information flows, for analysis to enable further refinement of the indicators.

The series of interviews allowed the development of a number of Information Flow Diagrams for different stakeholders. This built up a picture of the stakeholders and their means of interaction. These were analysed to identify the best way to develop and implement the proposed framework.

In addition to Dundee City Council and SET personnel, the indicators have also been discussed with the Scottish Executive's Indicator Unit to review their suitability, and to establish any future developments they foresee in indicator use.

3.3.1 Interviewee 1 Project Coordinator

Interviews were undertaken with several participants, the example used in this paper is the Project Coordinator for the Central Waterfront Development. These were undertaken to refine the draft benchmark indicators and establish his network of stakeholders and the type of interaction he has with them. These are shown in the Information Flow Diagram Figure 4.

The project coordinator has responsibility for all facets of the project, as can be seen in the Information Flow Diagram. The interview identified the information flows and their nature (e.g. verbal communication, letter, meeting minutes, reports) and where appropriate, documents relevant to refining the indicators. Of particular relevance was the Dundee City Council Community Plan (2005), which was used in the document analysis phase. Other potential key flows were identified with the Urban Design Group, Development Quality, and Architect and Developers.

All the Information Flows are shown in Tables 1 and 2.

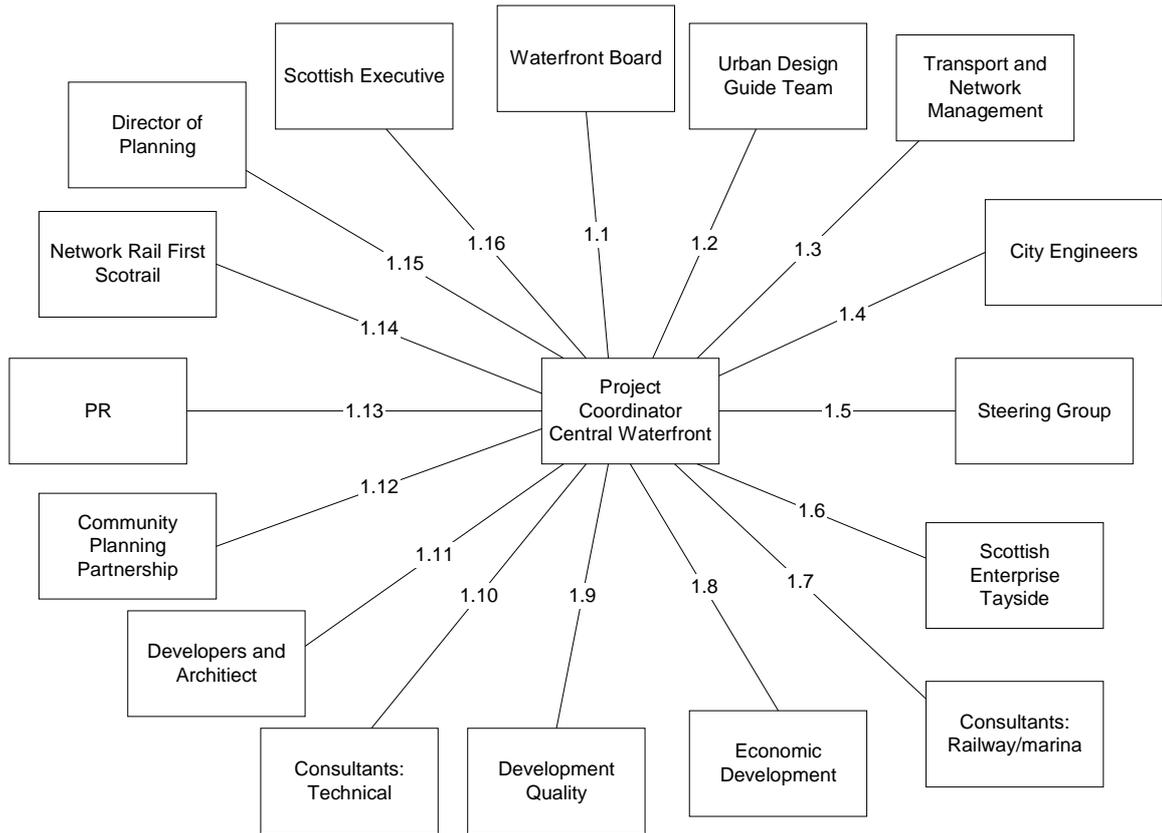


Figure 4 Information Flow Diagram - Project Coordinator Central Waterfront

Table 1 Information Flows Project Coordinator

Ref Number	Information flow	Ref Number	Information flow
1.1	Waterfront Board	1.10	Consultants: Technical
1.11	Report progress	1.101	Consultants report
1.12	Grant fund review	1.102	Data
1.13	Marketing update	1.11	Developers and Architect
1.2	Urban Design Group	1.111	Development quality
1.21	Guidelines	1.112	Brief from urban design guidance
1.22	Principles	1.113	Bid
1.23	Workshop results	1.114	Development control process
1.24	Urban design guide	1.12	Community Planning Partnership
1.25	Website sections	1.121	Reports
1.3	Transport and Network Management	1.122	Presentation
1.31	Departmental process	1.123	Updates
1.32	Capital plans	1.13	PR & Marketing
1.33	Marketing	1.131	Current economic development and marketing
1.34	Advice notes	1.132	PR department update

Table 2 Information Flows Project Coordinator (continued)

Ref Number	Information flow	Ref Number	Information flow
1.35	Public transport	1.133	Community council meeting
1.4	City Engineers	1.134	Briefing meetings
1.41	Copy emails	1.14	Network Rail Scotrail
1.42	Feedback	1.141	Property business development report
1.43	Updates	1.142	Briefing
1.44	Feasibility Report	1.143	Urban design guidance
1.45	Consultants reports	1.144	Negotiable
1.5	Steering Group	1.15	Director of Planning
1.51	Operational issues	1.151	Briefing notes
1.52	Progress reports	1.152	Cities growth fund annual report
1.53	Land transfer	1.153	Potential development
		1.154	Updating sharing information
1.6	SET	1.155	Urban design guide
1.61	Economic appraisal reports	1.156	Workshop results
1.62	Partnership arrangements	1.157	Meetings with developers
1.63	Property use	1.158	Development plan/proposals
1.64	Land receipts	1.16	Scottish Executive
1.7	Consultants: Marina	1.161	Annual reports-city growth fund
1.71	Consultants reports		
1.8	Economic Development		
1.81	Economic Reports		
1.9	Development Quality		
1.91	Developer proposals		
1.92	Design manual		
1.93	Meetings		

3.4 Document Analysis

Three key working documents have been used refine potential indicators in addition to the interviews. These were identified during interviews with Dundee City Council and SET personnel where several documents were identified for each information flow.

The documents were reviewed to identify potential indicators already in use and associated data availability. They were also used to develop indicators, which match the objectives and aspirations stated in the documents, and verify the potential relevance of indicators under development.

Each document has been used to align the benchmark indicators so that their wider relevance is assured.

4 POTENTIAL SUSTAINABLE DEVELOPMENT BENCHMARK INDICATORS

The potential Sustainable Development Benchmark Indicators for the Waterfront Development are given in Tables 3 to 5. The * denotes that the indicator is based on the UK Government or Scottish Executive Framework Indicator, but in most cases the definition has been adjusted to be more relevant to Dundee Central Waterfront. In some cases an indicator has been identified but not yet developed, with the definition requiring further work in Phase 2.

5 CONCLUSIONS

The aim of the scoping study was to identify stakeholders involved in the Waterfront Development, to demonstrate how they interact, to review current sustainable development indicators, and to develop a list of indicators suitable for monitoring and enhancing the sustainable development of Dundee Central Waterfront. The Information Flow Diagrams have identified the wide range of stakeholders involved in the Waterfront Development and their potential means of input to the Waterfront projects. The diagrams also reveal a high degree of public engagement on the process, which is essential for the assessment of the social aspects of sustainable development.

The review of current sustainable development indicators in the UK and Europe and of emerging indicators from the Scottish Executive, EU Commission and research groups enabled an appropriate list of relevant benchmark indicators for monitoring sustainable development to be developed, refined and proven to be robust via interviews. Additionally, project based indicators for the Sustainability Enhancement Framework were identified which will be used to influence decisions taken in all stages of the project.

The success of the enhancement framework depends on its ability to influence the decision making process, rather than to just monitor the overall sustainability of the Waterfront Development. The scoping study has ensured that the framework will be effective and fit in with current decision making processes. Information flow diagrams have been used to identify stakeholders' means of interaction and the diagrams and tables demonstrate the information received and passed by the interviewees. This information will be analysed more fully in an implementation stage over the next three years. Decision mapping techniques will be used to identify how stakeholders use the information and hence identify crucial decision points. This will guide the framework to further ensure its real world applicability its full integration with the Waterfront Development decision making processes as an integral part of the sub-projects design approvals process.

The development of the enhancement framework continues but there is sufficient evidence from the scoping study that the framework will influence sub-project level decisions and will provide an effective means of enhancing the overall sustainability of the Dundee Central Waterfront Development.

Table 3 Potential Sustainable Development Benchmark Indicators - Economic

Category	Benchmark indicators	Definition of indicator	Units
Economic	Demographics*	Population retention	Population number
	Retention of skills base	Graduate retention rate	% Student staying
	Capacity to stimulate investment*	Total investment	£ Inward investment
	Tourism	Number of tourists visiting Dundee	Number of visits
	Property Value	Increased property value	% Increase
	Job creation	Number of jobs created	Number
	Whole life cost of infrastructure	Capital and recurrent cost of infrastructure	£ Over life of infrastructure
	Economic output*	Growth over economic cycle	£

Table 4 Potential Sustainable Development Benchmark Indicators - Environmental

Category	Benchmark indicators	Definition of indicator	Units
Environmental	Biodiversity*	Priority Habitats	Number of habitats
		Priority Species	Number of species supported by habitat
	Green space/public space	Local environmental quality	Unit to be developed
		Design of safer places	Unit to be developed
	Waste*	Waste recycling	% of waste reused/recycled
		Waste arising by sector	Volume
	Air*	Air emissions	Emissions of CO ₂ , NO _x
	Water*	Loads to receiving water	Unit to be developed
		Domestic water consumption	Unit to be developed
	Noise	Noise level impact	Unit to be developed
	Energy*	Energy consumption	Unit to be developed
		Renewable energy	%
		Embedded energy	Unit to be developed
	Travel*	Public transport use	% Journeys

Table 5 Potential Sustainable Development Benchmark Indicators - Social

Category	Benchmark indicators	Definition of indicator	Units	
Social	Housing provision*	In relation to housing quality standard	% of houses of high quality	
	Health & Well being			
	Employment*	Employment rates	% Population	
	Social cohesion	Community spirit	Qualitative	
	Social Inclusion*	Accessibility of waterfront services	% Population	
	Participation and responsibility*	Participation in sustainable decision making		% Population involved in decision
		City centre action groups		
		Individual action for sustainable development		% Taking action
	Active community participation	Informal and formal volunteering	% Population	
	Acceptability	Acceptability to stakeholders	Qualitative	
	Confidence	Public perception of confidence	Qualitative	
	Amenity value			

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