

ON-SITE STORMWATER DETENTION – IS IT WORKING?

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1. INTRODUCTION

On-site Stormwater Detention (OSD) policies have been widely implemented in urban areas by local governments in NSW. Their rapid acceptance appears to have been at least partially driven by the belief that OSD would be a solution for many Council stormwater problems — an ideal solution which would not involve the authority in any capital or maintenance costs nor require any staff resources.

However the reality is quite different as problems have surfaced — problems that can vary from the very minor to those that are both substantial and serious.

This paper highlights the more serious issues and presents some options for reducing the number of problems or at least reducing their seriousness.

2. THE PROBLEMS

They arise through one or more of the following:

- ▶ deficiencies in the OSD code,
- ▶ deficiencies in design,
- ▶ deficiencies in construction, and/or
- ▶ inadequate maintenance.

2.1 Code Deficiencies

Each Council seems to have its own approach to OSD. Some Councils specify limiting discharges and required storage volumes based on assessment of development impact throughout the catchment while others assess the impact only at the site boundary.

Sometimes the intention of the code is not clearly spelt out, for example the performance requirements and/or detailed design specifications are not clearly presented.

Typically in only very recent times has maintenance rated a mention and even though some codes call for the submission of a maintenance schedule there is often no connection between the schedule and its application (successful or otherwise) by the owner.

These issues raise a number of questions. How do Councils know whether there is a need for OSD? Does their code address the need and does it include appropriate levels of detail for all the various aspects of OSD systems?

2.2 Design Deficiencies

In my experience design deficiencies can arise through either of two circumstances:

- ▶ Deficiencies in the Council code: If the code does not spell out the importance of key aspects of the design there are likely to be gaps in the submissions. It therefore follows that Council's reviewing officers will not notice the problems since the designer may well have submitted a design which is in accordance with the code,
- ▶ Deficiencies in the submission: In these cases the code is specific in its requirements but the submitted design does not conform to the code. In such cases unless both the designer and the Council reviewing officer have in-depth knowledge of Council's code there is always the possibility that a deficient design will be approved.

Either of the above situations are obviously unsatisfactory since once the design has been approved the potential for successfully negotiating the undertaking of works or measures to correct the deficiencies is very difficult for any Council officer. And even if the Council officer is particularly skilful in persuading the developer to undertake corrective works, his or her success rate is usually inversely proportional to the additional costs involved.

Councils therefore need to have confidence that both their code is sufficient in its level of detail and that designers and Council staff fully understand the code. But how many Councils have considered these issues (especially the latter)? How adequate is the training of Council staff?

2.3 Construction Deficiencies

The early emergence of problems due to unsatisfactory construction of OSD systems quickly led to the introduction of certification requirements. That is, Councils placed the onus on a suitably skilled professional person to certify that the works had been completed in accordance with the design drawings.

However in my opinion the certification process is not working well and is therefore not solving the problem of poor or unsatisfactory construction. Based on our company's experience in undertaking audits of OSD systems it is obvious that at least some OSD designers do not take the certification process seriously because the evidence, which is often very stark, is that the "certified" works are deficient.

Also in speaking to staff of numerous Councils the comment frequently expressed is that the signed certification forms often do not mean much. That is, they frequently find that when a "final" Council inspection is made — after receipt of work-as-executed (WAE) plans and a completed certification form — there are deficiencies with the works. Not only are there Council-identified deficiencies that need rectification before the officer will "sign off" on the project but given the dubious worth of the initial certification the Council officers see no point in asking for re-certification.

A major problem also exists with the quality (or lack of it) of the WAE survey. All too often the WAE survey consists of checking the invert levels of stormwater pits, confirming pipe diameters and simply quoting the achieved storage volume with little or no information about potentially critical overall drainage patterns or precise details about the storage itself, etc.

Also, difficulties will arise if the Council officer charged with signing-off on the project does not have sufficient skill to identify all the problems with the completed works.

2.4 Maintenance Deficiencies

Just like any other engineered structure, an OSD system requires maintenance. But the reality is that seemingly very few systems receive any maintenance.

Of course it has become relatively common place for the onus to be placed on the owner to maintain the system — usually by way of a positive covenant. But how many owners or new property purchasers understand what the covenant means? Or even if the legal ramifications are known or explained to them, how many can read the engineering plans — or even understand that often their whole property is integral

to the OSD system rather than it just involving say a couple of stormwater pits and pipes and an underground tank?

How many Councils have realised there are problems with some (or many?) of the OSD systems in operation in their LGAs? Are the problems only realised by accident, for example by way of property owners complaining?

A number of Councils have begun inspections of completed systems to try and identify maintenance or other problems. Some of those Councils, having undertaken inspections and identified problems, have written to owners asking them to rectify deficiencies, which exist due to inadequacies in the completed works (or directing them in cases where owners have made illegal modifications). We are not aware of any such Councils having success with their requests.

3. TOWARDS POTENTIAL SOLUTIONS

3.1 The Code

3.1.1 Is it Needed?

Almost all Councils have adopted across-the-board OSD policies. That is, while almost all codes exclude requirements for lower limits of development — such as small building extensions — very few have considered whether OSD is appropriate or necessary for all other sites in the LGA. For example, is OSD required for sites which do not drain to Council's overloaded stormwater system and therefore are not contributing to creating a bigger problem for others? Or similarly is it appropriate for runoff from downstream sites to be retarded, wouldn't it be better to allow that site's peak runoff to be discharged before the overall catchment flood peak arrives?

Is there actually a problem existing throughout the LGA? Is it possible through a combination of review of historical data and research to determine if OSD requirements can be waived for some or parts of some catchments. Gosford City Council has undertaken such a review, and Hornsby Shire Council is known to be currently making such an assessment.

3.1.2 Does it Have a 'Whole Site' Requirement?

Does the code insist or imply that the whole of the property is expected to be commanded by the OSD design? Is this necessary or appropriate? In my experience one of the most problematic areas in OSD design relates to inadequate design or complete oversight of drainage systems that are required to divert external catchment runoff around the OSD-commanded catchment. Even if the collection and conveyance system is appropriate, problems can still arise at the downstream boundary due to the concentration of the former sheetflow regime. Such problems would be minimised if the code limited the area to be commanded to a fixed percentage of the property (which would typically be related to the maximum development footprint) such that there is more opportunity for the external flows to be easily passed through the property.

3.1.3 Treatment of Subdivisions

Does the code permit subdivided lots to have individual OSD systems rather than a single basin servicing the whole subdivision? The latter arrangement should be adhered to since the overwhelming experience has been that a proliferation of small scale OSD systems is undesirable.

3.1.4 Does it spell out the Technical Details?

This question is not intended to encourage Councils to be so prescriptive in their approach to OSD that there is no flexibility for an innovative designer. Rather it is trying to highlight the importance of good design features - features which should be spelt out in the code. For example, the provision of overland flowpaths to both service the OSD system and to account for external runoff, details of discharge control pits and return valve installations, use of grates rather than solid lids, minimum acceptable dimensions for access, freeboard to habitable and non-habitable floor levels, etc.

While there has been a significant amount of practical OSD-related research undertaken, some Councils have failed to update their codes to reflect that research. For example, the Upper Parramatta River Catchment Trust (the Trust) has commissioned studies related to details such as orifice plates and outlet protecting screens and it is known that the Trust is happy to share the benefits of that research with other authorities.

It would seem to make sense for there to be a common local government specification/standard for the technical aspects of OSD. Otherwise, or in the interim, it is suggested that the Trust's handbook details could be adopted as "the standard".

3.2 Design Submissions

3.2.1 Certification of Designers

Some would argue that one way of improving the quality of the design submissions would be to improve the quality of the designers. The Trust has generated a fair bit of debate over the past six months or so by proposing that designers operating in the Trust's area should have both Institution of Engineers NPER Civil registration (or its equivalent for non-engineering bodies) and ISO 9000 quality assurance accreditation. In response to criticisms, especially regarding the latter, it is understood that the Trust is proceeding with implementation of the first requirement while treading more cautiously with the latter item.

But does the fact that a civil engineer has NPER (Civil) registration mean that the standard will improve? It is my personal belief that it will not because NPER (Civil) is a general civil engineering classification and therefore does not guarantee design competence in the field of urban stormwater systems. Rather if this approach is to have significant benefits I believe that bodies such as the Institution should be strongly lobbied by representative Council bodies, etc. to consider introducing a specialty registration area which would include OSD. (Enquiries made with the Institution have confirmed that this is an option since they have recognised the need for such specialties and are developing a specialty registration for fire safety engineering.)

But even with such a specialist pre-qualification can a Council be guaranteed that every submitted design will be satisfactory?

Another option that has periodically been floated is for Councils to have their own list of 'approved' designers. I see the major drawback of such a system being the amount of effort that is involved in producing the initial list and then in periodically updating it along with the likely political difficulties associated with such a system.

3.2.2 Use of a Detailed Check List

Some Councils have a "tick-a-box" style check list system whereby the designer needs to confirm that the submission is in accordance with the Council code. Typically the system involves say five or six general questions.

I believe such lists are in principle a good idea but should be taken a step further and I would advocate that:

- ▶ the check list should be very comprehensive (to reflect all the areas of the code),
- ▶ it should include two boxes - one for the designer and one for the Council reviewing officer — to acknowledge, and
- ▶ be separated into concept design, detailed design and WAE/Certification lists.

While such lists might seem like an overkill or just another piece of paper warfare, it is my experience with OSD audits that there are common faults in both the submissions and in the Council checking. Not only would the check lists minimise the potential to accept a deficient design but also both designers and Council staff would rapidly become better acquainted with the code and also retain their knowledge about the code.

However, it is important that such checklists should not be used as a means for resource-strapped Councils to allow unskilled junior staff to carry out OSD checking.

3.2.3 Charges for Submissions and/or Re-Submissions

Some Councils charge for checking, etc of OSD submissions while others also charge for checking of re-submitted designs. In contrast other Councils seem reluctant to impose such or similar charges. Given the critical nature of the works and to reflect the substantial effort that is required to adequately complete the various reviews, I believe that Councils should adopt a cost recovery system when it comes to processing OSD submissions.

Charges applied to re-submissions would also hopefully serve the additional function of gradually filtering out the 'poor' designers.

3.3 The Finished Works

3.3.1 Bonds

A number of Councils have a specific bond to cover the OSD system and often the size of the bond varies with the nature and size of the development. I believe that such an approach is the most effective way of ensuring that potentially the OSD system has been satisfactorily completed. However of course such an arrangement relies on the competency of the Council officer who is "signing off" on the OSD system and therefore recommending that the bond should be released.

3.3.2 Use of a Check List

Once again the use of a thorough checklist would not only improve the submission of WAE details and certification by the designer but also be a valuable aid to the Council officer whose responsibility it is to review the completed works.

3.4 On-Going Performance

I strongly believe that regular inspections are necessary. In this regard it is acknowledged that the typical positive covenant does give Councils considerable powers to inspect, direct that works be undertaken or failing that to enter a property to undertake any repair or maintenance works and subsequently recover the costs associated with the works.

Hopefully Councils will not become bogged down in taking legal action against a potentially large number of ratepayers at some considerable (or even unacceptable) political cost.

Regarding maintenance, an option could be that it is carried out by certified and qualified contractors.

3.5 Education about OSD

There is a need for improved education of all persons involved in OSD systems.

3.5.1 Council Staff

Councils usually rely on the skill and experience of only a very small number of staff to look after OSD-related matters. It is important that those staff have the necessary skills and therefore there should be regular training sessions. Given the costs in setting up such training it would be desirable for external courses to be available to cover both initial training and refresher courses with in-house supplementary training to cover the particular features and requirements of a Council's code.

3.5.2 Designers

There would seem to be substantial benefits in compiling a report (complete with diagrams, colour photographs, etc) that documents different types of OSD installations. I suggest that a report similar in style and layout to the DLWC's May 1995 report titled "Stormwater Pollution Control Devices — Some Examples of Current Practice" would be most appropriate as an education tool. In particular I think it would also be a very useful tool for selling the many "pluses" of above ground systems to developers and their architects.

I believe that such an education approach would, together with feedback about deficiencies in a submitted drainage concept plan, reduce the number of difficult OSD sites.

3.5.3 The Public

As mentioned earlier it is likely that very few members of the public have any real understanding of the nature of the OSD works within their property.

Perhaps a well made video (complete with graphics showing what happens as a storm passes over the property) would be the most appropriate education tool combined with (or followed by) a personal visit to explain the unique features of the property's OSD system. Desirably such a visit should take place on a regular basis.

Obviously it would make sense for the video to be produced for all Councils to use.

Simple handouts (also with good graphics) would also be appropriate for general education and for initially advising new owners of their responsibilities.

For a number of Councils there is the added complication of potentially numerous owners having non-English speaking backgrounds and therefore determining the most appropriate way to communicate with those owners. The cost of producing the video in a number of languages is unlikely to significantly add to the overall production cost.

4. CONCLUSIONS

The introduction of an OSD policy requires a serious commitment by any Council to provide a number of resources such as staff, education, training and dollars.

Ideally industry-wide standards for design, training and education should be explored and so lessen the burden on individual Councils. Nonetheless there are still substantial resources needed to try and ensure that installed OSD systems operate, and will continue to operate, in accordance with their intended function.

Since OSD has long been championed as a "win-win" solution with regard to stormwater problems and addressing the issues of catchment re-development, etc. there is the risk that OSD will become further discredited if insufficient resources continue to be allocated.