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Interim report: Maddington-Kenwick & Cockburn sustainable industry project

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Maddington-Kenwick & Cockburn Sustainable Industry Project

Small and Medium Enterprise Research Centre

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Project Background

This research project is the result of a grant from the Commonwealth National Heritage Trust, the funding of which is managed through the Swan Catchment Council, to develop and co-ordinate environmental management projects aimed at small and medium enterprises (SMEs) in light industrial areas*.

The aim of this project is to investigate the current attitudes and practices of business owner-managers in the light industrial areas of Maddington-Kenwick and Cockburn regarding environmental issues and waste management pre and post an intervention program. A specific aim of the project is to reduce waste and achieve implementation of better environmental management practices in this sector. The project commenced in February 2007 and is due to finish in December 2008.

The two survey areas are geographically located South East and South of Perth within two separate local government boundaries. The light industrial area of Maddington-Kenwick is part of the City of Gosnells which has a population of 91,579[1] whereas the City of Cockburn has a population of 78,000[2]. Maps of each light industrial area are included at Appendix A for reference. The light industrial areas were selected as appropriate locations to replicate an intervention previously conducted in Bellevue, Western Australia[3], as both Cities are looking for businesses within their boundaries to improve their environmental performance.

This interim report only provides the pre-intervention data. This data provides baseline information of the level of business interest in the environment and the waste, energy and water management practices of SMEs in these light industrial areas. Information was gathered on basic business demographics, attitudes to the environment, volume and type of waste produced by the businesses and the disposal methods used for each of those products. Also included is the knowledge and use of energy and water efficiency measures in the businesses.

*All further use of the term SMEs in this document refers to SMEs in light industrial areas; they include some retailers but most retailers and home-based businesses are outside the project's scope.

[1] City of Gosnells, April 2007

[2] City of Cockburn, April 2007

[3] Walker & Redmond, 2006

With the pre-intervention data collected and analysed, the Swan Catchment Council in conjunction with key stakeholders will provide advice, information and strategies for the small business owner-managers to assist them with waste, energy and water management in their businesses (the intervention). At the completion of the intervention (a period of approximately one year) a post-intervention survey will be conducted. The analysis of the post-intervention survey will then form the basis of a final report. The final report will outline the extent of any changes that have occurred in the target areas of waste, energy and water management and provide recommendations for future work in these areas with small business.

Methodology

Research design and questions

The research design incorporated both quantitative and qualitative methods to collect statistical, as well as more in-depth responses from the businesses. The key research questions were:

1. What are the owner-managers' current attitudes toward the environment?
2. What are the owner-managers' perception of the impact their business has on the environment?
3. What volume of waste is being produced in the area?
4. What waste management behaviours are being practiced in their businesses for treatment and disposal of the waste?
5. What level of knowledge do the owner-managers have of their businesses' natural resource usage (i.e. water and energy)?
6. Are the owner-managers' willing to participate in a waste reduction training program, and/or free energy and water assessments?

Survey Instrument

The survey instrument was adapted from a previous Swan Catchment Council/Edith Cowan University study within the Perth metropolitan area[3]. Two meetings were held with Swan Catchment Council stakeholders to refine the survey instrument and adapt it to the new light industrial areas. The final 47 item survey consisted of a mixture of qualitative and quantitative questions which related to the business (e.g. what is your business?), the environment (e.g. how do you rate your interest in the environment?), waste management (e.g., what type(s) and approximate volume of waste is produced and disposed of during your business operations each week?) and the local environment (e.g. how would you rate this light industrial area environmentally?). Where Likert scales were used the response options ranged from 1 (not at all important, never, very low or very poor) to 6 (highly important, always, very high or very good) depending on the question being asked. Prior to conducting the main survey, checks of the instrument for both face validity and content validity were made[4].

[3]Walker & Redmond, 2006
[4]Cavana et al, 2001

The survey was taken to 240 businesses in Maddington-Kenwick (85% response rate [n= 205]) and 226 businesses in the Cockburn (88% response rate [n= 199]) light industrial areas. This protocol of one-on-one collection of the data contributed to the high response rate to the survey. This is an excellent result and provides a good reflection in both industrial areas. Key subjects covered in the survey were:

- a profile of the business respondents,
- basic business information,
- environmental perceptions and waste management behaviours in the industrial area,
- views on environmental issues,
- waste volume, storage, and disposal method,
- barriers to recycling, and
- energy and water efficiency

Details regarding the purpose of the study and advice that participation was voluntary were given to each business approached to participate. Advice was also given that the information collected would remain confidential and that they could withdraw at any time. They were then asked if they agreed to participate.

Data analysis and results

The data were analysed using a statistical data package and, where necessary, qualitative data have been combined into categories to reduce the data. Where multiple responses to questions were received the results were adjusted to reflect the actual responses rather than the number of respondents. In some cases, the combination of responses contained information, for example on practical measures implemented for wastewater management, which seemed important enough to report separately.

Where we report volume of waste products these volumes are all in cubic metres with the exception of steel and other metals which are in kilograms; car bumpers, tyres, vehicle batteries and wooden pallets which are measured in units; and oil, radiator coolant, degreasers, paints and thinners which are provided in litres.

The results of this research are presented in two sections. The first outlines the findings in Maddington-Kenwick and the second the findings in Cockburn. This format allows the locations to be assessed individually.

Results Maddington-Kenwick

This section outlines the results from the Maddington-Kenwick light industrial area pre-intervention. The number of returned questionnaires (n=205).

Business profile and stability

Profiles of the respondents and businesses are shown in Table 1 and 2 to provide a broad social context to the collected data in Maddington-Kenwick. The demographic profiles of the respondents and the businesses are consistent with light manufacturing and service businesses in Australia and elsewhere. That is, this business sector is still dominated by independent older male owner-operators, with trade related skills, nearly half of which operate at a micro level (i.e. under 5 employees).

Table 1: Profile of the Survey Respondents by Percentage in Maddington-Kenwick

Question	*Percentage of responses (%)*
Position in Business (n=203)	
Owner/Manager	63
Manager	22
Other employee	6
Supervisor/Foreman	5
Administration	4
Gender (n=205)	
Male	83
Female	17
Age (n=205)	
Under 30	8
31-40	31
41-50	30
51-60	26
Over 60	5
Highest education (n=204)	
High School	36
Trade	33
University	16
TAFE	15

Note. Figures are rounded to nearest whole amount and exclude cases where no response was given.

Table 2: Profile of the Responding Businesses in Maddington-Kenwick

Factor	*Percentage of responses (%)*
Business Type * (*n*=202)	
Manufacturing	38
Retail Trade	25
Property and Business Services	11
Construction	10
Transport and Storage	7
Wholesale Trade	2
Other	5
Personal Services	1
Agriculture/Forestry	1
Structure (*n*=202)	
Independently Owned	93
Subsidiary or branch	5
Franchise	2
Premises (*n*=205)	
Owned	56
Leased	44
Employment (full time staff) (*n*=205)	
1 only	11
2 to 5	38
6 to 19	39
20 and over	12

Note: Figures are rounded to nearest whole number and exclude cases where no response was given.
* Based on ANZSIC codes.

The respondents were asked to advise of any intention to move out of, or within, the geographic area to assess the stability of the businesses within the light industrial area during the study period. The result of this set of questions is shown in Table 3 and shows that there is little intention to move out of the area in the next 12 months with only 6% intending to move to another location.

Table 3: Expectation to Move Out of, or Within, Maddington-Kenwick within 12 Months (n=203)

Factor	*Percentage of responses (%)*
Move out of Maddington-Kenwick (n=203)	
Yes	6
No	94
Reason given by the 6% who expect to move (n=12)	
Retiring	1.5
Closing Business	1.5
Other (larger premises needed, relocate, operate 24/7)	3
Moving to larger premises within Maddington-Kenwick (n=203)	
Yes	14
No	86

Note. Figures are rounded to nearest whole number and exclude cases where no response was given.

Environmental perceptions and attitudes

The interest of the respondents in environmental issues was explored using a Likert scale (1 = very low to 6 = very high) and their responses are shown in Table 4. The results indicate a high level of interest (i.e. a rating of 5 or 6) by the majority of the small business respondents (69%).

Table 4: Interest in Environmental Issues by Maddington-Kenwick Respondents (n=205)

Interest level	*Percentage of responses (%)*
Very low	1
2	1
3	6
4	23
5	35
Very high	34

Note. Figures are rounded to nearest whole amount and exclude cases where no response was given.

The respondent's environmental view of their light industrial area was investigated to put their interest in a local context. Collectively, the environmental perception (via a rating scale) of the Maddington-Kenwick light industrial area by the survey respondents was low, with only 33% rating it above average (see Table 5).

Table 5: Environmental Perception Rating of the Maddington-Kenwick Light Industrial Area (n=201)

Rating	*Percentage of responses (%)*
Very poor	6
2	22
3	39
4	21
5	10
Very good	2

Note: Figures are rounded to nearest whole amount and exclude cases where no response was given.

Critical environmental issues

The respondents were then asked an open question without prompts or a list of options to ascertain what they rate as the top environmental issue currently in the Maddington-Kenwick light industrial area. The responses indicate that the main concerns are related to air and water pollution as well as waste production and management (see Table 6).

Table 6: Top Environmental Issue Identified by Respondents in the Maddington-Kenwick Light Industrial Area (n=181)

Environmental Issue	*Percentage of responses (%)*
- responses with multiple answers (31x2; 2x3 issues)	*16*
Air pollution (dust, overspray, fumes, odour)	30
Water pollution/drainage management/water use	24
Waste production & pollution: management & control	13
Rubbish dumping/litter	10
Visual amenity	8
Other (energy use/efficiency; clearing of vegetation; noise; vandalism)	6
Missing facilities and services (e.g. recycling, public transport)	4
Traffic (amount, management, hoons, trucks)	4
No issues/all good/don't know	2
Awareness/education/support/enforcement	1

Note: figures are rounded to nearest whole number and therefore may not add to 100% and exclude cases where no response was given; answers with multiple responses were split into issues which were counted separately.

When asked to provide a priority list of changes or improvements for the light industrial area (see Table 7) the respondents in Maddington-Kenwick combined the need for awareness, education, support and enforcement on environmental issues (25%) as the highest need in the area. Other key concerns were water and air pollution, missing facilities and other issues.

Table 7: Respondents' Suggestions for Changes or Improvements to Maddington-Kenwick (n=157)

Change/Improvement	*Percentage of l responses (%)*
- responses with multiple answers (28x2; 1x3 issues)*	*15*
Awareness/education/support/enforcement	25
Water pollution/drainage management/ water use	16
Other (energy use/efficiency; clearing of vegetation; noise; vandalism)	12
Air pollution (dust, overspray, fumes, odour)	11
Missing facilities and services (e.g. recycling, public transport)	10
Rubbish dumping/litter	8
Visual amenity	8
Waste production & pollution: management & control	5
Traffic (amount, management, hoons, trucks)	4
No issues/all good/don't know	2

Note: figures are rounded to nearest whole number and exclude cases where no response was given; answers with multiple responses were split into issues which were counted separately.

The data shows that Maddington-Kenwick respondents are interested in environmental issues (92%), and this is congruent with other research findings. Table 8 adds to this information by showing that their concern is directed toward the impact on future generations (39%).

Table 8: Respondents' Main Concern about the Environment (n=203)

Main concern	*Percentage of responses (%)*
- responses with multiple answers (1x2, 2x3, 11x5 issues)*	*6*
Impact on future generations	39
Harm to global environment	21
Harm to local environment	15
Harm to Australian environment	11
Impact on your business	8
Other (waste, air pollution, water pollution, nil, lip service, sustainability, planting trees)	6

Note: figures are rounded to nearest whole number (totals may not add up to 100%) and exclude cases where no response was given; * multiple issues answers were split into issues and counted separately.

Business impacts on the environment

Responses show that positive business impacts on the environment were acknowledged by 29% of the respondents, but these were identified less often than negative environmental impacts on the environment (49%). Predominantly, respondents viewed the level of environmental impact as 'low' for both types of impacts (49% and 71% respectively). The types of positive impacts outlined included: good environmental practices (58%), provision of environmentally useful/friendly technology/ products (22%), avoidance of harmful or use of better/renewable materials (7%), service provision (5%) and product repair/ recondition/reuse (5%). The types of negative impacts identified by the respondents included: air pollution/dust/fumes/odours (32%), energy/ fuel use (27%), waste production (13%),

material use (10%), biophysical impacts (including mining, vegetation clearing) (7%), noise (5%) and water use/ pollution (3%). Some of these respondents indicated multiple impacts (15%).

Wastewater production, disposal and treatment

Table 9 shows that in Maddington-Kenwick 38% of all businesses produced wastewater. The wastewater of those businesses originated from washing parts/equipment (46%), degreasing (28%), other activities (12%; that included 'arris' machine, cutting processes, industrial washing machines, pump testing and process water), use of cooling baths (9%) and floor washing (6%). For some businesses the wastewater came from a combination of these activities (28%). The most common combinations, shown in Table 10 were: degreasing and parts/equipment washing (20%), cooling baths/systems and floor washing (5%), and degreasing and parts/equipment washing and floor washing (5%).

The methods of disposal of the water (Table 9) raised some concern since only a few of the wastewater producers used a licensed contractor (12%). Most used the sewerage system (41%) or stormwater drains (20%) as well as the open ground (11%) and other ways (11%) to dispose of their wastewater. Combinations of these disposal methods were also noted by the respondents (Table 10) with the most frequently used combination being a licensed contractor and the sewer (7%).

This issue was compounded since many businesses did not treat the wastewater before disposal (25%). For those that used treatment the preferred method was an above ground oil/water separator (26%). Other treatment methods were: a sediment trap (17%), chemical treatment (15%) and a below ground Petrol & Oil (P&O) trap (13%). Several combinations of these treatment methods were used, the most common being a combination of below ground P & O and sediment traps (4%), and above ground oil/water separator and sediment traps (4%) (Table 10).

Just under half of the survey respondents in this area (44%) were not aware of where the stormwater drains flowed.

Table 9: Production, Disposal and Treatment of Wastewater in Maddington Kenwick

Answers ('yes' or details)	*Frequency (n)*	*Percent of all businesses (n=205) (%)*	*Percentage of actual wastewater producers (n=77) (%)*
Wastewater Production	77*	38	100
Wastewater origin	73	36	95
Responses	*101*		*100*
- answers with multiple responses (22x2; 6x3 categories)	*28*	*14*	*28*
Part/equipment washing	46	22	46
Degreasing	28	13	28
Other	12	6	12
Cooling baths/systems	9	4	9
Floor washing	6	3	6
Disposal practice	76	37	99
Responses	*85*		*100*
- answers with multiple responses (9x2 categories)	*9*	*4*	*11*
Sewer	35	17	41
Storm water drain	17	8	20
Licensed contractor	10	5	12
Other	9	4	11
Open ground	9	4	11
Storm water/leach drain/soak well	5	2	6
Septic tank system	0	0	0
Treatment	69	34	90
Responses	*92*		*100*
- answers with multiple responses (11x2; 2x3 categories)	*13*	*6*	*14*
Above ground oil/water separator	24	12	26
Not treated	23	11	25
Sediment trap only	16	8	17
Chemical	14	7	15
Below ground Petrol & Oil trap	12	6	13
Other	3	2	3

Note: figures are rounded to nearest whole number and exclude cases where no response was given; number of responses is higher than number of answers since combination answers were split into categories and counted separately; *only 63 businesses actually answered 'yes' to this question, but those who either did not answer (8) or answered 'no' (2) but then gave details about wastewater were included here.

Table 10: Details of Response Combinations for Wastewater Origin, Disposal and Treatment in Maddington-Kenwick

Answer categories/ answer combinations	*Percent of all businesses (n=205) (%)*	*Percentage of wastewater producers (n=77) (%)*
Wastewater origin 1 Degreasing; 2 Cooling baths/systems; 3 Part/equipment washing; 4 Floor washing; 5 Other	36	95
- 1,3 - 2,4; 1,3,4 - 1,4; 1,5; 2,3; 1,2,3; 1,3,5	7 4 (2 each) 2 (.4 each)	20 10 (5 each) 7 (1.3 each)
Disposal practice 1 Storm water/leach drain/soak well; 2 Storm water drain; 3 Other; 4 Septic tank system; 5 Licensed contractor; 6 Open ground; 7 Sewer	37	99
- 5,7 - 2,6 - 3,6; 3,7	2 1 1 (0.5 each)	7 3 3 (1.5 each)
Treatment 1 Above ground oil/water separator; 2 Below ground Petrol & Oil trap; 3 Sediment trap only; 4 Not treated; 5 Chemical; 6 Other	34	90
- 1,3; 2,3 - 1,2; 1,5; 3,4; 3,5; 3,6; 1,2,3; 2,3,5	3 (1 each) 4 (0.5 each)	8 (4 each) 9 (1.3 each)

Note: combinations of the original possible answers, e.g. 1,3 refers to 'above ground oil/water separator AND 'sediment trap only'

Environmental behaviour applicable to the small businesses

Conscious environmental behaviour of the respondent, that is, behaviour that demonstrates that the individual is mindful of the impact their decisions and actions will have on the environment, was assessed on nine different factors to determine which behaviours were applicable to their business (see Table 11). The results indicate that there is room for improvement, as each one of the behaviours is never practiced by some businesses although there are those that always practice the behaviour. The highest mean score on a 6 point Likert Scale was in the use of energy efficient lighting (M=4.2) and the lowest mean score was the purchase of green energy/use 'natural power' options (M=1.3).

Table 11: Mean Environment Related Business Activities in Maddington-Kenwick

In your business, do you consciously...	*Mean**
Use energy efficient lighting (n=205)	4.2
Consider environmental issues when making business decisions (n=205)	3.8
Buy environmentally friendly products (n=204)	3.7
Ensure staff are trained in environmental issues (n=204)	3.1
Spend extra money to implement environmental practices (n=204)	3.1
Seek information about new environmental initiatives (n=204)	3.0
Go beyond legislative requirements (n=204)	3.0
Try to reduce greenhouse gas emissions (n=204)	2.5
Purchase green energy/use 'natural power' options (n=204)	1.3

Note: *Mean rating that is the average of answers given (1=never - 6=always, excluding N/A), 3.5 denotes the 50% mark.

Adoption of environmental management practices

To identify factors that had an influence on business adoption of better environmental practices the respondents were given a series of possible choices and asked to rate how much influence these issues had on their environmental behaviour (see Table 12). While all factors were found to have an influence, those factors with the strongest influence by mean rating on a 6 point Likert Scale were: concern for the environment (M=4.4), support of management/employees in the workplace (M=4.3) and government support (M=4.0).

Table 12: Importance of Factors That Influence the Adoption of Better Environmental Practices in Businesses in Maddington-Kenwick

Factor	*Mean**
Concern for the environment (*n*=204)	4.4
Support of management/employees to adopt good practices (*n*=205)	4.3
Government support to adopt good practices (*n*=204)	4.0
Having technical skills for implementation (*n*=205)	3.7
Access to money for implementation (*n*=205)	3.6
Having an environmental plan (*n*=205)	3.6
Customer support to adopt good practices (*n*=205)	3.5

Note: *Mean rating, that is the average of answers given (1 Not at all important -6 Highly important), 3.5 denotes the 50% mark.

Responsibility for the environment

When asked who should take responsibility for the environment, the most common response (47%) indicated that it should be placed with the individual (see Table 13). Only 4% chose the business as taking on responsibility for the environment.

Table 13: Responsibility for the Environment as Perceived by Respondents in Maddington-Kenwick (*n*=203)

Responsibility	*Percentage of responses (%)*
Individual	47
Government	27
Community	22
Business	4

Note. Figures are rounded to nearest whole amount and exclude cases where no response was given.

When asked what level of government should be managing the environmental issues in the Maddington-Kenwick area, 72% of the respondents' nominated local government (Table 14).

Table 14: Level of Government Responsibility for Environmental Issues Indicated by Respondents in Maddington-Kenwick (*n*=204)

Level of Government	*Percentage of responses (%)*
Local	72
State	22
Federal	6

Note. Figures are rounded to nearest whole amount and exclude cases where no response was given.

Waste generated

The management of waste generated from businesses in the Maddington-Kenwick light industrial area is very important as there is a large amount of potentially valuable waste produced in the area. It is also critical to ensure that wastewater, solid waste and liquids are managed appropriately to avoid environmental harm, given its close proximity to a river system.

Table 15 provides an overview of the types and approximate volume of waste produced and disposed of to landfill in the area per week from the 205 small businesses. The major waste items in this area were: steel (44t), plastics (366m^3) and oil (5239 litres). Although steel and oil were not usually taken to landfill, the majority of plastics are still disposed of in this way despite much of it being recyclable.

In contrast, the waste products generated by the largest number of businesses were cardboard and paper (n=165) followed by steel (n=113). Quite a number of businesses generated waste oil (n=66), oil filters (n=44), vehicle batteries (n=43) and shrink wrap (n=39). Electronic waste (n=1) was the product that was generated by the least number of businesses.

Table 15: Waste Produced and Sent to Landfill by Maddington-Kenwick Small Businesses in One Week

Product	*Producers (n)*	*kg*	*m^3*	*Units*	*Litres*	*Average amount per business (mean)*	*Landfill (% of producers)*	*Landfill (% of waste amount)*
Metals								
Steel	113	44142				391	5	0.2
Other metals	27	1575				58	0	0
Plastics								
Polystyrene	5		14			3	100	100
Plastic drums	19		43			2	26	14
Shrink wrap	39		58			2	74	66
Car bumpers	7			13		2	14	8
Other plastics	13		251			19	69	20
Cardboard & paper								
Combined	165		137			1	32	33
Wood products								
Solid timber	14		43			3	29	13
Pallets	19		37			2	53	73
Dust	15		55			4	60	17
Particle board	10		13			1	70	61
MDF	10		9			1	70	87
Liquids								
Oil	66				5239	79	2	.003
Radiator coolant	24				905	38	25* 8**	36* 0.6**
Paint	2				1	1	50	83
Thinners	9				139	15	0	0.2***
Degreasers	19				195	10	0	3***
Filters								
Oil Filters	44			339		8	7	7
Rubber								
Tyres	28			459		16	11	15
Glass								
Combined	7		15			2	86	93
Batteries								
Vehicle	43			97		2	0	0
Other waste								
Electronics	1		0.2			0.2	100	100
Miscellaneous	19		43			2	53	20

Note: figures are rounded to nearest whole number and exclude cases where no response was given; *disposed of in sewer; ** disposed of in open ground & storm water drain; ***form of disposal not specified

Competitive advantage from waste management

Table 16 shows that businesses in Maddington-Kenwick were interested in participating in waste management strategies when they could gain a visible or financial benefit. Strategies to gain benefit from recycling efforts of the businesses varied, providing evidence that many small businesses work at a survival/operational level rather than using a planned strategic approach. For example, Table 16 illustrates where some businesses had received financial benefit from their waste, others accepted a neutral outcome from the process or paid for waste removal from the property.

Table 16: Cost of Waste Disposal by Type of Waste in Maddington-Kenwick

Product	*Respondents (n)*	*Cost (%)*	*Income (%)*	*Neutral (%)*
Metals				
Steel	106	5	65	30
Other metals	27	4	93	4
Plastics				
Polystyrene	5	80	0	20
Plastic drums	16	31	13	56
Shrink wrap	43	56	0	44
Car bumpers	6	17	0	83
Other plastics	11	73	9	18
Cardboard & paper				
Combined	134	38	1	61
Wood products				
Solid timber	14	67	0	33
Pallets	19	54	0	46
Dust	15	83	0	17
Particle board	7	100	0	0
MDF	7	100	0	0
Liquids				
Oil	62	47	0	53
Radiator coolant	20	55	0	45
Paint	2	100	0	0
Thinners	8	63	13	25
Degreasers	14	86	0	14
Filters				
Oil filters	40	85	3	13
Rubber				
Tyres	24	88	4	8
Glass				
Combined	6	50	0	50
Batteries				
Vehicle	33	30	12	58
Other waste				
Electronics	1	0	0	100
Miscellaneous	16	63	0	38

Note. Figures are rounded to nearest whole amount and exclude cases where no response was given.

Steel is one of the most economically valuable products to recycling contractors, yet 35% of businesses were making either no profit or a loss from recycling their steel. Similarly, vehicle batteries were giving an income to only a few of the businesses and were cost neutral or a loss for the majority (88%).

In this light industrial area, a substantial amount of paper products were recycled yet only 1% of the businesses were achieving any income for engaging in this process, which may be due to the small amounts generated per business (Table 15). In addition, there were three products, MDF, particle board and paint which always incurred a cost for the businesses to recycle.

A considerable amount of waste oil is produced in Maddington-Kenwick in a working week. Respondents indicated that no profit is being made and at best they are achieving a neutral outcome from this waste product. Based on previous evidence[3,5] where small businesses were gaining different levels of profit from oil recovery, this result suggests that financial return may be dependent upon the business location within the metropolitan area.

While waste management practices vary within Maddington-Kenwick Table 17 shows that the majority of respondents (76%) were prepared to participate in a local waste management reduction program and were interested in receiving more information on waste reduction (72%). When the respondents were asked whether their name and business details could be passed onto recycling contractors that may be able to assist them with their waste issues 54% agreed to have these details passed on.

Table 17: Indication of Desire of Maddington-Kenwick Respondents to Participate in Waste Reduction Program and to Receive More Information

Participation item	*Percentage of responses (%)*
Waste reduction program (n=205)	
Yes	76
No	24
More information (n=205)	
Yes	72
No	28

Note. Figures are rounded to nearest whole amount and exclude cases where no response was given.

[3] Redmond & Walker, 2006
[5] Redmond, Walker, & Goeft, 2007

As respondents also indicated that email (43%) and newsletters (42%) are their preferred method of receiving information (see Table 18), these may be the best media to use to invite their participation and continue to engage them.

Table 18: Preferred Mode of Information Distribution by Maddington-Kenwick Respondents (n=199)

Method	*Percentage of responses (%)*
Responses	100
- responses with multiple answers (28x2; 2x3 methods)	*13*
Email	43
Newsletter	42
Industry magazine	10
Face to face	6
Industry seminars	0
Other	0

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple answers were split into options and answers counted separately

Barriers to recycling waste

Table 19 shows that the key barriers to recycling to the respondents in the Maddington-Kenwick light industrial area were that they produced too small an amount of waste to recycle (42%), there were no contractors available to take the waste (14%) or that they were recycling as much as possible (11%). These barriers are consistent with previous research in the Perth metropolitan area[3,5].

Table 19: Barriers to Recycling Waste Products in Maddington-Kenwick (n=194)

Barriers to recycling	*Percentage of responses (%)*
Responses	100
- responses with multiple answers (44x2; 4x3; 1x4 issues)	*20*
Amount too small	42
No contractor	14
All/most recycled, do recycle, recycle as much as possible	11
Didn't know you could	8
Not enough space	6
No council bin	5
Cost	4
Other*	3
Not interested	3
No time	2
Cannot recycle, not recyclable	1
Not enough room in bins	1

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple answers were split into categories and counted separately; *no material wasted; nothing to recycle; only discard rags; rely on contractor; insufficient advice on availability of recycling companies; staff participation; need to specify what can go into council bin.

[3] Redmond & Walker, 2006
[5] Redmond, Walker, & Goeft, 2007

Previous research[3,5] has shown that with increased co-operation between organisations and small business the outcomes are beneficial to all concerned. Table 18 outlines the measures the Maddington-Kenwick respondents suggested would assist and shows that more want support to find appropriate recyclers (33%) than financial incentives to recycle (22%).

Table 20: Help for Maddington-Kenwick Businesses to Increase Recycling (n=184)

Item or initiative to assist recycling	*Percentage of responses (%)*
Responses	100
*- responses with multiple answers (42x2; 11x3; 1x4; 3x6 categories)**	*21*
Help to find appropriate recyclers	33
Better financial incentives	22
Additional bins	17
Legal requirement to recycle	12
Knowledge of cost to recycle	6
More room for bins	6
Other**	5

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple answers were split into options and answers counted separately; * the most frequent combinations contained the most popular categories; ** Weekly service, smaller scale collection, recycling industry not supportive enough, rely on contractors, staff awareness.

Energy and water efficiency

To determine the current level of knowledge in of respondents in Maddington-Kenwick have of energy and water efficiency, a series of questions were put to them about their knowledge and use of each of these resources (see Table 21 and 22). These tables indicate that in Maddington-Kenwick the respondents are checking on energy use (61%) and costs (69%) more readily than they do on water usage (39%) and costs (44%). They are also more aware of energy efficiency measures (64%) than water efficiency measures (29%). However, in both cases, fewer respondents used efficiency measures with 64% knowing about these versus 56% using energy efficiency measures and 29% versus 23% for water.

Both knowledge and use of practical energy measures were evident in the responses, with more respondents knowing about measures than implementing them. The strongest energy efficiency knowledge related to the use of energy efficient lights (36%) and changing work processes (35%), followed by thermal insulation and use of more efficient machinery (11% each). The results for the use of energy efficiency measures reflected the knowledge findings in that the respondents implemented the same practices that they knew, with energy efficient lights making up 42% of measures, changed work processes 39% and thermal insulation as well as more efficient machinery at 7% each.

[3] Redmond & Walker, 2006
[5] Redmond, Walker, & Goeft, 2007

Both knowledge and use of practical water saving measures were also evident in the responses, although less so than for energy efficiency. The best known water efficiency measures were triggered hoses (26%) followed by water efficient devices & processes (23%), regular checks for water leaks (17%), other suggestions (15%) and wastewater recycling (14%). The most implemented efficiency water measures were triggered hoses (36%), and regular checks for water leaks (19%). Wastewater recycling (9%) and rainwater collection (5%) were the least used water saving measures.

Table 21: Energy Efficiency Awareness and Activities of Responding Businesses in Maddington-Kenwick

Question (number of answers)	*Frequency of 'yes' answers (n)*	*Percentage of answers/responses (%)*
Check on energy use (*n*=205)	125	61
Keep track of energy costs (*n*=205)	141	69
Know ways to use energy efficiently (*n*=205)	132	64
Responses	*254*	*100*
- answers with multiple responses (52x2; 18x3; 10x4; 1x5 categories)	*81*	*61*
Use of energy efficient lights	*92*	*36*
Changed work process	*88*	*35*
Thermal insulation	*28*	*11*
Use of more efficient machinery	*27*	*11*
Other (e.g. natural light, timers, turn off power)	*19*	*8*
Use energy efficiency measures (*n*=204)	115	56
Responses	*205*	*100*
- answers with multiple responses (45x2; 16x3; 3x4; 1x5 categories)	*65*	*55*
Energy efficient lights	*85*	*42*
Changed work process	*80*	*39*
Thermal insulation	*15*	*7*
More efficient machinery	*15*	*7*
Other (e.g. natural light, timers, turn off power)	*10*	*5*

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple answers were split into categories and counted separately.

Table 22: Water Use Efficiency Awareness and Activities of Responding Businesses in Maddington-Kenwick

Question (number of answers)	*Frequency of 'yes' answers (n)*	*Percentage of answers/responses (%)*
Check on water use (*n*=205)	80	39
Keep track on water cost (*n*=205)	90	44
Know ways to use water efficiently (*n*=205)	59	29
Responses	*117*	*100*
- answers with multiple responses (13x2; 15x3; 5x4; 1x5 categories)	*34*	*56*
Use of triggered hoses	27	26
Use water efficient devices & processes	30	23
Regular checks for water leaks	20	17
Other*	17	15
Wastewater recycling	16	14
Use of rain water	7	6
Use water efficiency measures (*n*=198)	47	23
Responses	*78*	*100*
- answers with multiple responses (8x2; 8x3; 3x4 categories)	*19*	*36*
Triggered hoses	28	36
Regular checks for water leaks	15	19
Water efficient devices & processes	13	17
Other**	11	14
Wastewater recycling	7	9
Collect rain water	4	5

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple answers were split into categories and counted separately; *e.g. native gardens, don't use/use wisely, dual flush; **e.g. bore water, don't use/minimise, native gardens, mulch.

When the respondents were asked whether they would be interested in free business energy and water efficiency assessments 38% responded yes.

Best method to help

Table 23 shows the methods that respondents in Maddington-Kenwick see as the best to minimise environmental harm from small business. The most frequent response was to educate those in these businesses (37%) followed by law and enforcement (22%) and business support as well as self-management/industry driven initiatives (21% each).

Table 23: Respondents' opinion in Maddington-Kenwick on best method to minimise environmental harm from small businesses (n=205)

Method	*Percentage of responses (%)*
Responses	100
- answers with multiple responses (7x2; 4x4 methods)	*5*
Education	37
Laws and enforcement	22
Support for small business	21
Self management/ industry driven	19
Other (audits; NOT law & enforcement)	1

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple answers were split into categories and counted separately.

Summary Maddington-Kenwick

This concludes the report on the results from the Maddington-Kenwick light industrial area pre-intervention. The next section will outline the results from the Cockburn light industrial area.

Results Cockburn

This section outlines the results in Cockburn pre-intervention. The number of returned questionnaires was n=201.

Business profile and stability

To provide a broad social context to the collected data in Cockburn, profiles of the respondents and the businesses are shown in Table 1 and 2. The demographic profile of the respondents and the businesses are consistent with light manufacturing and service businesses in Australia and elsewhere. That is, this business sector is still dominated by older male owner-operators, with trade related skills, operating at a micro level (i.e. under 5 employees).

Table 1: Profile of Participating Respondents by Percentage in Cockburn

Question	*Percentage of responses (%)*
Position in business (n=200)	
Owner/Manager	67
Manager	21
Administration	5
Other	5
Supervisor/Foreman	3
Gender (n=201)	
Male	85
Female	15
Age (n=200)	
Under 30	7
30 – 40	32
41 – 50	43
51 – 60	17
61 and over	3
Highest Education (n=193)	
High School	25
TAFE	13
Trade	49
University	12

Note: figures are rounded to nearest whole number and exclude cases where no response was given.

Table 2: Profile of Participating Businesses in Cockburn by Percentage

Factor	*Percentage of responses (%)*
Type of Business (ANZSIC code) (*n*=197)	
Manufacturing	47
Wholesale Trade	19
Other	10
Transport & Storage	7
Property & Business Services	7
Construction	4
Retail Trade	4
Cultural & Recreational Services	2
Agriculture/Forestry	1
Communication Services	1
Structure (*n*=196)	
Independently Owned	92
Subsidiary/Branch	4
Head Office Company	2
Franchise	1
Other	1
Premises (*n*=200)	
Owned	44
Leased	56
Employees - Full time (*n*=200)	
1 only	13
2 to 5	41
6 to 19	37
20 and over	10

Note: figures are rounded to nearest whole number and exclude cases where no response was given.

In order to assess the stability of the businesses within the light industrial area during the study period, the respondents were asked to advise of any intention to move out of, or within, the geographic area. The results of this set of questions are shown in Table 3 and indicate that there is little intention to move out of the area in the next 12 months with only 3% intending to move to another location.

Table 3: Expectation to Move Out of, or Within, Cockburn within 12 Months

Factor	*Percentage of all responses (%)*
Move out of Cockburn (*n*=200)	
Yes	3
No	97
Reason given by the 3% who expect to move (*n*=7)	
Other (new premises, expanding, move to new offices)	3
Selling business	1
Retiring	0
Closing business	0
Moving to larger premises within Cockburn (*n*=200)	
Yes	10
No	91

Note: figures are rounded to nearest whole number and exclude cases where no response was given.

Environmental perceptions and attitudes

The interest of respondents in environmental issues was explored using a Likert scale (1 = very low to 6 = very high) and responses are shown in Table 4. The results indicate a high to very high level of interest (i.e. a rating of 5 or 6) by the majority of the small business respondents (75%).

Table 4: Interest in Environmental Issues by Cockburn Respondents (*n*=199)

Interest level	*Percentage of responses (%)*
Very low	0
2	1
3	6
4	18
5	46
Very high	29

Note: figures are rounded to nearest whole number; no response cases are omitted

To put their interest in a local context the respondents' environmental view of their light industrial area were investigated. Collectively, the environmental perception (via a rating scale) of Cockburn light industrial area was quite high with 54% rating it above the mid point (see Table 5).

Table 5: Respondent's Environmental Rating of Cockburn Light Industrial Area (n=196)

Rating	*Percentage of responses (%)*
Very poor	4
2	14
3	29
4	39
5	15
Very good	0

Note: figures are rounded to nearest whole number and exclude cases where no response was given

Critical environmental issues

The respondents were then asked an open question with no prompts or list provided about what they currently rate as the top environmental issue in the Cockburn light industrial area. Table 6 shows that the principle concern is air pollution (45%) which is mainly due to air/dust emissions from large metal recycling businesses, galvanisers, the cement works and spray painters located within the Cockburn and Kwinana areas.

Table 6: Top Environmental Issue in Cockburn Light Industrial Area (n=178)

Environmental issue	*Percentage of responses (%)*
Responses (n=194)	100
- answers with multiple responses (14x2; 1x3 issues)	*8*
Air pollution (dust, overspray, fumes, odour)	45
No issues/all good/don't know	14
Water pollution/drainage management/water use	11
Missing facilities and services (e.g. recycling, public transport)	10
Other (energy use/efficiency; clearing of vegetation; noise; vandalism)	9
Traffic (amount, management, hoons, trucks)	5
Waste production & pollution: management & control	4
Rubbish dumping/litter	1
Visual amenity	1

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple issues answers were split into issues and counted separately; this was an open question without prompts or multiple choices and answers were sorted into categories afterwards.

When asked without prompting to provide a priority list of changes or improvements for the light industrial area the respondents in Cockburn gave precedent to the need for facilities and services such as recycling and public transport (23%) in the area (see Table 7). Other key concerns were related to environment or awareness issues (16%).

Table 7: Respondent's Suggestions for Changes or Improvements to Cockburn (n=144)

Change/Improvement	*Percentage of responses (%)*
Responses (n=160)	100
*- answers with multiple responses * (15x2; 1x3 issues)*	*11*
Missing facilities and services (e.g. recycling, public transport)	23
Awareness/education/support/enforcement	16
Other (energy use/efficiency; clearing of vegetation; noise; vandalism)	14
No issues/all good/don't know	12
Air pollution (dust, overspray, fumes, odour)	12
Traffic (amount, management, hoons, trucks)	10
Water pollution/drainage management/ water use	7
Visual amenity	4
Waste production & pollution: management & control	1
Rubbish dumping/litter	1

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple issues answers were split into issues and counted separately; this was an open question without prompts or multiple choices and answers were sorted into categories afterwards.

As previously stated the Cockburn respondents have shown that they are interested in environmental issues (75%). This is a lower figure than usual as other research findings tend to be above 90%, yet it is a positive result. When further explored (see Table 8), the most common reason for their concern is the same as research has found in other small businesses, the impact on future generations (44%).

Table 8: Respondent's Main Concern about the Environment in Cockburn (n=189)

Main concern	*Percentage of responses (%)*
Impact on future generations	44
Harm to global environment	28
Other**	14
Harm to local environment	5
Harm to Australian environment	5
Impact on your business	4

Note: figures are rounded to nearest whole number and exclude cases where no response was given; **e.g. all, air pollution, wastewater, waste, pollution, water use

Business impacts on the environment

Positive business impacts on the environment were acknowledged (18%) but identified less often by the respondents than negative impacts on the environment (39%). In general, both these impacts were considered by the respondents to have a low level of environmental impact (54% and 74% respectively).

The main types of positive impacts outlined by the respondents included: good environmental practices (60%), provision of environmentally useful/friendly technology/ products (16%), avoidance of harmful or use of better/renewable materials (5%), and product

repair/ recondition/reuse (5%). In addition, several respondents provided a combination of these positive impacts (5%).

The main types of negative impacts identified by the respondents included: air pollution/dust/fumes/odours (e.g. from galvanising and spray painting activities as well as vehicle emissions) (25%), waste production (16%), energy/fuel use (12%), material use (9%), and biophysical impacts (incl. mining, vegetation clearing) (4%). In addition, several respondents provided a combination of these negative impacts (12%).

Wastewater production, disposal and treatment

Table 9 shows that in Cockburn, 19% of all businesses produced wastewater. The main activity that produced wastewater was washing parts/equipment (57%). For some of the businesses that generated wastewater it came from a combination of activities (15%). The most common combination (Table 10) was degreasing and parts/equipment washing (3%).

It is of some concern that the most common method of disposal of wastewater was stormwater/leach/soak drains (39%) rather than a licensed contractor (22%). Combinations of these methods (see Table 10 for details) were also noted by the businesses that disposed of wastewater (12%). Less than half of all the respondents (46%) were aware of where the stormwater drains flowed.

Just under half of the businesses did not treat the wastewater before disposal (47%). When treatment was undertaken the preferred method was an above ground oil/water separator (17%). Other treatment methods were: a sediment trap (14%), other methods of disposal (14%) or a below ground Petrol & Oil trap (8%). Table 10 shows the different combinations of treatment methods that were used (8%).

Table 9: Production, Disposal and Treatment of Wastewater in Cockburn

Question (number of respondents)	*Frequency of 'yes' answers (n)*	*Percent of all businesses (n=201) (%)*	*Percentage of all answers/ responses (%)*
Wastewater Production (*n*=195*)	36*	18	19
Wastewater origin (*n*=36)	36	18	100
Responses	*46*		*100*
- answers with multiple responses (5x2; 1x3; 1x4 categories)	*7*	*4*	*15*
Part/equipment washing	26	13	57
Degreasing	6	3	13
Other**	6	3	13
Cooling baths/systems	4	2	9
Floor washing	4	2	9
Disposal practice (*n*=36)	36	18	100
Responses	*41*		*100*
- answers with multiple responses (5x2 categories)	*5*	*3*	*12*
Storm water/leach drain/soak well	16	8	39
Licensed contractor	9	5	22
Other^	5	3	12
Septic tank system	4	2	10
Open ground	3	2	7
Sewer	3	2	7
Storm water drain	1	1	2
Treatment (*n*=32)	32	16	83
Responses	*36*		*100*
- answers with multiple responses (3x2 categories)	*3*	*2*	*8*
Not treated	17	9	47
Above ground oil/water separator	6	3	17
Sediment trap only	5	3	14
Other *	5	3	14
Below ground Petrol & Oil trap	3	2	8
Chemical	0	0	0

Note: figures are rounded to nearest whole number and exclude cases where no response was given; number of responses is higher than number of answers since combination answers were split into categories and counted separately; *only 192 businesses answered this question and 33 of those answered 'yes', but those who either did not answer but then gave details later were also included here; **cleaning product, cutting fluid, food production, testing equipment, toilet, slowing of drying time; ^ on-site containment, recycling or reuse; * grease trap, taken to landfill and use of robowash.

Table 10: Details of Response Combinations for Wastewater Origin, Disposal and Treatment in Cockburn

Response options/ response combinations	*Percent of all businesses (n=201) (%)*	*Percentage of wastewater producers (n=36) (%)*
Wastewater origin: 1 Degreasing; 2 Cooling baths/systems; 3 Part/equipment washing; 4 Floor washing; 5 Other	18	100
- 1,3 - 2,3; 3,4; 4,5; 1,2,3; 1,2,3,4	1 3 (0.5 each)	3 15 (3 each)
Disposal practice: 1 Stormwater/leach drain/soak well; 2 Stormwater drain; 3 Other; 4 Septic tank system; 5 Licensed contractor; 6 Open ground; 7 Sewer	18	100
- 1,3; 1,4; 1,5; 3,5; 5,7	3 (0.5 each)	15 (3 each)
Treatment: 1 Above ground oil/water separator; 2 Below ground Petrol & Oil trap; 3 Sediment trap only; 4 Not treated; 5 Chemical; 6 Other	16	83
- 1,3; 2,3; 4,6	2 (0.5 each)	9 (3 each)

Note: combinations of the original possible answers, e.g. 1,3 refers to 'above ground oil/water separator AND 'sediment trap only'

Environmental behaviour applicable to the small businesses

Conscious environmental behaviour, that is, behaviour which demonstrates that the individual is mindful of the impact their decisions and actions will have on the environment, was assessed on nine different factors with businesses to determine which behaviours were applicable to their business (see Table 11). This table shows that there is room for improvement in each one of the behaviours, as the responses vary from never to always in all cases. The behaviour most frequently practiced on a 6 point Likert Scale was the use of energy efficient lighting (M=4.2) and this was closely followed by consideration of the environment when making business decisions (M=3.8). The behaviour with the lowest mean on a 6 point Likert Scale was: try to reduce greenhouse gas emissions (M=.5).

Table 11: Mean Environment Related Business Activities in Cockburn

In your business, do you consciously...	*Mean**
Use energy efficient lighting (n=197)	4.2
Consider environmental issues when making business decisions (n=197)	3.8
Buy environmentally friendly products (n=196)	3.0
Ensure staff are trained in environmental issues (n=197)	2.8
Spend extra money to implement environmental practices (n=197)	2.8
Seek information about new environmental initiatives (n=197)	2.8
Go beyond legislative requirements (n=197)	2.7
Try to reduce greenhouse gas emissions (n=197)	1.2
Purchase green energy/use 'natural power' options (n=196)	.5

Note: *Mean rating that is the average of answers given (1=never - 6=always, excluding N/A), 3.5 denotes the 50% mark.

Responsibility for the environment

Table 12 shows that when respondents were asked who should take responsibility for the environment, the community was the most common response (42%). Only 8% of the respondents chose business.

Table 12: Responsibility for the Environment in Cockburn (n=200)

Responsibility	*Percentage of responses (%)*
Community	42
Individual	30
Government	20
Business	8

Note. Figures are rounded to nearest whole amount and exclude cases where no response was given.

When asked what level of government should be managing the environmental issues in Cockburn 70% of respondents thought that local government should be responsible (see Table 13).

Table 13: Level of Government Responsibility for Environmental Issues in Cockburn (n=197)

Level of Government	*Percentage of responses (%)*
Local	70
State	23
Federal	7

Note. Figures are rounded to nearest whole amount and exclude cases where no response was given.

Waste generated

The management of waste generated from businesses in the Cockburn light industrial area is very important for two reasons; large amounts of potentially valuable waste are produced in the area and it needs to be appropriately managed to avoid environmental harm and to reduce waste removal to landfill. Table 14 shows the main types and approximate volume of waste produced in the area per week from the 201 small businesses. Large volumes of steel (nearly 110t), other metals (1.6t), waste oil (985 litres) and tyres (2180 units) are produced.

It was also found that substantial amounts of timber products (65-100%), plastics (ranging from 29-100%), miscellaneous waste (50-77%) and paper/cardboard (61%) are disposed to landfill. These figures support research that small business operations have a substantial impact on the environment[6].

It is obvious from the data that those businesses that produce high volumes of a particular waste product recycle more often than do those with small volumes. Some materials, such as polystyrene, particle board, MDF and glass, all went to landfill, whereas others, such as all of the liquids (with the exception of degreasers which one operator disposed of on site) and virtually all tyres and vehicle batteries were recycled.

[6] Hillary, 2000

Table 14: Waste Produced and Sent to Landfill by Cockburn Small Businesses in One Week

Product	*Producers (n)*	*kg*	*m^3*	*Units*	*Litres*	*Average amount per business (mean)*	*Landfill (% of producers)*	*Landfill (% of waste amount)*
Metals								
Steel	95	109774				1156	10	14
Other metals	29	1599				55	11	0.7
Plastics								
Polystyrene	3		2			0.7	100	100
Plastic drums	49		24			0.2	70	39
Shrink wrap	73		30			0.04	85	91
Car bumpers	7			12		2	29	42
Other plastics	15		10			0.7	69	50
Cardboard & paper								
Combined	173		98			0.1	61	51
Wood products								
Solid timber	57		11			0.002	74	65
Pallets	26			25		1	65	68
Dust	21		15			0.2	86	87
Particle board	16		12			0.8	100	100
MDF	15		8			0.5	100	100
Liquids								
Oil	31				985	32	0	0
Radiator coolant	11				127	12	0	0
Paint	3				3	1	0	0
Thinners	7				72	10	0	0
Degreasers	5				38	8	20*	26*
Filters								
Oil Filters	17		20			1	13	3
Rubber								
Tyres	6			2180		363	17	0.0005
Rubber buffed off tyres	1		1200			1200	0	0
Glass								
Combined	8		3			0.4	75	100
Batteries								
Vehicle	13			50		4	0	0.06**
Other waste								
Electronics	2		3			2	50	33
Miscellaneous	66		229			3.5	77	80

Note: figures are rounded to nearest whole number and exclude cases where no response was given;
* disposed of in on-site storm water well; ** type of disposal not specified

Competitive advantage from waste management

Table 15 shows that businesses were interested in participating in waste management strategies when they could gain a visible or financial benefit. Strategies to gain benefit from recycling efforts of the businesses varied, providing evidence that many small businesses work at a survival/operational level rather than use of a planned strategic approach. For example, Table 15 illustrates where some businesses had received financial benefit, others accepted a neutral outcome from the process or paid for waste removal from the property.

Table 15: Cost of Waste Produced by Cockburn Small Businesses

Product	*Respondents (n)*	*Cost %*	*Income %*	*Neutral %*
Metals				
Steel	92	8	79	13
Other metals	28	4	89	7
Plastics				
Polystyrene	3	67	0	333
Plastic drums	49	35	2	63
Shrink wrap	69	48	0	52
Car bumpers	6	33	17	50
Other plastics	16	69	0	31
Cardboard & paper				
Combined	165	33	2	66
Wood products				
Solid timber	23	70	0	30
Pallets	26	65	0	35
Dust	20	65	0	35
Particle board	15	93	0	7
MDF	14	93	0	7
Liquids				
Oil	26	35	0	65
Radiator coolant	10	70	0	30
Paint	3	100	0	0
Thinners	7	100	0	0
Degreasers	5	60	0	40
Filters				
Oil Filters	16	81	0	19
Rubber				
Tyres	4	100	0	0
Glass				
Combined	8	75	0	25
Batteries				
Vehicle batteries	10	10	10	80
Other waste				
Electronics	1	100	0	0
Miscellaneous	63	57	6	37

Note: figures are rounded to nearest whole number and exclude cases where no response was given

Steel is one of the most economically valuable products to recycling contractors, yet 21% of the businesses were making either no profit or a loss from recycling their steel. Similarly, vehicle batteries were giving an income to only a few of the businesses (10%) and were cost neutral or a loss for the majority (90%), and car bumpers were an income for some (17%) and a cost or neutral (83%) to most. It appears that there may have been some confusion concerning payments for some of these items, since it is, for example, unlikely that income has been received for paper.

Tyres are a major waste item in this area and are not only producing waste *in-situ* there is also a considerable amount of rubber being buffed off tyres as well (1200 m^3 per week). These waste items are always a cost to the business and have been seen as a problem for some time.

While waste management practices vary within Cockburn Table 16 shows that the majority of respondents (67%) indicated that they were prepared to participate in a waste reduction program and that they were interested in more information on waste reduction and recycling practices (66%). Less of the respondents were prepared to have their business name passed to recycling contractors (38%).

Table 16: Indication of Desire to Participate in Waste Reduction Programme and to Receive More Information in Cockburn

Participation item	*Percentage of responses (%)*
Waste reduction program (*n*=200)	
Yes	67
No	33
More information (*n*=200)	
Yes	66
No	34

Note: Figures are rounded to nearest whole amount and exclude cases where no response was given.

Also as most respondents indicated that newsletters (46%) and email (39%) are their preferred method of receiving business information (Table 17) these may be the best media to use to invite their participation and continue to engage them.

Table 17: Preferred Mode of Information Distribution by Cockburn Respondents (n=195)

Method	*Percentage of responses (%)*
Responses	100
- responses with multiple answers (57x2; 12x3; 1x4 methods)	*31*
Newsletter	46
Email	39
Industry magazine	10
Face to face	3
Other	2
Industry seminars	0

Note: Figures are rounded to nearest whole amount and exclude cases where no response was given.

Barriers to recycling waste

Table 18 shows that the key barriers to recycling for small businesses in the Cockburn light industrial area were that they had no council bin to recycle (29%), there were no contractors available to take the waste (19%) or the amount was too small (13%). These barriers are consistent with previous research in the Perth metropolitan area[3,5].

Table 18: Barriers to Recycling Waste Products in Cockburn (n=195)

Barriers to recycling	*Percentage of responses (%)*
Responses (n=297)	100
- responses with multiple answers (57x2; 18x3; 4x4issues)	*26*
No council bin	29
No contractor	19
Amount too small	13
All/most recycled, recycle as much as possible	11
Cost	10
Didn't know you could	7
Other*	4
Not enough space	4
Cannot recycle, not recyclable	2
Not interested	2
No time	0

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple answers were split into categories; * no waste; rely on contractor; no recycling bin; no incentives; too hard to separate; not made fully aware; start soon.

Previous research[3,5] has shown that with increased co-operation between organisations and small business the outcomes are beneficial to all concerned. Table 19 outlines the measures the respondents suggest will assist and shows that they generally have three needs: additional

[3] Walker & Redmond, 2006.
[5] Walker, Redmond & Goeft, 2007

bins (41%), help to find appropriate recyclers (22%) and better financial incentives (19%). Intervention strategies should address these areas specifically.

Table 19: Help for Cockburn Businesses to Increase Recycling (n=170)

Item or initiative to assist recycling	*Percentage of responses (%)*
Responses (n=260)	*100*
*- answers with multiple responses (51x2; 12x3; 2x4; 1x5; 1x6 categories)**	*26*
Additional bins	41
Help to find appropriate recyclers	22
Better financial incentives	19
Other **	7
Knowledge of cost to recycle	4
More room for bins	4
Legal requirement to recycle	3

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple answers were split into options and answers counted separately; * the most frequent combinations contained the most popular categories; ** council bin, more bins, local recycler, recyclers interested in small volumes.

Energy and water efficiency

To determine the current level of knowledge of respondents in Cockburn have of energy and water efficiency, a series of questions were put to them about their knowledge and use of each of these resources (see Table 20 and 21). These tables indicate that the Cockburn respondents are checking on energy use and costs (49% and 51%) more readily than they do on water use and cost (19% and 43%). They are more aware of energy efficiency measures (77%) than water efficiency measures (20%).

Use of energy efficient lights (38%) and changed work processes (25%) were the best known ways to save energy by this group of respondents (Table 20). While use of energy efficient lights (34%) was also the most applied energy efficiency measure, other measures (27%), such as using natural light and turning off power/equipment, were the next most used measures, followed by changed work practices (24%).

Table 20: Energy Efficiency Awareness and Activities of Responding Businesses in Cockburn

Question (number of answers)	*Frequency of 'yes' answers (n)*	*Percentage of answers/ responses (%)*
Check on energy use (*n*=199)	97	49
Keep track of energy costs (*n*=199)	102	51
Know ways to use energy efficiently (*n*=198)	153	77
Responses	*263*	*100*
- answers with multiple responses (29x2; 31x3; 14x4; 3x5 categories)	*67*	*25*
Use of energy efficient lights	*99*	*38*
Changed work process	*66*	*25*
*Other**	*43*	*16*
Use of more efficient machinery	*39*	*15*
Thermal insulation	*16*	*6*
Use energy efficiency measures (*n*=198)	123	62
Responses	*257*	*100*
- answers with multiple responses (36x2; 23x3; 7x4; 3x5 categories)	*66*	*26*
Energy efficient lights	*87*	*34*
*Other***	*70*	*27*
Changed work process	*62*	*24*
More efficient machinery	*26*	*10*
Thermal insulation	*12*	*5*

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple answers were split into categories and counted separately. *e.g. natural light, timers, turn off power, reduce use, off peak power, solar power; **e.g. natural light, turn off power/ equipment, env. mgmt plan recycling

Table 21 data show that the most popular category for water efficiency measures was 'other' (34%) which included a selection of suggestions that ranged from limiting or minimizing water use to the establishment of native gardens as well as use of bore water and storage tanks. Use of trigger hoses (19%) and wastewater recycling (17%) were less well known. The actual use of water saving measures reflected the same preference: 'other' (36%) suggestions were most often chosen and included use of bore water, minimization of water use, establishment of native gardens and desert cubes in urinals, followed by triggered hoses (22%) and wastewater recycling (19%). The water efficiency results seem to indicate that there is much less knowledge about and interest in water saving than energy saving in Cockburn by small businesses.

Table 21: Water Use Efficiency Awareness and Activities of Responding Businesses in Cockburn

Question (number of answers)	*Frequency of 'yes' answers (n)*	*Percentage of answers/responses (%)*
Check on water use (*n*=198)	37	19
Keep track on water cost (*n*=199)	86	43
Know ways to use water efficiently (*n*=199)	39	20
Responses	*47*	*100*
- answers with multiple responses (2x2; 3x3; 2x4 categories)	*7*	*15*
*Other**	*16*	*34*
Use of triggered hoses	*9*	*19*
Wastewater recycling	*8*	*17*
Use water efficient devices & processes	*6*	*13*
Use of rain water	*6*	*13*
Regular checks for water leaks	*2*	*4*
Use water efficiency measures (*n*=198)	31	16
Responses	*36*	*100*
- answers with multiple responses (2x2; 1x3; 1x4 categories)	*4*	*11*
*Other***	*13*	*36*
Triggered hoses	*8*	*22*
Wastewater recycling	*7*	*19*
Water efficient devices & processes	*5*	*14*
Regular checks for water leaks	*2*	*6*
Collect rain water	*1*	*3*

Note: figures are rounded to nearest whole number and exclude cases where no response was given; multiple answers were split into categories and counted separately; *e.g. limit/minimise water use, native gardens, bore water, storage tanks; **e.g. bore water, don't use/ minimise, native gardens, desert cubes in urinals

When the respondents were asked whether they would be interested in free business energy and water efficiency assessments 67% responded 'yes'.

Best method to help

Table 22 shows the methods that the respondents in Cockburn see as the best method to minimise environmental harm from business is to educate those in these businesses (47%).

Table 22: Business Opinion in Cockburn on Best Method to Minimise Environmental Harm from Businesses (*n*=200)

Method	*Percentage (%)*
Education	47
Laws and enforcement	19
Support for small business	19
Self management/ industry driven	11
Other (incentives; supply chain demands; all; combinations of above)	6

Note: figures are rounded to nearest whole number and exclude cases where no response was given

Summary

This research has provided a snapshot of the current attitudes and behaviour in small businesses regarding environmental issues in the light industrial areas of Maddington-Kenwick and Cockburn. Increasing the participation of these businesses in environmental management practices through intervention strategies provided by the Swan Catchment Council and support from local stakeholders, particularly local government who have been identified by the survey respondents as a key stakeholder, should lead to a reduction in waste and implementation of better environmental management practices. These outcomes will be important to the local communities both in terms of economic and social health.

In the final quarter of 2008 the research team will conduct a post-intervention survey in the Maddington-Kenwick and Cockburn light industrial areas to determine the extent of any changes in waste, energy and water management as a result of the intervention program and report on these changes.

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Appendix A

Figure 1: Kenwick-Maddington Light Industrial Area

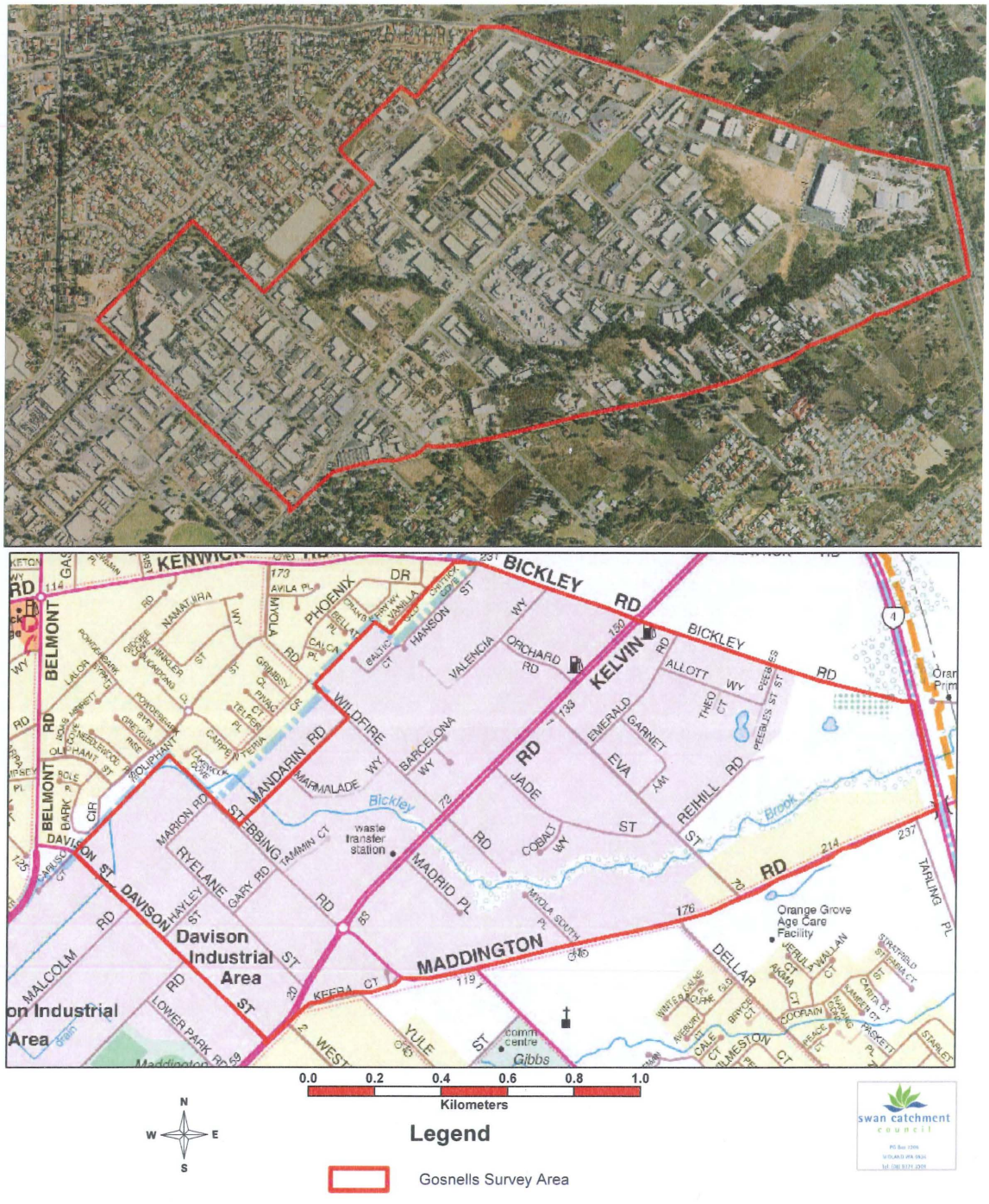

Figure 2: Cockburn Light Industrial Area Part 1

Figure 3: Cockburn Light Industrial Area Part 2