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SUMMARY SHEET

category: WATER QUALITY

BMP: STREET SWEEPING/ CATCH BASIN CLEANING

sub-category: RESIDENTIAL

OBJECTIVE

To reduce contaminants that become incorporated in stormwater and eventually in surface and/or groundwater systems.

WHERE APPLICABLE

Any region that has a network of roadways, especially where significant volumes of traffic exist and in urban or urbanizing areas. It has been stated that the first hour of a storm can contribute as much pollution as a sanitary sewer system. (Ref. (1))

PROS

1. Realize a positive affect on water quality by reducing organic and other contaminants in stormwater.
2. Improvement of the suburban environment and civic pride.
3. Decrease filling-in of lakes and other surface water bodies.

CONS

1. Additonal costs associated with increased activities.
2. Existing catch basin methods are relatively ineffective in removing fines and other potential contaminants since they only remove coarse solids.

IMPLEMENTATION CONSIDERATIONS

1. Street Sweeping

Particulates and other materials which accumulate on road surfaces can be effectively removed by street sweeping. These include organic debris, components from vehicles, litter, de-icing materials, etc. Between the two basic types of sweepers, brush and vacuum, the vacuum units are more efficient in picking up fine materials (on dry pavement).

Street sweeping should be frequent and scheduled around periods of rainfall. It has been shown that approximately 90% of contaminants accumulate within 12 inches of the curb. Pavement conditions as well as parked cars can present problems in street sweeping effectiveness. (Also see BMP sheet on grassed waterways).

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2. Catch Basin Cleaning

Catch basins should be cleaned frequently to improve their efficiency in removing contaminants. Activities should be scheduled, if possible, around rain or storm events to maximize cleanout benefits.

Implementation of street sweeping and catch basin cleaning programs takes place at the municipal level and therefore depends on municpal resources and their organization. In Wilmington, Del., the Public Works Department operates mechanical sweepers on its streets 8 months out of the year. During cold months hand sweeping crews do the job. Streets are swept mechanically once per week. The city has erected permanent signs to restrict parking on days of sweeping and illegally parked cars are ticketed. The cost for the mechanical sweeping is approximately $12/mile based on 15 miles per day, and for hand sweeping approximately $90/mile for 3.5 miles/day. Source: Public Works Dept., City of Wilmington, Wilmington, Delaware, December 1979.

1. Unit costs of Catch Basin Cleaning, Sewer Cleaning, and Mechanical Street Cleaning

Catch Basin Cleaning	
Hand	$3.29/Catch basin
Eductor	$3.47/Catch basin
Orange Peel	$4.38/Catch basin
Sweeping	
Mechanical Street Sweeping	$100.00/shift

Source: (APWA, 1969) (ref. (5)).

For Additional Information

1. EPA. Water Pollution Aspects of Street Surface Contaminants. Cincinnati, Ohio: EPA, 1972
2. Mallory, C.W. The Beneficial Use of Stormwater. Washington, DC: EPA, Office of Research and Monitoring, 1973. EPA-R2-73-139.
3. Conwed Corporation, Conwed Petroleum Sorbent Products,Minneapolis, MN 55414.
4. Heaney, P.H. et.al. Urban Stormwater Management Modeling and Decision Making. Gainsville, Fl.: University of Florida, 1975. EPA-670/2-75-022.
5. Field, R. Urban Runoff Pollution Control Technology Overview. Washington: EPA, 1977
6. Urban Land Institute - Water Resources Protection Technology, J. Toby Tourbier, 1981.

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SUMMARY SHEET

category: WATER QUALITY

BMP: DETENTION/ RETENTION BASINS

sub-category: RESIDENTIAL

OBJECTIVE

To detain/retain stormwater to allow for recharge of runoff and removal of contaminants prior to incorporation into surface and groundwater.

WHERE APPLICABLE

In developing areas or areas that have already experienced development and stormwater runoff has experienced altered drainage patterns and increased velocity due to addition of impervious surfaces.

PROS

1. Reduction in contamination of ground and surface water.
2. Facilitation of recharge into groundwater (where applicable), therefore sustaining groundwater budget.
3. Reduction in stormwater runoff velocity reduces capability of picking up more and larger contaminants.
4. Can help to reduce flooding and consequences of flooding.

CONS

1. Can be public hazard if not properly constructed or maintained (fenced, etc)
2. Associated additional cost of regular maintenance.

IMPLEMENTATION CONSIDERATIONS

There are a variety of designs and types of detention and retention basins. These would be applied according to the specific site characteristics and intended use(s). A multitude of information is available (see additional information sources below) on this subject and engineering considerations are too vast to enumerate here. Improper planning and design can render this type of stormwater control method ineffective, which emphasizes the need for seeking expertise and examining previous case studies and pilot programs. If properly developed, benefits can be many.

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For Additional Information

1. Hittman Associates, Inc. Approaches to Stormwater Management. Washington: OWRT, November, 1973.

2. Day, G.E. and Crafton, C.S., Site and Community Design Guidelines for Stormwater Management. Blacksburg, Va: VPI & SU, February 1978.

3. Denver Regional Council of Governments. Urban Storm Drainage Criteria Manual, Vol. 1 and 2. March 1969. PB 18262 and PB 185263.

4. Urban Land Institute, Water Resources Protection Technology, J. Toby Tourbier, 1981.

5. Lake Hopatcong Regional Planning Board, Lake Hopatcong Studies and Comprehensive Management Plan., Hopatcong, N.J., Princeton Aqua Science.

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SUMMARY SHEET

category: *WATER QUALITY*

sub-category: *RESIDENTIAL*

BMP: *GRASSED WATERWAYS/ RIP-RAP*

OBJECTIVE

To intercept and retard relocation of stormwater runoff down a slope to increase overland flow time, allow removal of contaminants, increase infiltration (recharge capability), and minimize soil erosion.

WHERE APPLICABLE

It is recommended by Tourbier (ref. 6) that grassed swales not be used if the velocity is greater than 8 feet/sec. otherwise, widely applicable.

PROS

1. Grassed waterways are aesthetically advantageous since they blend well with surroundings.
2. Water quality and infiltration are enhanced.
3. Soil erosion is reduced.

CONS

1. Additional maintenance may be required.
2. Careful design and sizing are essential, sometimes using more space than other methods.

IMPLEMENTATION CONSIDERATIONS

1. Grass Waterways are broad, shallow, gently sloping channels lined with a dense, erosion-resistant turf of mown grass. For maximum effectiveness and maintenance purposes they should be carefully incorporated into the grading plan. Natural swales are preferable. Grass seed mix, channel size and overall design should be developed with care. A discussion and specifications on these can be found in reference 6 (3.1, 3.1A). The function as described by Tourbier is to convey concentrated run-off from one point to another at safe velocities; and/or to intercept overland flow or sheet run-off on long slopes and to convey this to a safe discharge point. Because they are intended to carry stormwater only, they are dry at times.

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2. "Rock rip-rap forms a flexible protective lining which is not susceptible to settlement and undercutting as rigid linings since it can slump into the scour hole without damage. A major advantage of rock rip-rap is that due to its roughness, it causes dissipation of much of the stream's energy and so minimizes scouring problems at the downstream end of the protected section". (see ref. 6, (4.6) for detailed information)

For Additional Information

1. USDA, SCS. Engineering Field Manual For Conservation Practices. Washington: GPO, continually updated.

2. Baltimore (MD) Sediment Control Manual, 1971.

3. USDA, SCS. "Detail of Level Spreader, SCS Design Standard

4. Chow, Ven Te. Handbook of Applied Hydrology. N.Y., N.Y.: McGraw-Hill, Inc. 1964, Section 21, p.61.

5. Engineering Science,Inc., Berkeley, Ca 94701.

6. Urban Land Institute, Water Resources Protection Technology, Tourbier, 1981.

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SUMMARY SHEET

category: WATER QUALITY

sub-category: RESIDENTIAL

BMP: ROAD DE-ICING

OBJECTIVE

To reduce water quality contamination by minimizing the use of de-icing materials where possible.

WHERE APPLICABLE

In regions where snow and ice on roads warrants the use of de-icing agents such as salt.

PROS

1. Realize enhanced water quality.
2. Reduce vehicle corrosion due to salt.
3. Reduce damage to roadside vegetation.

CONS

1. Icy roads cause accidents which can result in injury and death, therefore, it is difficult to draw the line between water supply degradation and vehicle-related safety.

IMPLEMENTATION CONSIDERATIONS

1. De-Icing Salts - Chloride ions from de-icing salts move rapidly into the soil and can pollute ground and/or surface water.(5) As a result, consequences can occur such as hypertension, caused by excess sodium in water supplies; serious corrosion of vehicles and highway structures from chlorides; damage of pavement and roadside vegetation, also from excess chlorides in water; and deterioration of the soil structure.

   Since presently there are no viable alternatives for calcium or sodium chlorides for road de-icing, (pavement heating is too expensive), and because the use of abrasives, such as sand and grit, alone is often not publically acceptable and may result in excessive sediment problems, the use of these materials can probably not be eliminated altogether. However, through operator education programs and by setting clear guidelines on application rates and optimum mixes, quantities spread and frequency of spreading can be significantly reduced. Also, spreading equipment should be well maintained for best performance of even spreading. Equipment can be modified to improve application effectiveness, and new techniques such as pre-storm application of a brine solution followed by use of high speed snow blowers, should be investigated and evaluated for their effectiveness. Limiting salt application in aquifer recharge areas or directly over major aquifers to critical areas for road safety only (such as steep slopes, curves, and intersections) is a possibility worth investigation. It has also been experienced that sediment control basins which receive salt-contaminated water from snow melt can be evaporated in the spring to yield salt concentrations high enough (specific gravity of 1.178) to be reused for de-icing the next winter season (175 gals/mile). (2)

   Salt tolerant species of vegetation should be planted on all new roads.
2. Salt Storage Piles - The leachate from stockpiles of de-icing salts can make its way into groundwater and/or surface water supplies and therefore can become a serious problem. It is necessary to properly site, construct and maintain these piles. They should be placed on impervious liners or pads that are not susceptible to breakdown from salt exposure, and covered to eliminate water infiltration and leachate leading areas should be kept clean so scattered salt is not washed away into water systems.

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For Additional Information

1. Adams, F.S. Highway Salt: Social and Environmental Concerns. Highway Research Report 425. Ottawa, Ont.: National Research Council, 1973.

2. Walker, W.H. and Wood, F.O. Road Salt Use and the Environment. Highway Research Record, Repor 425. Ottawa, Ont.: National Research Council, 1973.

3. Hanes, R.E. Effects of De-Icing Salts on the Environment. Highway Research Record, Report 91. Ottawa, Ont.: National Research Council.

4. Murray, D.M. A Search for New Technology for Pavement Snow and Ice Control. Washington: EPA, 1972.

5. Urban Land Institute, Water Resources Protection Technology, Tourbier, 1981.

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SUMMARY SHEET

category: WATER QUALITY

sub-category: RESIDENTIAL

BMP: POLLUTION SOURCE CONTROL

OBJECTIVE

To reduce the source of potential contamination, prior to its incorporation into ground and surface water.

WHERE APPLICABLE

Throughout the watershed or drainage basin.

PROS

1. Minimize costs of maintenance and rehabilitation.
2. Realize enhanced ground and surface water quality
3. Increase civic pride .

CONS

1. Requires public awareness, participation and most of all the desire to do something about this concern.

IMPLEMENTATION CONSIDERATIONS

1. Litter Control - Whether deliberate or from carelessness, litter can accumulate, become unsightly and cause direct contamination of water supplies. Sources include uncovered trucks, mishandled trash, construction demolition sites, and improper storage or placement for collection of household garbage. All of these can be controlled by people. Illegal dumping and littering violations should be penalized and strictly enforced.

2. Nutrients and other contaminants from activities such as excessive or unnecessary applications of herbicides and pesticides, use of phosphate detergents and soaps, pet waste, improper handling of lawn and garden refuse, and improper disposal of materials such as oil and gasoline from cars and other machines used around the household, all contribute to the degradation of ground and surface water when incorporated into stormwater runoff. A public education program which informs the home owner of how this can occur and how and where to properly dispose of unwanted material including ways to implement practices that avoid or minimize the use of the above should be instated on a wide-spread and large scale basis. Municipalities should provide proper repositories for materials such as used oil, and possibly used tires, for future recycling.

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For Additional Information

1. EPA, Water Pollution Aspects of Street Surface Contaminants. Cincinnati, OH: (author), 1972.

2. Mallory, C.W. The Beneficial Use of Stormwater. Washington, D.C.: EPA, Office of Research and Monitoring, 1973. EPA-R2-73-139.

3. Water Resources Planning Board. Controlling Stormwater Runoff in Developing Areas. Washington: Metropolitan Washington Council of Governments, 1978.

4. Woodward-Clyde Consultants. Candidate Measures for the Control of Urban Runoff. San Francisco: Association of Bay Area Governments, June 1977.

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SUMMARY SHEET

category: WATER QUALITY

sub-category: RESIDENTIAL

BMP: ON-SITE WASTEWATER DISPOSAL

OBJECTIVE

To minimize contamination to groundwater by ensuring maximum efficiency of on-site wastewater disposal system.

WHERE APPLICABLE

Any region where regional sewering does not exist and on-site systems (e.g. septics) are relied upon for wastewater treatment.

PROS

1. Recharge groundwater aquifers thus sustaining the water budget.
2. Cost-effective and environmentally sound if properly designed, sited, installed and maintained.
3. Can provide long-lasting and effective domestic wastewater treatment.

CONS

1. Septic system efficiency requires lots large enough to sufficiently sustain them as well as suitable soils, drainage, topography etc.
2. Septic Systems are sensitive to industrial wastes and "toxic" materials.

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IMPLEMENTATION CONSIDERATIONS

Please refer to the following documents prepared by this office entitled:

1. Innovative and Alternative Technology Guide for On-Site Wastewater Disposal Systems in Sussex Co., New Jersey.

2. Environmentally Based Growth Management: A Carrying Capacity Approach for Sussex County.

3. Sussex County Homeowners Guide to Onsite Sewage Disposal System Maintenance.

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SUMMARY SHEET

category: *WATER QUALITY*

sub-category: *RESIDENTIAL*

BMP: *REGIONAL WASTEWATER TREATMENT FACILITIES*

OBJECTIVE

To promote the use of regional systems, only if warranted by existing "over development" (see next paragraph), that incorporate state-of-the-art technology with regard to deviations from the traditional sewage collection/treatment plant.

WHERE APPLICABLE

In areas where the "carrying capacity" of the land has already been exceeded by the development of residences being beyond what soils and groundwater can assimilate with regard to on-site wastewater treatment and disposal, regional systems may be warranted.

PROS

1. May be only answer for "over-developed" or highly industrial regions.
2. State of the art technology often does away with point discharges of effluent into water bodies. Instead, effluent is applied to suitable land in appropriate quantities which has a much greater capability to assimilate and properly handle potential contaminants than does a water body.

CONS

1. Traditional regional collection/treatment systems are extremely expensive.
2. Historically, the traditional wastewater treatment facility (WWTF) has been over designed and therefore not as effective in its treatment process.
3 WWTF often becomes a financial burden to the community when improperly designed.
4. Federal funding, once abundant for these massive projects, has recently dwindled manyfold.
5. In areas where groundwater supplies are relied upon as a water source, interbasin transport of wastewater does not allow for recharge into the basin from which the water is extracted, thereby affecting the balance of the groundwater budget.
6. Certain state of the art technologies require more land for their proper implementation.
7. A multi-disciplinary team of experts wil be needed to properly implement a state of the art facility.

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Deviations from the traditional wastewater treatment facility have widespread and varied applications depending on the specific characteristics of the region and population to be served. Many examples exist, some are listed below:

- Sludge composting
- Aquaculture
- Overland flow
- Spray irrigation
- Lagooning
- Meadow marsh ponds.

For Additional Information

There is a multitude of information on this subject. It is not within the purview of this document to detail each one. A good reference to begin with is Innovative and Alternative Technology Assessment Manual, U.S. Environmental Protection Agency, Municipal Environmental Reserach Laboratory, Office of Research and Development, Cincinnati, Ohio 45268

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