Coastal Catchments Initiative

Industry Stormwater Project

City of Kingston

Final Project Report
March 2008

City of KINGSTON

Acknowledgements

This project was a component of the Institutionalising Water Sensitive Urban Design and Best Management Practice in Greater Melbourne interim project of the Better Bays and Waterways programme. This project was funded by the City of Kingston and the Australian Government through the Coastal Catchments Initiative; a program of the Natural Heritage Trust. It was overseen by a Steering Committee comprised of stakeholder agencies.

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Much of the research of this project depended on the information and assistance supplied by others. Kingston gratefully acknowledges their contribution to the development of this project.

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2 Executive Summary

Stormwater discharges from industrial, small to medium sized enterprises (SMEs) are largely unregulated and receive little or no treatment before entering our waterways and coastal waters. SMEs are extremely widespread and represent 75% of the total number of businesses in Australia. It is widely accepted that the inappropriate on-site activities from these businesses significantly contribute to poor waterway health.

The effects of these discharges are evident in the City of Kingston, where stormwater from approximately 4,500 industrial businesses drain into the Mordialloc Creek and Port Phillip Bay. Melbourne Water's 2004 report; '*Melbourne's Rivers and Creeks*' rated the Mordialloc Creek as 'very poor' for water quality and 'poor' for aquatic life and vegetation.

The City of Kingston undertook this work as part of the Better Bays and Waterways project (water sensitive urban design and best management practices) to further explore the causes of industrial stormwater pollution and build upon the findings and recommendations of Council's earlier work. Funding support was provided through the Coastal Catchments Initiative.

The major component of this project piloted a regulatory stormwater model for local government, based on compulsory audits at SMEs, using the delegated litter provisions (Section 45) of the Environment Protection Act 1970 for enforcement. EPA Victoria provided significant input during the development of the model and supported local government's use of the Act.

Council officers audited a total of 135 industrial businesses. Of these, 47 businesses were found to be operating in a manner that presented an unacceptable risk of stormwater contamination, 3 of which were referred to EPA Victoria for further action. The remaining 88 businesses were either operating to a satisfactory standard, or the audits were not relevant to their business activities.

Each audit compared business activities to a set of best practice stormwater standards and where necessary, made recommendations for improvement. Follow up audits were then undertaken to assess the outcomes and progress of improvements once the agreed timeframe for implementing changes had lapsed.

A stormwater quality monitoring programme was developed and implemented to determine the level of contamination in the industrial sub-catchments. This also provided an invaluable benchmark for use in future water quality monitoring programs. The results of this survey revealed continuous levels of 'background pollution' with heavy metals and hydrocarbon contamination present even at small sub-catchment level.

The audits identified poor housekeeping as the most common cause of this persistent and diffuse pollution, typically caused by everyday 'drips and drops'. If not recovered effectively, this seemingly insignificant material can be transported to external areas by foot traffic, vehicle wheels or wind. Once exposed to the elements, these pollutants are washed into the stormwater drainage system during rain events.

Many business managers associated stormwater pollution with large spills or significant incidents and were not aware that their activities added to the bigger problem. This diffuse pollution is difficult for EPA Victoria to regulate and traditionally, their intervention at SMEs is mostly due to more significant incidents or complaints.

The pilot of the model developed through this project revealed an acceptance for local government as the 'regulatory authority' for stormwater pollution. This was demonstrated by the high level of cooperation and ease of access offered by business operators.

Council provided support for businesses and gained credibility by providing real and practical solutions to stormwater management issues. This support, combined with the acceptance of local government enforcement provided a successful foundation for any future role.

The second component of this project engaged Ainley Projects to further investigate the use of 'structural isolation' devices as a means of preventing stormwater pollution from industrial sites. This was in response to an earlier report funded by the Victorian Stormwater Action Program (VSAP) that proposed residential scale water sensitive urban design (WSUD) features could be used at industrial SMEs if the pollution sources were structurally isolated from the stormwater pathway.

Ainley Projects explored the viability of recessed areas, trench grates, ramps, and bunding, including practicality of construction, maintenance requirements, impact on use, and measure of protection to stormwater quality. This was done through initial investigations, drafting of possible options, a consultation workshop and several meetings with developers, builders, leasing agents and factory users.

'Recessed areas' across the inside of external entrances and 'trench grates' were recommended as the preferred options because of their minimal impact on forklift activity and ease of maintenance. The costs of these structural isolation measures were found to be relatively insignificant when incorporated into the cost of a new building and they would have little impact on the purchase price or rent.

It was believed however, that these devices would only protect stormwater from an internal liquid spill, large enough to flow beyond the confines of an industrial building. The rarity of such incidents was raised by the factory users during the study and as a result, the final report recommended that further investigations are required into the effectiveness of these devices for pollution prevention.

The audit findings and water quality monitoring survey confirmed these findings through the absence of significant spills, despite the continuous levels of contamination found in the monitored sub-catchments. This contamination appeared to be the result of widespread, diffuse pollution, caused by small accumulations of pollutants in external areas, and occasional, sporadic point source events such as deliberate disposal or washing activities.

These results suggested that the recommended structural isolation measures would be ineffective at preventing the most common and widespread forms of stormwater

contamination caused by poor housekeeping, washing activities and deliberate disposal.

The stakeholders' workshop reviewed these report findings and made recommendations to further explore the feasibility of WSUD at site level. It was suggested that residential scale WSUD devices would most likely treat the low levels of pollution discovered during the audits, without the need for structural isolation devices.

It was also recommended that WSUD measures should be 'open', so that any significant pollution event would show a clear link to an individual property through an obvious failure, or contamination of the WSUD device. Incorporating these devices into the site's landscaping may provide a good incentive to maintain their appearance and prevent contamination through deliberate disposal or other direct discharges. Reinstating or maintaining a WSUD feature that had failed due to pollution should be paid for by the occupier of the premises through an agreement with the land owner or suitable authority.

Additional WSUD measures could also be installed at street level to offer further treatment or, in the event of a significant pollution, provide a safety net for the receiving waterway.

3 Introduction

3.1 Project Objectives

This project has two objectives:

1. To develop and test a model for local government use of legislative and regulatory controls to improve stormwater management in existing small to medium sized industrial premises.

2. To further investigate the use of structural isolation devices as a means of preventing stormwater pollution from industrial sites.

3.2 Background

3.2.1 Stormwater runoff from Industrial Areas

It is widely accepted that stormwater runoff from industrial areas contributes to stormwater pollution and poor waterway health. Heavy metals, hydrocarbons, nutrients, litter and oxygen demanding organics are just some of the common contaminants found in waterways receiving runoff from these areas.

Kingston's industry meets the Mordialloc Creek. The confluence of the engineered Settlement Drain and creek can be seen on the lower right hand side of the image.

In Australia, Small to Medium sized Enterprises SMEs account for approximately 75% of the total number of businesses. Stormwater discharges from these businesses are largely unregulated and receive no prior treatment before flowing into the stormwater drainage system and waterways. This issue is believed to be the principle cause of contamination in waters receiving runoff from industrial precincts.

The origins of contamination within industrial precincts are significantly varied, occurring in both point and non point source discharges.

Point Source Stormwater Pollution

Point source pollution within industrial precincts is often very visual and can be attributed to a single activity or identified as having one clear source. They are the result of accidental discharge or deliberate disposal and, once identified, can often be rectified by a single solution on site and regulated by the relevant authority. Point source discharges are the least common means by which pollutants can enter stormwater.

Non-Point Source Stormwater Pollution

Non-Point Source (NPS), or diffuse pollution, defines the common effect caused by widespread, evenly distributed inputs of contamination and is considered the greater long term threat to water quality. In small industrial sub-catchments, this is typically caused by the cumulative effect of lightly polluted runoff, originating from many industrial premises.

3.2.2 Previous Kingston Industry Stormwater Projects

The City of Kingston has nine industrial business clusters which have evolved over many decades of development. Within these are approximately 4500 industrial businesses representing a wide and diverse range of activities. Typical industrial business activities within Kingston include metal engineering, vehicle servicing, waste recycling, food manufacturing, distribution warehousing and plastics manufacturing.

In 2000, Kingston developed the Stormwater Quality Management Plan with two underlying principles:

- To maintain and improve the quality of Kingston's receiving waters by improving the quality of stormwater discharging into them.

- To reduce the risks of damaging the environmental values and beneficial uses of Kingston's receiving waters.

The plan identified these industrial clusters as a threat to the health of local creeks and Port Phillip Bay.

To address this, Council successfully applied for funding from the Victorian Stormwater Action Program (VSAP) to implement several stormwater projects. Those projects that related to industry were a stormwater education program for

industrial businesses, a feasibility study of Water Sensitive Urban Design (WSUD) for industrial premises and the development of industry specific stormwater guidelines.

The industry stormwater education program recruited over 100 businesses to receive a site visit from Council staff. Once visited, each business was informed on their performance and given advice on how to manage their on-site activities to prevent stormwater pollution.

Kingston engaged consultants Ecological Engineering to carry out the study into the applicability of WSUD for industrial premises. The findings of this report identified that WSUD treatment devices could be applied to industrial sites if there were measures in place to isolate the active work areas from the stormwater pathway. 'Structural isolation' measures were raised in Ecological Engineering's report as a possible means of achieving this.

3.2.3 Areas for Investigation

Piloting local government's use of legislative and regulatory controls enabled Council to gain a better understanding of the stormwater management issues and barriers faced by industrial businesses. Additionally, this project continued to explore the sources of stormwater pollution and risks associated with poor practices.

The 'structural isolation' measures proposed by Ecological Engineering's 2006 report were investigated to determine the most feasible method of protecting the stormwater pathway from pollution from within an industrial premise.

4 Project Components

The overarching aim of the project was to develop and pilot a model enabling local governments to minimise stormwater pollution from small to medium sized industrial businesses.

It trialled the use of compulsory site audits by Council and utilised a set protocol to guide each business towards the required standards set by Council.

An investigation of current best practice standards for stormwater management and relevant legislation was carried out prior to the development of this model. Educational material for businesses was also developed to support the site audits.

A water quality monitoring program was developed and applied in the local stormwater drainage system, before and after the audit program, to assist in the evaluation of the site visits.

Additionally, the project built upon the findings of a previous Kingston study and explored the feasibility of Structural Isolation devices in 'new build' industrial premises.

4.1 Development of Best Practice Standards

An investigation of current national, and international, best practice standards for industrial stormwater management was completed to gain an operational benchmark for the program.

The findings of this research were summarised in one comprehensive document entitled; Best Practice Guidelines for Stormwater Management by Small to Medium sized Industrial Businesses. These guidelines provided an overview of the most relevant best practice standards for small to medium sized industrial businesses. A copy of this document can be found within the environment pages at: www.kingston.vic.gov.au

It identified the most common activities carried out in SMEs, that are considered to pose significant risks of stormwater pollution, and provided advice on the current best practice to manage these risks.

The activities were grouped and addressed under the following categories:

- Storage and management of liquids.
- Cleaning, wash down & maintenance,
- Litter and waste management, and
- Storage and management of materials.

4.2 Development of Local Government Enforcement

Unlike previous educational programs carried out by Kingston, this project set out to trial the use of compulsory audits, by local government, of industrial SME activities. It was envisaged this approach would get more businesses thinking about stormwater protection than had ever been possible, including those with little regard for their impacts on water quality.

4.2.1 Review of Enforcement

During the early stages of the project, an extensive review was done on the current enforcement of industrial stormwater quality management standards in Australia. It looked at the relevant legislative controls for each state, who administered them and how they were applied to manage poor practices within SMEs.

In Victoria, the EPA is responsible for regulating any activity that causes, or is likely to cause pollution of waters, including those at industrial SME premises. It does this by administering the relevant acts, regulations, State Environment Protection Policies (SEPPS), Waste Management Policies (WMPs) and other legislation.

In practice, industrial SMEs are too numerous to be regulated proactively by the EPA and intervention is most commonly due to reported occurrences of poor practice or actual pollution of waters.

4.2.2 Development of a Local Government Enforcement Protocol

A strong partnership between the City of Kingston and EPA Victoria was established early in the project to develop a clear enforcement protocol and legislative tools for local government.

With guidance from the EPA, it was established that the delegated litter provisions of the Environment Protection Act 1970 (Part VIIA) could be used to enforce activities at SME sites that present a risk to stormwater quality.

Under the Act, litter is defined as:

"…any solid or liquid domestic or commercial waste, refuse, debris or rubbish.....but does not include any gases or smoke or any waste that is produced or emitted during, or as a result of, any normal operations of the mining, building or manufacturing industry..."

EPA Victoria interpreted the term 'normal operations' within this definition, as SMEs that operate in an environmentally responsible manner or to best management practices. Where poor practices do occur, for example; allowing debris or liquid to accumulate in outdoor areas, these can not be regarded a 'normal operation' of industry and should be classed as litter.

The offence of littering is presented in Sections 45E (a) and (b) which states a person can only deposit litter in an appropriate place and that it cannot leave that place without human assistance. Using the previous example, allowing debris or liquid to accumulate in outdoor areas would be regarded as littering and an infringement of Section 45E.

The enforcement protocol recommended that, when necessary, authorised officers from local government use the 'litter abatement notice' (Section 45ZB) as the most appropriate enforcement tool for breaches of the Act. Additionally, sites identified with significant pollution (or risk of) should be passed on to EPA Victoria for further action

4.3 Development of educational resources

Stormwater educational material was required to support Council officers conducting the audit and provide business operators a point of reference for after the visit. A review of Kingston's previous educational publications revealed gaps when compared to current thinking and the Best Management Standards for Stormwater Management document. These gaps were addressed by the production of new educational resources. Some examples of this educational material are contained in Appendix A.

4.3.1 Development of the Industry Stormwater Guidebook.

Prior to this project, Kingston's most recent educational resource for stormwater was a series of 4, industry specific manuals entitled; 'Sustainable Industries – Stormwater Guides'. These were easy to read and filled with bright, bold illustrations conveying, what was then, the most up to date information on stormwater management for industrial SMEs.

In the review, these were found to be too specific and changes were required to update these guides and make them more applicable to more industries. This resulted in the production of a single document, the 'Industry Stormwater Guidebook', combining elements of the previous four but with some key additions and new illustrations.

This document was tested with co-operative businesses during the initial audit trials and revised accordingly.

4.3.2 Development of the Industry Stormwater Brochure

Feedback from industrial business managers on the Industry Stormwater Guidebook was mixed. While some found it useful as a reference, many found it too long to be useful and that it may not be used effectively.

It was established that the core principles of best practice stormwater management would be more appealing to business managers if they could be presented on a single page document.

This led to the production of the Industry Stormwater Brochure. This is a simplified, single leafed document that provided all of the basic points about stormwater and the common issues faced by business operators. Additionally, a simple self audit checklist was printed onto the rear of the document to help businesses asses their performance.

A communication consultant assisted in the production of the brochure in order to make it concise and more appealing to busy site managers.

The draft version of the brochure was tested during the trial phase of the of the site audit program.

4.4 Development of a Model for Local Government

4.4.1 Audits and Assistance

An audit approach was developed to assess stormwater management in small to medium sized industrial premises. It was agreed that the role of local government, in the first instance, must be to assist and encourage businesses towards minimising their impact on stormwater quality.

Enforcement action and EPA referrals would only be used as a last resort when cooperative efforts failed or where serious or significant circumstances required such measures.

The final model was developed around the following basic principles:

- Compulsory stormwater audits for all businesses within the targeted catchments.
- Business owners or site managers must accompany Council officers throughout the site visit.
- The timing of each visit must be kept to a minimum (target: 10 minute maximum).
- All site visits should be done on a 'cold calling' basis wherever possible.
- Each audit must be carried out by two authorised officers. (Under Section 224 of the Local Government Act 1998 and Section 45 of the Environment Protection Act 1970)
- Each site assessed using a simple checklist derived from the Best Practice Management Guidelines for Stormwater Management document (Kingston).

A basic, site inspection process and approach for Council officers was developed with the following steps:

1. **Door knock and introduction**

   Wear/carry relevant Personal Protective Equipment (PPE), audit tools and identification to each site.
   Ask to see the site manager or business owner.

If no manager is available:

1. Make a new appointment whilst at site (where possible)

Or:

2. Take details and phone back to arrange revisit

2. Describe the purpose and intentions of the site visit

Explain that Council need to inspect each site to determine the source of stormwater pollution detected by the water quality monitoring survey
Ask if the site manager or business owner has a few minutes to accompany Council's stormwater staff around the site.

3. Clear OHS Issues

Ensure that any site specific OHS issues or company procedures are understood and addressed.

4. Commence site inspection

Starting at the front of the premise, lead the site manager through the site and inspect:

- Infrastructure: stormwater drains, pits, gutters etc.
- Equipment that uses water and its discharge point.
- Liquid storage and handling operations.
- Cleaning, washdown and maintenance operations.
- Litter and waste management activities.
- Storage and management of goods and materials.

During the inspection, ask about their business (eg the products made or the procedures in the manufacturing process) to gain more information on what may present a risk to stormwater quality.

5. Indicate areas of concern to the site manager during inspection

Point out any areas that present a risk to stormwater quality.
Make a note of these issues on the inspection audit report form.
Continue with the inspection. Appendix B highlights the inspection report form.

6. Return to the site office/starting point and discuss the findings of the audit

Provide feedback of the audit findings.
Where issues were identified, discuss the possible solutions with the site manager.
Leave the site manager with a copy of the Industry Stormwater Brochure and Industry Stormwater Guidebook.

7. Record results and mail out correspondence

Enter the results of the audit onto the Stormwater Audit Database.

Send an electronic copy of the audit results to each business, incorporating any recommendations and timeframes where issues are found.

4.4.2 Follow up audits

Follow up audits were required to check the implementation of Council recommendations, once the agreed timeframe had lapsed.

Sites that had followed the recommendations, and reduced their risk of polluting stormwater, were acknowledged as having met the City of Kingston's requirements and received a Stormwater Management Certificate.

If the follow up visit revealed no improvements had taken place, then a further follow up visit would be required. More emphasis would be placed on the importance to change the activity, either using the environmental benefits as a driver or the possibility of enforcement action.

Business that had commenced working on the recommendations received further follow up visits and support until the tasks were completed.

Enforcement action or EPA referral would most likely be taken at sites where no improvements had commenced after the second follow up visit and the attitude of the site operator was belligerent.

4.4.3 Audit Enforcement Protocol

The audit enforcement protocol was developed from the findings of the enforcement review and the partnership with EPA Victoria. Council responses were established for both minor and significant breaches of the Environment Protection Act 1970.

Minor Breaches of Section 45 of the EP Act 1970

These are common on industrial sites and are typically the result of ignorance, poor housekeeping, poor practice and accidental spillage etc.

Examples of this include litter build up around the site, storing materials in a way which allows them to become litter, failing to clean up after a potentially polluting spill, discharging wash waters into the stormwater drainage system and leaking containers.

Council response to minor breaches during audit:

1. Raise the issue with the site manager, whilst on site, and record the breach on the audit report form.

2. Recommend and discuss realistic, cost effective, solutions.

3. Leave supporting information with site manager.

4. Record the details of the breach onto the checklist and database.

5. Write to the site manager summarising the on site discussions with particular attention to:
    - The nature of the breaches found on site
    - The possible recommended solutions discussed on site
    - The intention to revisit the site.

6. Carry out a follow up visit and confirm polluting activity has ceased.
7. Allow more time and another follow up visit if progress has been made to resolve the issue.

8. Serve the company with a Section 45ZB Litter Abatement Notice if no progress has been made and/or the attitude of the site manager is belligerent.

Significant Pollution and Significant Breaches of Section 45 of the EP Act 1970

These breaches are typically the result of deliberate action, where the site operator knowingly permits the release of litter to stormwater or has caused significant pollution from their on site activities.

Common examples include the deliberate disposal of oils and wastes into the stormwater drainage system or large incidental releases of contaminants.

Council response to significant breaches during audit:

1. Explain to site manager the implications of their actions and that the activity must cease.

2. Pass company details on to EPA Victoria for further investigation.

Advising a business manager of a significant breach may illicit a strong response. Personal safety must be observed at all times and under some circumstances it may not be safe to continue the audit.

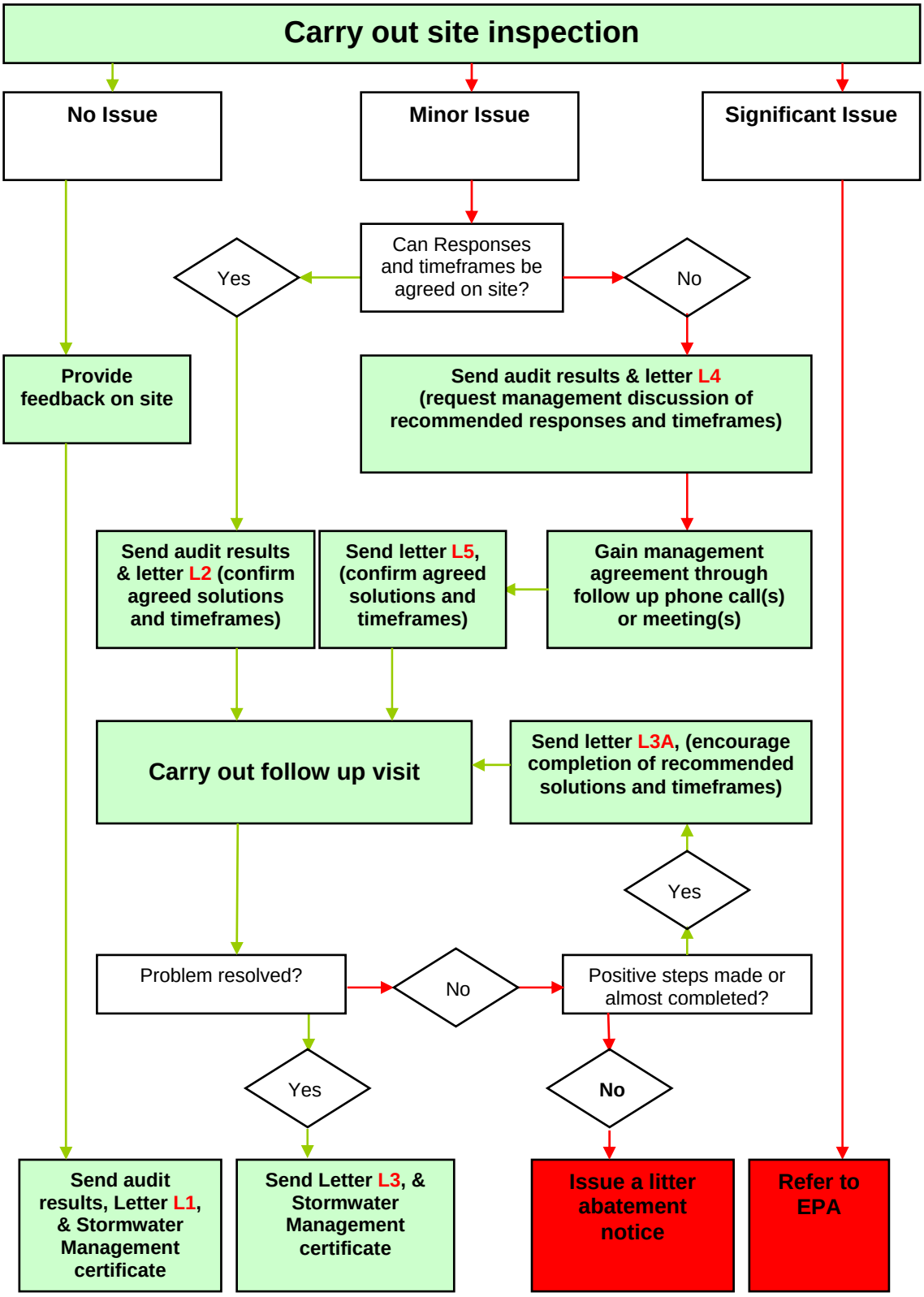
4.4.4 Referral to EPA

The enforcement model was developed so that any business found to be causing, or at risk of causing, significant pollution would be referred to the EPA for further action.

EPA Victoria worked closely with Council to determine the threshold at which ‘problem sites’ should be referred to the EPA. It was concluded that Council should attempt to influence change at every site unless their activity was causing significant pollution.

Additionally, it was agreed that business operators who were hostile, or failed to cooperate with Council directions should also be referred to the EPA for further action.

4.4.5 Short Trial of audit protocol



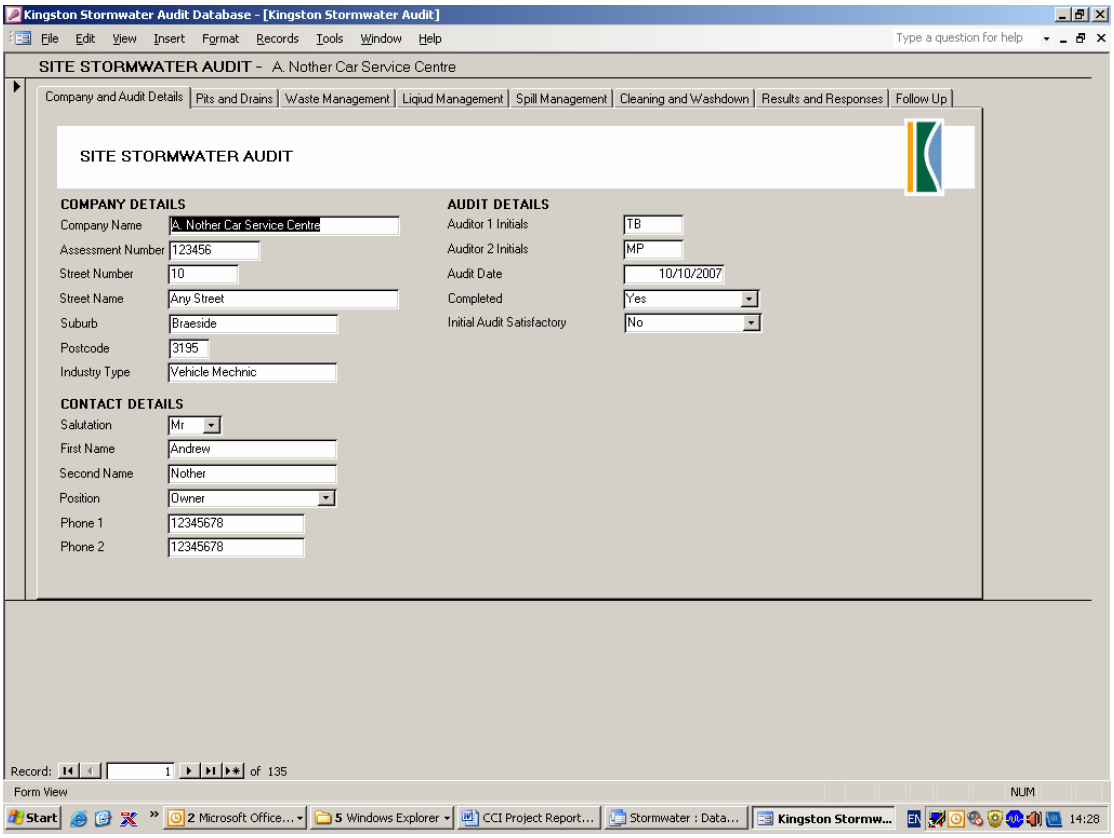
The flow diagram above outlines the local government audit and enforcement protocol developed during the project.

Ten businesses, which had participated in previous Kingston programs, were invited to assist Council in the trial of the audit protocol. The findings and feedback of these 'dry runs' was used to refine Council's educational material, audit approach and audit checklist prior to the audit pilot.

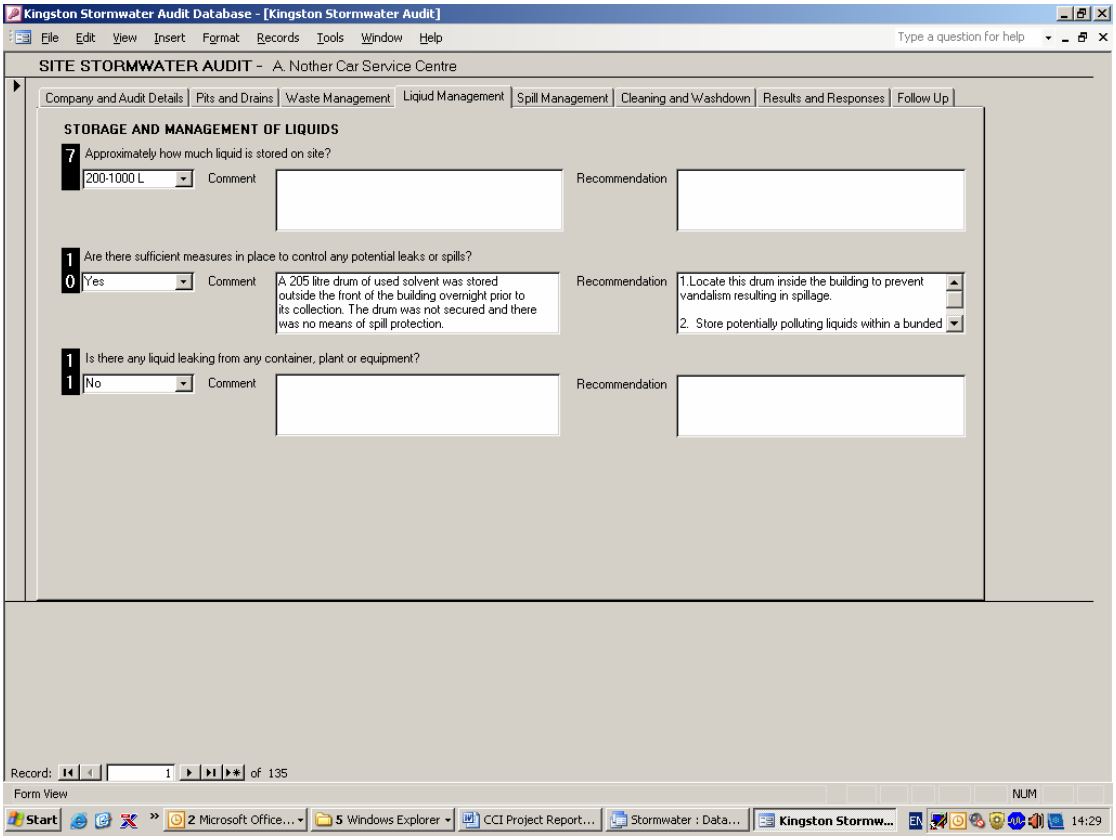
4.5 Development of a Stormwater Audit Database and Tracking System

A software consultant was engaged to design and construct a stormwater audit database in Microsoft Access. The principle purpose of this database was to record the findings of each audit and track the status of each business, towards completion of their on-site improvements.

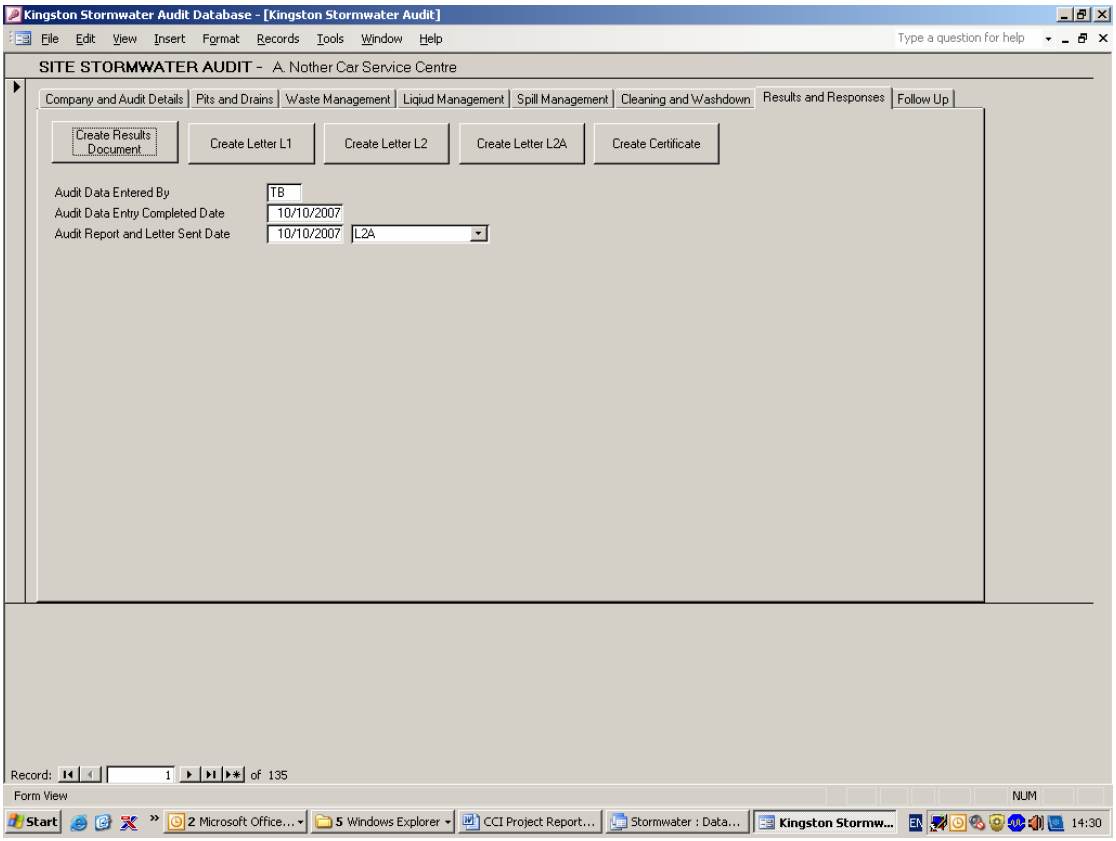
Standard letters, site audit reports and stormwater management certificates could all be generated by simple functions within the database.



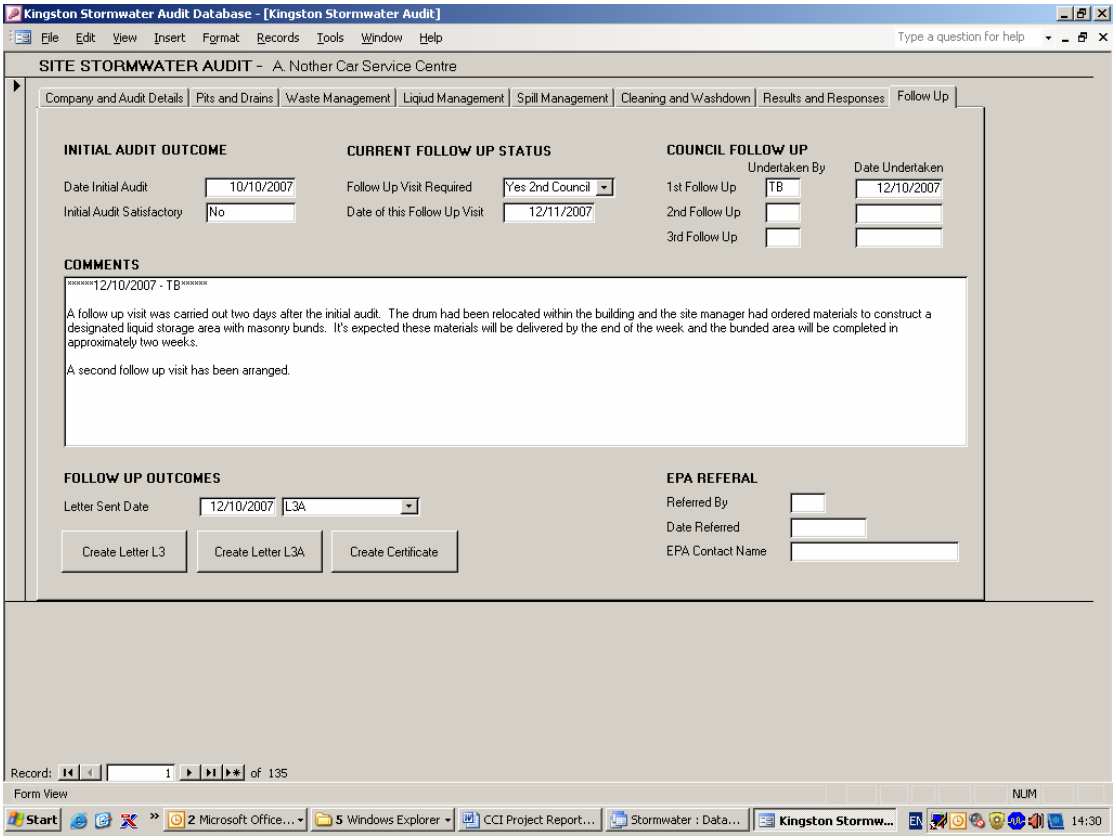
Company and initial audit details are entered onto the first screen of the database.



The findings and agreed recommendations of the audit are entered within the relevant category tabs. The database uses this information to generate the audit results report.



The audit results, letters and stormwater management certificate can be generated into Word documents from this page.



Where necessary, follow up actions are recorded on the final page of the database. This information was used to track the status of each business.

4.6 Development of Stormwater Quality Monitoring Program

A stormwater quality monitoring program was implemented to better identify the nature and sources of pollution from Kingston's industrial areas and to monitor improvements gained through the audit program.

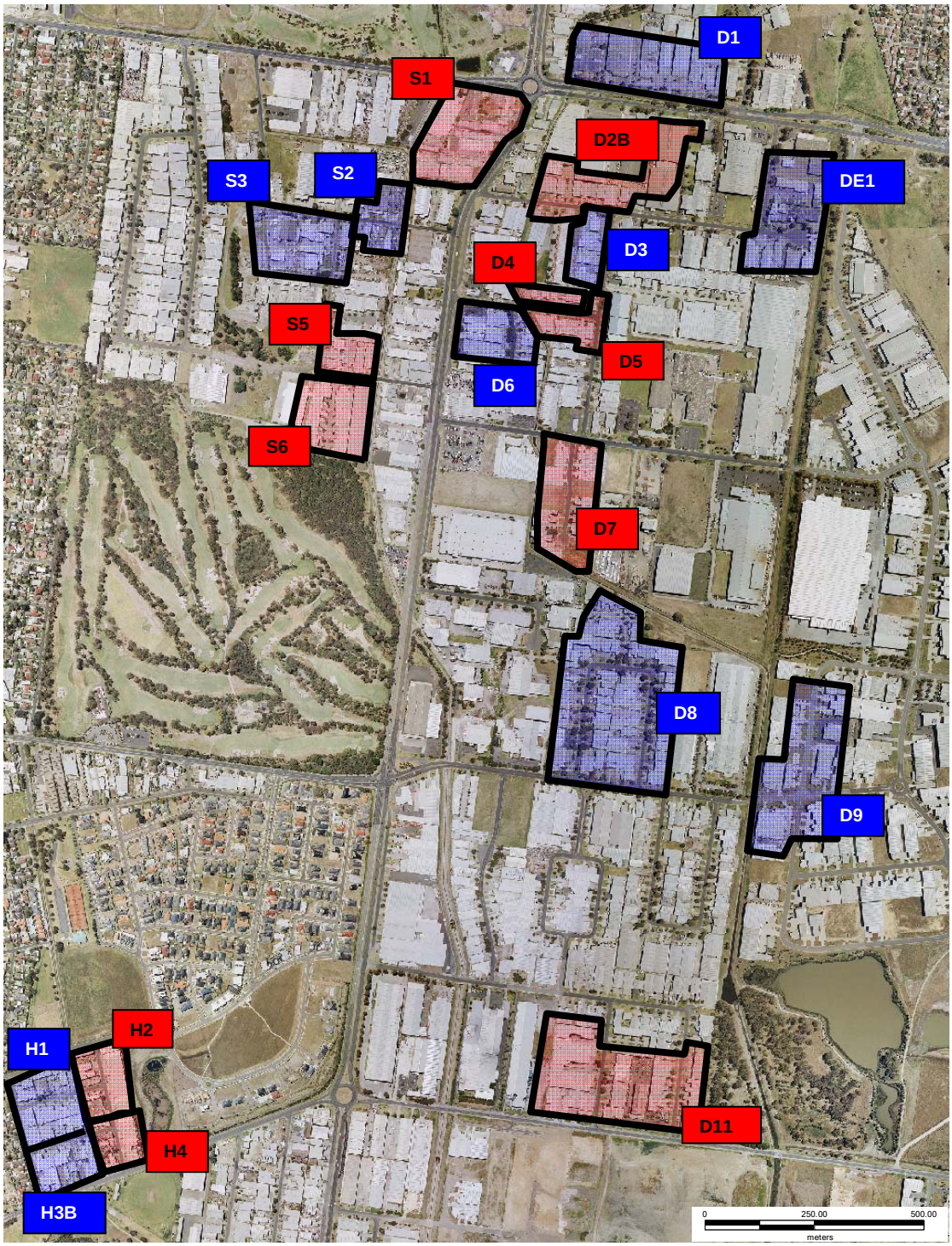
Kingston's southern industrial suburbs are served by a network of open stormwater drainage channels with many, easy points of access. These factors determined the location of the monitoring program and, ultimately, the suburbs in which the audits took place.

Melbourne Water and the University of Melbourne's 'Centre for Environmental Stress and Adaptation Research' (CESAR) developed a simple, cost effective approach to monitor each sub-catchment. This consisted of a porous bag, containing Granular Activated Carbon (GAC), anchored across the discharge point. GAC was chosen for its ability to retain heavy metals and hydrocarbons within the media.

Twenty small sub-catchments, totalling around 400 industrial premises, were chosen for the project study area. Each of these sub-catchments discharged directly into an open stormwater drainage channel and was not influenced by stormwater runoff from residential areas.

The survey was designed to monitor each catchment for seven days to capture the complete weekly cycle of on-site activities. This was conducted for eight weeks, both

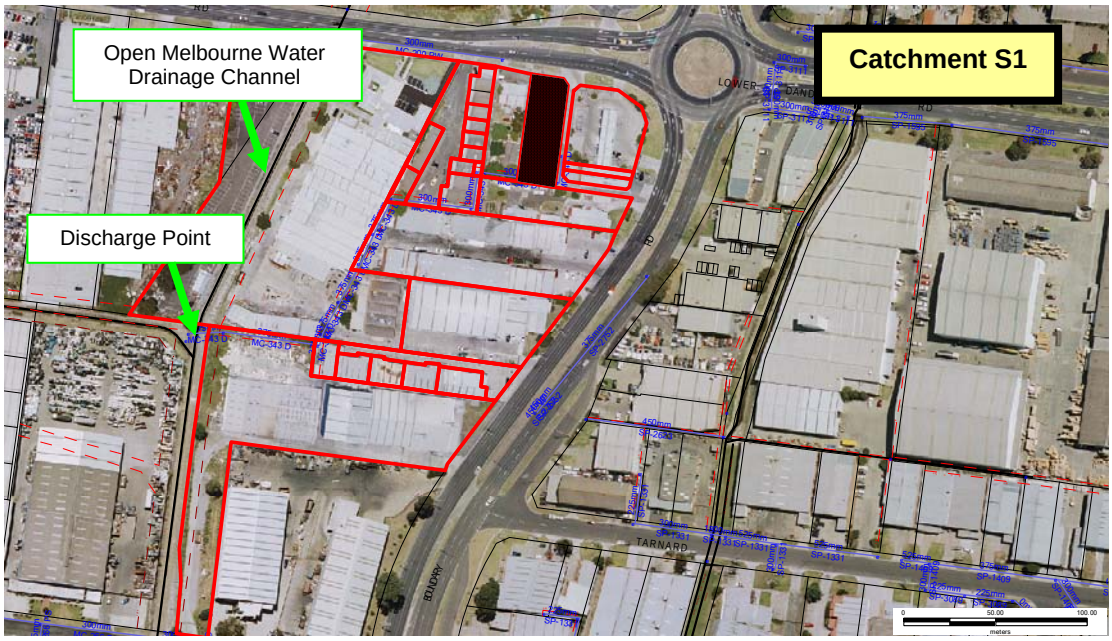
before and after the audit program, to determine if the site visits made improvements in water quality.



The 20 sub-catchments used for the audit pilot program – Every business within the red zones received an audit.

This unique monitoring technique was the subject of a paper *Bagging industrial drains: a solid media survey of stormwater contamination* (Marshall S, Pettigrove V, Potter M, Barrett T, Pfitzner M.). This paper was presented by CESAR at the International Rainwater and Urban Design Conference held in Sydney, August 2007.

CESAR, Melbourne Water and the City of Kingston were also presented with a merit award in stormwater excellence by the Stormwater Industry Association of Victoria (SIAV) for the development and trial of this unique monitoring method.



An example of a sub-catchment: All property boundaries within the catchment are identified by a red border. The stormwater drainage network is highlighted in blue.

A porous bag containing GAC anchored across a discharging stormwater drain.

4.7 Piloting of Model

The twenty sub-catchments were divided into 'matching' pairs according to their industry types, size and the approximate age of precinct. For the benefit of the water quality monitoring survey, half the sub-catchments were used to pilot the model, the other half used as a control group. Businesses within the control group of sub-catchments did not receive an audit from Council.

Each group of catchments provided a good representation of typical, mixed, small to medium sized industrial businesses. Vehicle mechanics, metal engineering workshops, warehousing distributors, plastics manufacturers, joiners and construction companies were just some of the more common types of industry located within these precincts.

Audits were carried out consecutively, street by street, until every property had been visited by Council. A total of 135 businesses were audited during the pilot program.

The pilot program tested the effectiveness of the audit approach, enforcement protocol, EPA referrals, educational material and the stormwater audit database.

4.8 WSUD and New Industrial Premises

An earlier VSAP report, 'WSUD for Industrial Areas' identified that residential scale WSUD treatment devices could be applied successfully within industrial precincts if industrial pollutants were 'structurally isolated' from the stormwater pathway.

Roofing of all work areas and on-site, engineered spill containment devices were just some of the structural isolation measures recommended in the report.

For this project component, Council engaged Ainley Projects to further investigate and report on the feasibility of structural isolation measures in new build, multi use industrial 'shells' for SMEs.

It explored the viability of recessed areas, trench grates, ramps, and bunding including practicality of construction, maintenance requirements, impact on use, and measure of protection to stormwater quality. This was done through initial investigations and drafting of possible options, a consultation workshop and several meetings with developers, builders, leasing agents and factory users.

The results of this study were presented at a workshop with stakeholders from EPA Victoria, Melbourne Water, The City of Kingston, Environment and Land Management and Ainley Projects. The focus of this meeting was to discuss the project findings and their implications for any further development of pollution control in new industrial premises.

5 Project Findings

5.1 Stormwater Management Practice in SMEs and Audits

Council's stormwater officers visited a total of 135 industrial businesses during the audit pilot. Of these, 47 businesses were found to be operating in a manner that presented an unnecessary risk of stormwater contamination, 3 of which were referred to EPA Victoria for further action. The remaining 88 businesses were either operating to a satisfactory standard, or the audits were not relevant to their business activities.

5.1.1 Audit Findings

First Impressions

One of the initial concerns regarding the audit process was how to gain entry at each site. To overcome this, a simple introductory dialogue was used to explain how the monitoring survey had revealed some concerns about stormwater and water quality from the industrial estate. Talking about water quality appeared to strike a chord with business managers and projected a real need for the stormwater officers to investigate each site.

After this brief explanation, the Council officers asked if the site manager was available to accompany them around the site for five minutes so their premises could be confirmed as not contributing to the issue.

Responses to the introduction provided a good snapshot of the manager's awareness of what stormwater is or how their activities can contribute to poor waterway health.

Some of the more common responses given were as follows:

- our activities do not pollute stormwater
- our site does not produce any liquid wastes, so there is little risk
- we do not use or discharge stormwater
- our bathroom and kitchen are the only connections to stormwater
- our roof is the only stormwater connection so we can't be polluting

It was found that the most effective way of gaining entry after these responses was to politely ask the manager to show the officers their 'clean site' so it could be ruled out as the cause of the water quality issue. Gaining entry proved more difficult if discussions on stormwater education had begun before the inspection had commenced.

This introductory approach proved extremely successful and the vast majority of site managers invited the officers onto their premises at that time. Managers that were too busy were asked to provide a time and date for another appointment before the officers moved onto the next site. No business manager refused Council staff entry onto their premises.

The physical appearance of Council staff was also considered an important contributing factor to gain entry at each site. Stormwater officers wore 'uniforms' of hi-visibility vests, safety boots, identification badges and polo shirts with Council logos. This projected a professional and authoritative presence.

Environmental Awareness and Responsibility

The effects of 'mass media mainstreaming' of environmental issues, such as water conservation and global warming, were evident during the audits. Every business operator had an awareness of these topics and some had even responded by making changes to their operations such as installing water tanks or recycling their process waters.

This new level of environmental enthusiasm extended to the stormwater audits, even though many businesses did not clearly understand how their activities could compromise the health of local waterways. Those activities that were identified as contributing to stormwater pollution were nearly always caused through ignorance of the site operator and not through any deliberate or malicious action.

It was clear that almost every site manager knew they had an environmental responsibility not to pollute and these businesses did not want the stigma associated with being a polluter.

Where potential stormwater issues were identified, the response was positive with every business working with Council to reduce their impacts, except those referred to the EPA.

EPA Referrals

Only 3 businesses were referred to EPA Victoria throughout the audit program.

The first of these occurred within the initial two weeks when stormwater officers discovered a large (approx 10,000 litres), unbunded oil tank, situated in an unsecured yard, 5 metres from a stormwater drain. Additionally, there was no spill kit on site and poor housekeeping had led to significant accumulations of fine calcium powder around the factory floor.

The business manager was cooperative and let the Council officers onto his site but he disagreed with their findings and indicated he would not undertake any remedial works.

It was felt at the time that these issues were too great for Council to resolve and the matter was passed to EPA Victoria, as arranged during the development of the model. Their intervention resulted in the business manager agreeing to install bunding around the oil tank and to keep a spill kit onsite.

Towards the end of the program, the stormwater officers' confidence had developed and Council managed to resolve issues at a business with a similar situtaion, once preliminary checks with the EPA had been carried out.

The other two sites, a vehicle mechanic and a meat processing business, had more serious pollution issues and were referred to the EPA.

Local Water Authority Partnership

Good partnerships with the local water authorities were established to overcome the problem of unidentified disposal connections. On two occasions the stormwater officers found external, engineered wash bays but could not determine if these were connected to the sewer or to stormwater. A quick check with the trade waste field officer revealed that neither of these businesses held a trade waste agreement. These issues were followed up and resolved by the regional water authority

Risk versus actual pollution

Every stormwater issue highlighted during the audits could be divided into two general categories; activities that presented a risk of stormwater pollution, and those that were actually contributing to stormwater pollution.

Activities were deemed as actually contributing to stormwater pollution if the contaminants were beyond the control of the site operator. This included dormant activities such as long-term outdoor storage, where there was a potential for the next rain event to transport the pollutants into the stormwater drainage system. These types of activities were very common amongst small businesses.

Less frequent were those issues associated with risk of stormwater contamination. These were activities located within reach of the stormwater pathway, without the protection of safeguards to prevent an incidental or accidental release of pollutants to stormwater.

The following section highlights the most common risk issues and causes of actual pollution encountered during the audit pilot program.

Main risk issues

Poor liquid storage and management

- Storing significant quantities of liquid (more than 1000 litres) without secondary containment
- Locating drums of liquid close to stormwater drains (unprotected)
- Storing Intermediate Bulking Containers (IBCs) or 205 litre containers close to traffic areas
- Storing open containers outside
- Decanting liquids/liquid operations in unprotected, outside areas
-

Inadequate protection from spill kits

- No spill kit
- Inadequate spill kit

- Not enough spill kits
- Spill kits not located in the right places

Main causes of actual pollution

Wash/waste water disposal

- Tipping wash effluent into the stormwater drain or gutter
- Washing vehicles, equipment or plant on areas draining to stormwater

Outside work activities and storage

- Storing oily or rusty equipment in outside areas
- Storing products coated with dusts or process residues outside
- Allowing effluents from work activities to enter the stormwater drain
- Storing residue coated containers outside without protection

Poor Housekeeping

- Allowing sediment, dust or liquids to accumulate in outside areas
- Allowing litter to accumulate in outside areas
- Tracking sediment or mud from active work areas into outside areas
- Tracking product or waste materials from active work areas to outside areas
- Failing to adequately clean up after drips, drops and spills

The Absence of Spills

During the audits, advice was given on how to prevent an accidental spill escaping to into the stormwater drainage system. While this information was important in reducing the risk of stormwater contamination, it did not address the actual pollution occurring at the time of the visit.

Significant spills at small to medium sized industrial sites appeared to be rare occurrences and no business displayed evidence of such an event. Minor drips and spills were found at many sites, but these could be easily managed with rags or a handful of absorbent material. Business operators did not categorise these minor events as a spill.

Importance of Housekeeping

The stormwater quality monitoring survey revealed continuous ‘background’ levels of contamination in every small sub-catchment. Poor housekeeping was assessed to gauge its likely impact on continuous, low level pollution.

The quality of housekeeping was extremely varied and there were no clear links with industry type or business size. Professional image, perception of untidiness, health

and safety, and levels of tolerance to working in an untidy space were all contributing factors to effective housekeeping.

Common trends were, however, noted in the way pollutants were transported into the stormwater pathway. Continuous or repetitive tasks, such as a vehicle mechanic draining an engine or a machine operator changing a sawdust extraction bag, frequently resulted in small amounts of polluting material falling onto the factory floor.

To the operator these drops can appear insignificant and often too small to recover at that time. If this material is not recognised as a health and safety risk, or if the business does not look too untidy, it is more time efficient to recover the material once the activity is complete or when enough material has accumulated to make the recovery task worthwhile.

If not recovered effectively, these seemingly insignificant drops get carried by foot traffic, vehicle wheels or wind to external areas where they can be washed into the stormwater drainage system by rain events. The risk of stormwater pollution is even greater where activities occur in external areas, such as storage and unloading.

Evidence of this continuous, low level pollution was widespread throughout the audits and many businesses had stained concrete or small accumulations of polluting material beyond the confines of their buildings.

Whilst bunding, cut-off trenches, and spill kits can reduce the risk of significant pollution from an industrial site, they are largely ineffective in preventing this type of pollution tracking towards the stormwater system. Good housekeeping is the simplest and most cost effective way of dealing with this issue on site.

One of the most significant barriers to effective housekeeping appeared to be the business managers' perception of what actually causes pollution and how their small contributions can add to the bigger problem.

Providing Assistance with Specific Practical Advice

Where problems were identified, Council sought to provide advice on simple, cost effective solutions. There was often more than one solution to an issue and businesses were encouraged to get involved with the design and implementation of the recommended measures.

A simple hierarchy of treatments was used by the officers to determine the most appropriate approach to an issue. Fundamentally, this tried to ensure that all sources of contamination were prevented at source, rather than at the point of discharge. For example, small foam off-cuts were found littering the yard area of a plastics factory. These were being generated inside the plant and then taken by forklift, in large bags, to the waste bin in the yard. For this scenario, the site officers looked at the location of the bin, the method of storage and transport before considering a filter at the stormwater drainage pit.

Not all businesses followed the recommendations and some managed to find their own solutions to minimise stormwater pollution. One example of this occurred where a marquee hire company used a high pressure water cleaner on the returned marquees. The effluent from this activity discharged to the stormwater drainage system.

Council's recommendations proposed ways to isolate the pressure washing activity from the stormwater drainage system, including the construction of a purpose built wash bay. Using their own initiative, the business resolved the issue by utilising a wet industrial floor scrubber on marquees that were spread out inside the building. This machine vacuumed and recycled the wash water with negligible runoff.

Not all of the sites could be resolved by simple solutions. Recommendations were given to two businesses to seek external, professional assistance from specialist consultants. One of these businesses required an engineering solution to capture and treat yard runoff that had become contaminated with tiny metal particles known as swarf. The other had outgrown their liquid storage area and was looking to re-design the layout and drainage of their yard to improve working efficiency and reduce the risk of pollution.

Issues with recommendations

No business disputed the necessity to change their activities or site arrangements to prevent stormwater pollution.

For most businesses this audit was the first time they had considered their impacts on waterway health and, once issues were identified, Council officers were positively surprised at the level of commitment displayed.

It was important to include the manager in the decision making process on what actions should be taken and the most realistic timeframe. Keeping the solutions as cost effective and simple as possible was also a key factor in gaining this commitment to carry out the necessary works.

Business Responses

While accepting the need to change, not all businesses resolved their issues within the initial timeframes. The follow up visits revealed a distinct trend where businesses had completed the simple tasks within the suggested timeframes but had not addressed the more complex or larger issues.

	completed by 1st follow up visit	Completed by 2nd follow up visit	completed by 3rd follow up visit	completed by 4th follow up visit
Percentage Of Businesses	**47**	**31**	**18**	**4**

Almost half of the businesses carried out the recommended improvements to their activities before the first follow up visit. Most of these improvements were relatively

simple or cost effective to implement. Businesses with more complex issues were often reluctant to commence these improvements before the first follow up visit. These were generally commenced when it became clear that Council would continue to revisit the site until the tasks were completed. Complex or more costly issues required more time to implement. These businesses were closely guided by Council towards their targets and some improvements were not completed until the fourth follow up visit.

Despite attempts to keep the cost of recommended solutions to a minimum, some larger businesses were more concerned with 'compliance' and chose to invest in structural solutions rather than just relying on behavioural changes. This 'belt and braces' approach was successful in reducing the risk of stormwater pollution from businesses with a larger work force.

Several site managers, particularly those of smaller businesses, indicated that the allocated time for implementation was perhaps too long. These businesses requested a shorter time period so that they were under pressure and the issue would be dealt with, rather than placed at the back of their mind. Typical timeframes were between 2 weeks and a month for the more simple tasks.

Encouragement and Assistance or Regulation and Penalties

The pilot program initially set out to trial the regulatory role of local government enforcement and enforcement tools. However, as the program developed it became apparent that the firm, positive approach applied by Council was gaining great success without the need for enforcement.

Businesses understood that the issues identified by Council could not continue and, although enforcement was rarely discussed, there was an assumption that Council were the regulatory body for stormwater contamination.

Once a business had indicated a commitment to carrying out the necessary works, the stormwater officers would encourage and guide them towards completion. Some businesses were visited as many as four times before they achieved their goals. Each visit, the stormwater officers reviewed the progress of the business and provided full support and assistance to ensure they were completed to a satisfactory standard.

It was concluded from these follow up visits that Council officers could mitigate any poor practice on site through continued encouragement and assistance. Those that chose not to work with Council could be issued with a litter abatement notice or referred to EPA for further action. However, it appeared from the audit trial the underlying assumption of Council's regulatory standing was enough to gain cooperation with the stormwater officers.

Local Government Role

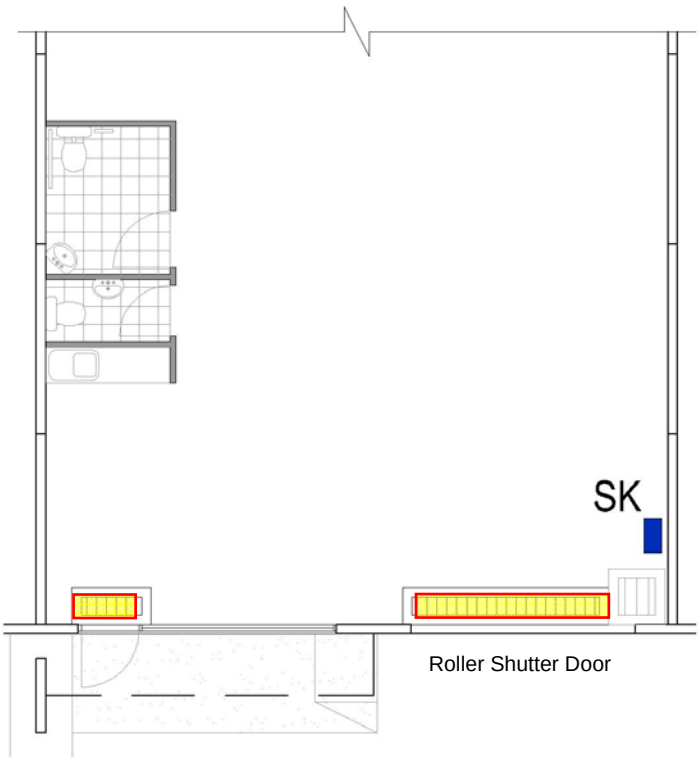
The pilot of the protocol revealed an acceptance by SMEs of local government as the 'regulatory authority' for stormwater quality. This was demonstrated by the high level of cooperation and ease of access provided by business operators.

Council provided full support for businesses and gained credibility by providing real and practical solutions to stormwater management issues. This support, combined with the acceptance of local government enforcement provided a successful foundation for any future role.

5.2 Structural Isolation and New Industrial Premises

Stakeholder consultation for this project component clearly highlighted 'recessed areas' and 'trench grates' across the inside of external doorways as the most feasible methods of structural isolation in new, small to medium sized industrial premises.

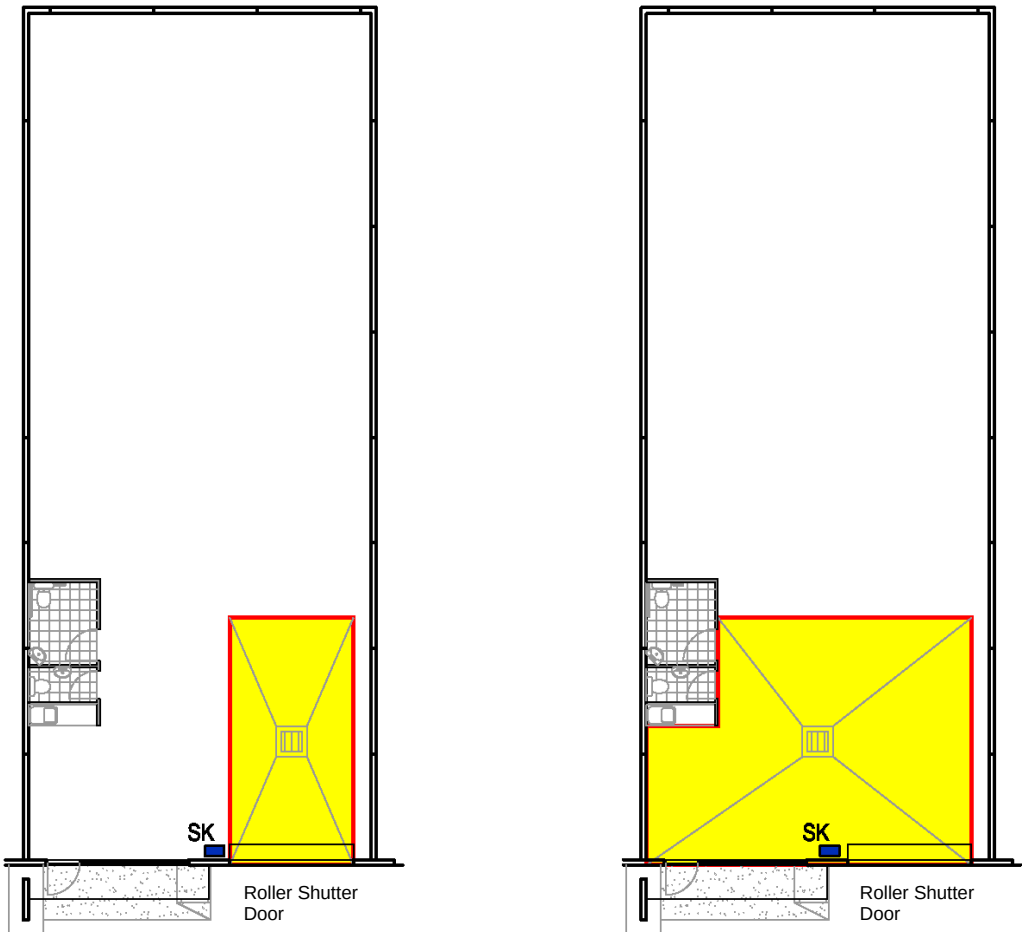
These outcomes were based on their effectiveness to control spills, estimated installation costs, maintainability, practicality and other limiting factors, such as difficulty of installation. A summary of consultation outcomes for each device is presented in Appendix C.



A trench grate across external doorways, draining to a collection pit.
(The recommended location of the spill kit is marked as SK)

5.2.1 Practicability of Recommended Options

Forklift access and safety was raised as the most common concern for the practicality of structural isolation devices. Business operators did not want recessed areas in forklift areas and preferred a flat floor. It was believed that the most feasible option for forklift safety was the trench grate although some operators still had concerns with their long term effectiveness and the quality of installation.



A recessed area within the internal loading bay (covering the roller shutter door) draining to a collection pit. The recommended location of the spill kit is marked as SK.

5.2.2 Maintenance and Costs of Recommended Options

The costs of all structural isolation devices investigated were considered minimal when incorporated into the cost of a new building. These treatments would have little impact on the rental value of the property.

Recessed areas and trench grates offered the least amount of effort to maintain and, if installed correctly, were the preferred choice of treatment for most stakeholders. It was also believed that these minimal maintenance options would present less risk in units with a high turnover of tenants.

5.2.3 Effectiveness of Recommended Options

The structural isolation measures investigated in this survey were all designed to contain a surface flow of liquid, large enough to flow out of an industrial building. During the consultation exercise, several stakeholders questioned the significance of such spills as a contributing factor to stormwater pollution. These concerns were regularly supported throughout the site stormwater audit program by the absence of evidence of large spills, particularly from internal working areas, and the continuous background pollution identified by the monitoring survey.

The consultants report suggested that pollution control measures may need to address external areas to have a greater impact on stormwater quality. They also stated that the effectiveness of each solution relied upon the operator to maintain the device and ensure that if a spill did occur, the captured effluent would be disposed via the appropriate means.

It was concluded that changing the behaviour of an operator presented the greatest challenge to preventing stormwater pollution from industrial sites. Any structural isolation solution will also require an effective education and enforcement program aimed at industrial businesses to make them effective.

6 Recommendations

6.1 A Model for Local Government Use

Industrial SMEs are largely unregulated by EPA Victoria. Where EPA intervention does occur, it is most often due to complaints of poor environmental practices or in response to a reported incident.

While effectively tackling the more significant issues, reactive regulation does little to reduce the continuous, diffuse pollution caused by poor housekeeping or the everyday 'drips and drops' discovered during the audit pilot.

This audit pilot program successfully demonstrated that local government organisations can improve poor work practices at industrial SMEs to help prevent stormwater contamination.

Additionally it revealed that Kingston's industrial community accepted the regulatory role adopted by Council and welcomed the support provided by stormwater officers to reduce any impacts on water quality.

Council's role of service provider and local authority places local government in a good position to deliver a proactive, pollution prevention program to the business community. However, getting local government to commit resources to such programs presents a significant challenge and Councils may need to look to external funding to undertake this work.

Ongoing support and back up from EPA Victoria is vital for any future program to succeed. Strong partnerships are needed to ensure Council's stormwater officers operate within the delegated provisions of the Environment Protection Act 1970 and any significant breaches, or pollution, is referred to EPA officers for further action. Training opportunities with the EPA may also exist under this partnership to ensure the programs are delivered consistently across all Councils.

Approximately 35% of industrial premises audited failed to meet the standards set by The City of Kingston. Future programs should attempt to increase the percentage of sites with problems visited so that more time is spent at premises with stormwater issues. Councils could achieve this by targeting areas with specific problems, or by conducting drive-by inspections to identify individual businesses with potential stormwater issues. It was believed that a more strategic and selective program, delivered across the whole municipality, would achieve the greatest impact amongst businesses.

6.2 Structural Isolation Measures in New Industrial Premises

Ainley Project's report proposed five recommendations for structural isolation devices to prevent stormwater pollution from small to medium sized industrial premises.

1. For loading that occurs within a building, a recessed area with a pit or trench grate across entrances are the preferred options identified during consultation

2. Structural isolation treatments could be included in the approved building documentation and verified upon construction through the building inspection process.

3. Further investigations are required to determine the relative importance and effectiveness of this structural isolation method, due to the levels of risk to stormwater pollution internally and externally.

4. Further investigations are required into the role of spill kits and whether they should be mandatory requirements.

5. Any Industrial stormwater pollution treatment should integrate education, enforcement and infrastructure to ensure it is effective.

The audit pilot strengthened the need to further investigate the effectiveness and importance of the proposed structural isolation measures in preventing stormwater pollution, as outlined in Ainley Projects' third recommendation.

It was believed that these measures would only protect stormwater from a liquid spill, large enough to flow beyond the confines of an industrial building. No business showed evidence of such events, despite the continuous levels of contamination identified by the water quality monitoring in these sub-catchments.

This contamination appeared to be the result of widespread, diffuse pollution, caused by small accumulations of pollutants in external areas, and occasional, sporadic point source events such as deliberate disposal or washing activities.

These results suggested that the recommended structural isolation measures would be ineffective at preventing the most common and widespread forms of stormwater contamination.

The stakeholders' workshop reviewed these findings and made recommendations to further investigate and trial the use of site level WSUD without the structural separation devices investigated by this report.

Furthermore, it was advocated that site scale WSUD measures should be designed as 'open' features so that any contamination, or failure of a device, will show a clear link to an individual property.

Incorporating these features into the site's landscaping should encourage the business operator to maintain the aesthetic appearance of the system and prevent contamination through inappropriate discharges or deliberate disposal.

Recommendations were also made to explore how the cost of reinstating or maintaining a WSUD feature, that had failed through contamination, could be paid for by the occupier of the premises.

Finally, it was suggested that additional WSUD measures could be installed at street level to offer further treatment or, in the event of a significant pollution, provide a safety net for the receiving waterway.

7 Appendices

List of appendices:

Appendix A: Example of educational material

Appendix B: Site audit checklist

Appendix C: Ainley Projects' table of consultation outcomes

Appendix A:

Example of Educational Material

Industry Stormwater Brochure

STORMWATER Keep it Clean

Monitoring of stormwater quality in Kingston has revealed unacceptable levels of pollution from industrial areas. This pollution threatens the health of our rivers and beaches and in turn, our use of them for recreation.

It also limits any potential use of stormwater such as for watering parks and playing fields.

The drought and water restrictions are forcing communities around Australia to save precious tap water for essential purposes and look for other sources of water for nonessential uses.

Council needs your help to reduce the pollution of stormwater, and keep stormwater from industrial areas clean and useable.

Industry Stormwater Brochure

Check Your Business Premises

Take a quick walk around your premises and in just five minutes you can do your own stormwater audit to check if your stormwater discharge is clean.

Simply use the checklist at the back of this brochure.

Stormwater Pits

GET STARTED ... by checking your stormwater pits.

Is there anything other than (clean) rainwater going into your stormwater drains?

Is there any litter, cigarette butts, sand, sediment, raw materials or products inside these pits that will pollute the stormwater from your site?

Stop this material from getting into stormwater pits by:

- Regularly picking up litter, sweeping outdoor areas and cleaning up small drips and spills (that's good housekeeping);
- Securely storing fine materials, stopping powders and granules escaping into yard areas; and
- Stopping forklifts and trucks tracking materials into outdoor areas.

If it's not practical to stop all material reaching the stormwater pits then consider installing a pit trap to stop the materials from going down the drain.

There are different types of traps available to suit different needs. Take note that traps need to be carefully designed so they allow for adequate drainage. And traps need to be cleaned and maintained regularly to help water flow through freely and prevent flooding.

Here's an example of a stormwater pit trap that will help stop materials going down the drain.

Image provided courtesy of spill station Australia

Management of Materials, Product and Wastes

Check your management of materials and wastes.

Is there any loose or unsecured material that could find its way into any of your drains?

Control the escape of raw materials, product and wastes from where they are used or stored by:

- Storing and using fine materials undercover;
- Making sure all wastes are securely stored undercover or in bins and skips;
- Keeping all bin and skip lids closed when they're not in use;
- Checking there are no holes in skips; and
- Regularly sweeping up material that has escaped and place in a bin.

Is there any old or unused plant or equipment on site?

Oil leaks, paint flakes or rust can contaminate the ground or drains. Prevent this by:

- Selling or scrapping unwanted items and clearing valuable yard space; and
- Covering wanted items with tarpaulins - to protect them and prevent oil leaks, rust or paint from washing off.

Storage and Management of Liquids

Check how you store and manage liquids.

How much liquid do you have on your site?

Less than 200 litres < 200 – 1,000 litres > Greater than 1,000 litres

Use bunds for bulk liquid storage of more than 1,000 litres - no matter what size the containers are.

If only a few 205 litre drums are stored in isolated locations on your site, use a spill pallet to catch any spills and drips.

Small amounts of liquids (in containers less than 20 litres) can be stored safely inside a building without bunding – that's if they are stored away from exterior doors or areas where they can run out.

This spill pallet will help catch any spills and drips from 205 litre drums

Image provided courtesy of spill station Australia

Check your spill kits.

Are your spill kits located in the best places?

Are the contents of the spill kits complete?

Keep your spill kits on site and in places where liquids are stored and used – this includes loading and unloading areas.

A good spill kit contains absorbents, booms, personal protective equipment, contaminated waste bags, drain seals and leak sealing putty.

Check your spill response plan.

Is your spill response plan located where liquids are stored and used?

A spill response plan and kit should be located where liquids are stored and used.

Image provided courtesy of spill station Australia

A spill response plan describes what to do and who to contact in the event of a spill or leak. Spill response plans should be located with the spill kits and act as an emergency guide to support a staff member's training.

These plans should be simple, clear and easy to read.

Industry Stormwater Brochure

Cleaning, Washdown and Maintenance

Check how you do your cleaning, washdown and maintenance.

Do you wash any plant, equipment or product on your premises?

Wash effluent cannot be discharged to any stormwater drains.

Wash facilities on your premises must dispose all effluent to either a holding tank (for later licensed collection), or to the sewer with a trade waste license.

Use a local wash facility if your washing requirements are less frequent.

Review for Action

Now...review your audit checklist

In which areas are you managing well?
And what things will be continued to maintain good stormwater quality management?
Which areas need some attention and changes made?

Improvement Actions

Make a note of the specific actions you'll carry out to make your premises more effective in keeping stormwater clean.

Further Information

If you need further information or free advice on any of the things you've noted to improve, contact **Tony Barrett**, Kingston's Industry Stormwater Officer on (03) 9581 4379.

Use local wash facilities when your washing requirements are less frequent.

Produced by City of Kingston and the Australian Government through the Coastal Catchments Initiative, a program of the Natural Heritage Trust.

Site Stormwater Audit

Walk around your premises and complete this form.
In just a few minutes you'll have an assessment of your stormwater management.

Stormwater Pits & Drains

Inspect your stormwater pits and drains.

- ☐ Is there any material such as cigarette butts, sand, sediment, raw materials or product inside the stormwater pits or drains?

If so, how could you keep it out?

Remember: The stormwater drains are for clean water only.

Management of Materials, Products and Wastes on Site

Look around your site.

- ☐ Is there any loose or unsecured material that could find its way into any of your drains?
- ☐ Is all waste securely stored on site?
- ☐ Is there any old or unused plant or equipment on site?
- ☐ Is there any oil, flaking paint or rust that could contaminate the ground or drains?

Storage and Management of Liquids

Approximately, how much liquid is stored on site?

- ☐ Less than 200 litres
- ☐ 200 – 1000 litres
- ☐ Greater than 1000 litres
- ☐ Is there a Spill Kit on site?
- ☐ Are the contents of the Spill Kit complete?
- ☐ Are Spill Kits located in the best places?
- ☐ Are there sufficient measures (bunds, spill pallets, safety cabinets) in place to control any leaks or spills from containers?
- ☐ Are any containers damaged or leaking?
- ☐ Is there a Spill Response Plan?
- ☐ Is the Spill Response Plan clear and concise?
- ☐ Are Spill Response Plans located in the right places? (Eg with the Spill Kit, noticeboard, office copy)

Cleaning, Washdown and Maintenance

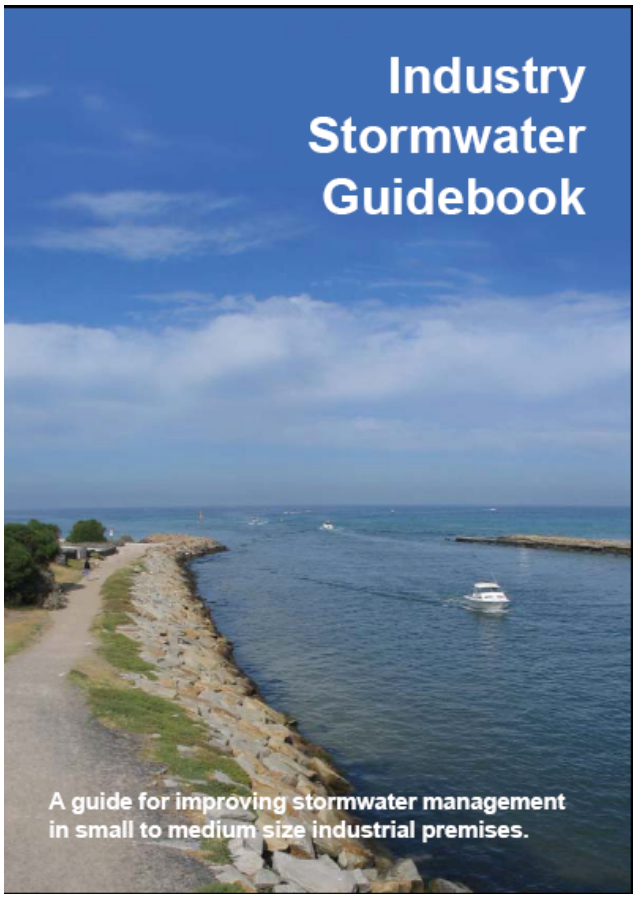
Do you wash any plant, equipment or product on your premise?

- ☐ Are there wash facilities on site?
- ☐ Are these facilities adequate? (Eg. good condition, well maintained, correct size)

How is wash effluent disposed?

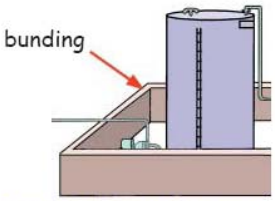
- ☐ Holding tank for licensed collection
- ☐ To sewer with trade waste
- ☐ Other

Revised Industry Stormwater Guidebook



Storage and Management of Liquids

Drum And Tank Storage



Example of bunding for bulk liquid storage tanks. Bund complies with:

Standards Australia and

EPA Bunding Guidelines, Publication 347 (www.epa.vic.gov.au/Publications).

Store In Bunded Areas

A bund is a simple and effective way to minimise the risk of liquid escaping into the environment.

A bund is generally a low wall built to contain spills from fixed tanks and containers such as 200 litre (44 gallon) drums. Bunds must comply with the relevant Australian Standard:

1894 - Non-flammable cryogenic & refrigerated liquids
1940 - Flammable & combustible liquids
2022 - Anhydrous ammonia
2507 - Agricultural & veterinary chemicals
2714 - Organic peroxides
2927 - Liquid chlorine gas
3780 - Corrosive substances
3833 - Mixed classes of Dangerous Goods
3961 - Liquified natural gas
4081 - Polyfunctional isocyanates
4326 - Oxidising agents
4452 - Toxic substances
4681 - Miscellaneous Dangerous Goods

Store full or partly-full IBCs in bunded areas.

Spill containment pallet.

IBCs & Drums

Full or partly full IBCs (Intermediate Bulk Containers) and drums containing fluids (including waste liquids) should be stored in a bunded area or on a suitable spill containment pallet.

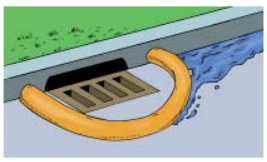
Spill containment pallets are plastic or metal tray-like containers that will capture the contents of a leaking drum.

Small individual containers can be stored on a drip tray at their point of use.

Only empty IBCs and drums should be stored in non-bunded areas.

Storage and Management of Liquids

EMERGENCIES



Sealing Off Stormwater Drains

Stormwater drains should either be of the lockable type that can be pumped out if contaminated water enters them, or they should be sealed off with barriers (socks) drain mats or pillows (bags). These products are available from your usual supplier of safety equipment, or look in the Yellow Pages under 'Safety Equipment & Accessories', 'Environment and/or Pollution Consultants' and 'Oil & Chemical Spill Recovery or Dispersal'.

Contaminants

When water is used to fight a fire it could pick up contaminants from materials that are stored on site or from buildings, such as plastics, chemicals, oils, soot and charcoal. If the fire brigade are in attendance, the Officer-in -charge will decide if it is safe to discharge the water to a stormwater drain.

If you are fighting a small fire and the fire brigade are not involved, then contaminated water or spent fire fighting chemicals should not be allowed to enter the stormwater system, where it can kill fish and other water life and seriously pollute the environment. Contaminated waters should be contained and collected.

Contaminated Water

Any contaminated water or spent fire fighting chemicals that you capture should be securely stored, preferably under cover and must be disposed of through a licensed disposal facility.

Appendix B:

Site Audit Checklist

Site Audit Checklist

Site Stormwater Audit

Answer the questions on this checklist with either: 0 = no 1 = yes 2 = not applicable

Enter supporting information and recommendations for better management on the supporting comments page

Company Name					
Street No		Street		Suburb	Postcode
Contact Name			Position		
Contact Number			Mobile		
Industry Type			Auditors		Date

Stormwater Pits and Drains

Inspect site stormwater pits and drains:

1 ☐ Is there a significant amount of any material such as cigarette butts, sand, sediment, raw materials or product inside the stormwater pits? (A yes score indicates a pollution, or potential pollution concern)

2 ☐ Is there any evidence of illegal connections or discharges to stormwater?

Management of Materials, Products and Wastes on Site

Undertake a site inspection:

3 ☐ Is there a significant amount of any loose or unsecured material that could find its way into of the site drains?

4 ☐ Is all waste securely stored on site?

5 ☐ Is there any old or unused plant or equipment on site?

6 ☐ Is there any oil, flaking paint or rust that could contaminate the ground or drains?

Storage and Management of Liquids

Approximately, how much liquid is stored on site?
(Place Y in the most appropriate box only)

7 ☐ Less than 200

8 ☐ 200 – 1000 litres

9 ☐ Greater than 1000

10 ☐ Are there sufficient measures in place to control any leaks or spills from the containers? (eg, bunds, spill pallets, safety cabinets)

11 ☐ Are any liquid containers damaged or leaking?

12 ☐ Are there enough spill kits on site?

13 ☐ Are the contents of the spill kit complete?

14 ☐ Are spill kits located in the right places?

15 ☐ Is there a spill response plan?

16 ☐ Is the spill response plan clear and concise?

17 ☐ Are spill response plans located in the right places? (eg with spill kits, noticeboard, in office)

Cleaning and Washdown

18 ☐ Do any washing activities take place on site? (eg plant, equipment vehicles or product)

19 ☐ Are there wash facilities on site?

20 ☐ Are these facilities adequate for their purpose? (e.g. good condition, well maintained, correct size)

How is wash effluent disposed?
(Place Y in the most appropriate box only)

21 ☐ Holding tank for licensed collection

22 ☐ To sewer as trade waste

23 ☐ Other (detail on comments sheet)

Appendix C:

Ainley Projects' table of consultation outcomes

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Option	Effectiveness	Estimated Costs	Maintenance	Practicality	Limiting Factors
Recessed Area	Relies on pit being emptied and spill material being disposed of appropriately. There is a risk of the pit being connected to the sewerage system over time.	$1000 for concreting works and labor (for loading bay option). $2000 for concreting works and labor (for entire floor option for small factory) $600 for pit. Additional cost to treat emergency access door depending on its location.	Maintenance of pit required to prevent it becoming filled with rubbish. No maintenance to recessed floor.	A spill is most likely in the loading bay so should cover this area.	This will effect the storage of some items, so should not be across entire floor
Small ramp	Relies on spill being cleaned up and material disposed of appropriately. Mopping up is time consuming.	$1000 for concreting works and other labor for each roller door entrance. $600 for each pedestrian entrance.	Maintenance required to ramp surface and indicators.	To be workable the ramp would need a very gentle slope. The space required to achieve this would impact on available usable space.	Ramps are dangerous to forklift operation and would affect leasing and selling.
Trench grate	Relies on spill being disposed of appropriately after collection. There is a risk of the trench being connected to the sewerage system over time.	$1350 for the grate for each roller door entrance (based on an entrance width of 4.5m) $300 for each pedestrian door entrance. Labor cost of $1500 per grate. The cost of construction is relatively expensive compared to other options.	Maintenance of grate required to prevent it becoming blocked.	Minimal impact on operation, leasing or sale.	Construction is difficult. Would need to meet high industrial standards for load bearing. Could have an impact on forklift operation.
Collapsible bund	Relies on regular maintenance to be effective. Relies on spill material being disposed of appropriately. Clean up of spill can be time consuming.	Under $1000 to purchase material and install. Ongoing maintenance and replacement cost.	High maintenance requirement to repair and replace material.	Can impede operation and are likely to be removed.	Viewed as a nuisance.
Apron bund	Relies on spill material being disposed of appropriately. Clean up of spill can be time consuming.	$5000 for 150 square metre factory would be added to the building cost. The cost of construction is relatively expensive compared to other options	Minor maintenance required to surface area and associated ramp or trench grate.	Would need a ramp or trench grate at doorways.	Would need a ramp or trench grate at doorways.