2.4 Funding, policy, regulatory and enforcement practices

2.4.3 Illicit discharge elimination programs

Description

Illicit connections are defined as ‘illegal or improper connections to storm [water] drainage systems and receiving waters’ (CWP, 1998). Illicit discharge elimination programs seek to identify and remove illegal or inappropriate waste streams entering the stormwater network. The most obvious of these waste streams include trade wastes from commercial and industrial premises and wastewater from domestic premises.

Illicit connections to stormwater can be surprisingly common. For example, a 1986 US study found 38% of businesses surveyed in Washtenaw County (Michigan) had illicit connections, mostly in automobile-related and manufacturing businesses (Schmidt and Spencer, 1986).

These connections can also represent a major source of pollution. For example, the Clean Charles 2005 Initiative in Boston (Massachusetts) found one connection that contributed approximately 327,000 litres of sewage to stormwater per day (Lehner et al., 1999).

Applicability

This BMP is applicable to all urban areas, but has increased value in commercial and industrial areas, older areas where several generations of plumbing may have occurred, and unsewered areas. Case studies indicate that this BMP can result in major reductions in pollutants being discharged to the stormwater network, and therefore it should be a priority in any urban stormwater quality management program.

For new developments, preventative practices such as the thorough inspection and verification of drainage and sewerage arrangements during the construction phase can avoid the need for more extensive detection techniques and subsequent disconnection (US EPA, 2001). For existing developments, illicit connections are detected using the techniques briefly described below.

Recommended Practices

The US EPA (2001) recommends that illicit discharge elimination programs should have four principal components:

• procedures for locating priority areas that are likely to have illicit discharges;
• procedures for tracing the source of an illicit discharge;
• procedures for removing the source of the discharge; and
• procedures for program evaluation.

Illicit discharge education initiatives are also needed, which may include stormwater drain stencilling, a program to encourage public reporting of illicit connections or discharges to stormwater/water bodies and the distribution of educational materials to businesses, tradespersons (e.g. plumbers) and residents.
Other features of illicit discharge elimination programs are the mapping of the region’s stormwater drainage network, targeted education campaigns, plans to detect and remove non-stormwater discharges, and regulatory mechanisms that:

- prohibit non-stormwater discharges from entering the stormwater network;
- allow inspectors to access private property to investigate potential illicit discharges; and
- allow regulatory action to be taken to eliminate the discharge and prosecute offenders (where appropriate).

See Section 2.4.2 for more discussion on point source regulation and enforcement activities. In particular, the Unauthorised Discharge Regulations 2004 have recently been enacted under the Environmental Protection Act 1986 in Western Australia (see <www.slp.wa.gov.au/statutes/av.nsf/doe> or telephone (08) 9321 7688). These regulations include an on-the-spot infringement notice system for minor pollution offences. These powers can be delegated to local government officers. The new on-the-spot fines currently carry a penalty of $250 to $500, which increases to $5,000 if the matter proceeds to court. The fines apply to commercial and industrial premises and cover the discharge of substances to stormwater or groundwater. These substances include hydrocarbons, solvents, degreaser detergent, dust, engine coolant, food waste, laundry waste, pesticides, paint, dyes, acids, alkali, sediment, sewage and substances containing heavy metals (Raine, 2004).

Typically, illicit discharge elimination programs focus on identifying and removing direct connections of wastewater to the stormwater network (e.g. from domestic, commercial or industrial premises). The programs may include the following techniques to identify such illicit discharges:

- field testing of dry weather discharges in the stormwater drainage network;
- visual inspections by closed circuit cameras;
- undertaking a review of architectural plans and plumbing details to identify potential sites where improper connections may have occurred;
- conducting field tests of selected pollutants in stormwater;
- smoke testing; and
- dye testing.

Following identification of an illicit discharge, an inspection of the discharging premises occurs, followed by elimination of the discharge and, potentially, prosecution of those responsible for the discharge.

Note: An Industrial Waste Permit is required to connect and discharge wastewater to sewer.

Further information is available from the Water Corporation by telephoning the Customer Service Centre on 13 13 95 or via <www.watercorporation.com.au/indwaste>.

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21 In this context, ‘non-stormwater discharges’ to the stormwater drainage network (or water bodies) that may need to be controlled include illegal dumping, swimming pool discharges, wastewater from car washing, street wash water, wastewater from the scouring and/or sterilisation of water mains, contaminated groundwater, and stormwater/groundwater that is pumped out of deep excavations on construction sites.
In some jurisdictions, community volunteers are engaged to help identify dry weather discharges to the stormwater system and minimise the cost of the program. For example, the Department of Environmental Protection in Montgomery County (Maryland, USA) has an illicit discharge detection and elimination initiative called ‘Pipe Detectives’. Under this initiative, community volunteers undertake dry weather inspections and report suspicious findings to a community hotline (MCDEP, 1997).

Benefits and Effectiveness

Taylor and Wong (2002c) report that illicit discharge elimination programs can be a highly effective non-structural BMP for the improvement of stormwater quality and waterway health. They found evidence from several case studies that receiving water quality can be improved (particularly for faecal coliform levels and dissolved oxygen concentrations), large volumes of liquid wastes can be prevented from entering stormwater and significant loads of stormwater pollutants can be reduced over several years. For example, one study reported that an illicit discharge elimination program was responsible for a 75% decrease in faecal coliform levels in a receiving water, over three years. Another program prevented 999 litres/km²/day of raw sewage entering receiving waters, while another eliminated 4,321 litres/km²/day of liquid waste discharges (Taylor and Wong, 2002c).

Such evidence prompted Lehner et al. (1999) to conclude that, in the US, ‘local governments have found that identifying and eliminating illicit connections and discharges is a remarkably simple and cost-effective way to eliminate some of the worst pollution from stormwater and to improve water quality’ (p. 5-15).

Challenges

Illicit discharge elimination programs are publicly funded, and despite attempts to involve volunteers in the detection and reporting process, they are often labour-intensive and require a substantial commitment of funds to carry out the detection tasks. In addition, jurisdictional disputes may arise in some areas about whether such programs should be funded and/or delivered by the agency that owns the sewerage network or by the affected stormwater drainage network.

Another challenge is the issue of gaining access to private property for inspection purposes. A regulatory instrument that ensures right of entry is critical in locating potential illicit discharges (US EPA, 2001).

In areas with highly permeable soils, such as much of the Swan Coastal Plain, illicit discharges to groundwater can be harder to detect than those discharges entering an impermeable drainage network. Detection techniques in this context may include inspection of ‘high risk’ premises (e.g. unlicensed premises that typically generate liquid trade wastes), dry weather water quality monitoring in drains and waterways (such programs may indicate the approximate location of a plume of contaminated groundwater), and groundwater quality monitoring. Similarly, in areas where the stormwater drainage network is discontinuous (i.e. where infiltration of stormwater is encouraged), illicit discharges may quickly drain to groundwater and be hard to detect using simple methods such as dry weather inspections.

Cost

Based on four successful US programs, Taylor and Wong (2002c) report that the cost of running an illicit discharge elimination program is approximately AUD$0.23 - AUD$14.23/km² per annum22 (averaging

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22 Based on a 2003 currency conversion rate of US$1 = AUD$1.92.
AUD$3.77/km² p.a.), when the total program costs are spread over the entire city area. Another cost estimate based on US programs is AUD$935 - AUD$1,241/km², where the entire area is tested for illicit discharges to stormwater. Equivalent costs for Australian programs are not currently available.

Additional Information

The *National Menu of Best Management Practices for Storm Water Phase II* (US EPA, 2001) contains excellent on-line guidelines that contain a number of useful references and fact sheets on key aspects of illicit discharge elimination programs, such as:

- identifying illicit connections;
- industrial/business connections;
- recreational sewage;
- sewer overflows;
- wastewater connections to the stormwater drainage system;
- failing septic systems;
- illegal dumping; and
- non-stormwater water discharges.

Examples / Case Studies

**Tulsa, Oklahoma (USA)**

Taylor and Wong (2002c) report that the City of Tulsa, Oklahoma, started an illicit discharge elimination program in 1994, in cooperation with State agencies. The program included inspection of premises (using remote camera and smoke inspection techniques), dry weather field screening, industrial surveys, enforcement activities, repairs to sewerage infrastructure, as well as community education and involvement. The number of inspections and enforcement actions in the 1997-98 reporting year was 164 and 20, respectively. The program covered a region with a population of approximately 367,000 and an area of 471 km² (Lehner *et al.*, 1999), and cost approximately US$3.5M p.a. (Van Loo, 2002).

Changes to the quality of the City of Tulsa's stormwater before and after the program were measured and analysed using event mean concentrations averaged over four year intervals. The results include a 13%, 17% and 18% reduction in event mean concentrations for total suspended solids, total phosphorus and total kjeldahl nitrogen, respectively (US EPA, 2001; Lehner *et al.*, 1999). Taylor and Wong (2002c) report that the bulk of this improvement may be attributable to the City's illicit discharge elimination program (including its educational elements).

**New York City, New York State (USA)**

The New York City Department of Environmental Protection began a Shoreline Survey Program in 1989 to detect and eliminate illegal dry weather discharges to the City's stormwater and estuaries. The region over which the program operated was approximately 2,939 km², with a population of approximately 8.5 million (Lehner *et al.*, 1999). The approximate cost of the program was US$475,000 p.a. (Lehner *et al.*, 1999).

It is estimated that from 1989 to 1998, the Shoreline Survey Program eliminated approximately 12.7 million litres per day of illicit discharges. The Department also reported that overall water quality
conditions in the City's receiving waters from 1991 to 1995 improved on pre-1990 conditions. Levels of faecal coliforms and dissolved oxygen concentrations, in particular, continually improved throughout the 1990s (Lehner et al., 1999).

Local Examples

An illicit discharge elimination program is proposed in Maddington during late 2004 (contact the Department of Environment for an update on this program).

The Swan River Trust has commenced a program to encourage diverting wastewater from air conditioners away from stormwater drains.

The Department of Environment, Fire and Emergency Services Authority and the Department of Industry and Resources are inspecting ‘Special Risk Plan’ premises that pose a high risk to the environment and public safety if a fire should occur. The inspections determine if any illicit discharges are occurring and if the premises are complying with regulations or licence conditions.

The WA Light Industry Working Group has been established to help manage illegal discharges from light industry. This program has education and legislative (Unauthorised Discharge Regulations 2004) components.

References and Further Information


Raine, K. 2004, Ken Raine, Manager, Response and Audit, Department of Environment, internal Department of Environment article (7 April 2004).


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