

Our success factors for controlling erosion, sediment runoff, sand drift and dust during subdivision

90% of large scale subdivision sites in the City of Swan are estimated to be compliant with the City's *Development Design Specifications* related to erosion and sediment control, and stormwater management. This is due to:

1. Our strong commitment to ensuring compliance with our *Development Design Specifications*
2. A high level of support being offered to land developers¹ by the City at the initial planning stage
3. The requirement for land developers to refer to expert technical manuals and guidelines for stormwater management when submitting their subdivision and construction plans.

Ensuring compliance with our *Development Design Specifications*

The City of Swan inspects subdivision development sites to monitor compliance and site conditions. The City will advise the developer of any conditions or situations which require attention, and provide guidance and direction on remediation methods if necessary.

High level of support provided to land developers at the initial planning stage

The City of Swan carries out *Start-up Meetings* with land developers prior to the commencement of all new subdivision developments. At these meetings, all of the requirements of subdivision developments (*Design Specifications*) are outlined, including but not limited to, safety, quality, environment and customer service.

The Developer's contractor is then required to submit a management plan to the City of Swan which will include environmental control measures prior to construction. The Developer's Consulting Engineer is the site superintendent and is responsible for compliance with contract conditions.

Land developers are also required to carry out regular meetings with the City of Swan and undertake regular site inspections.



Sediment runoff draining straight into the Swan River

Sediment runoff and sand drift from building sites is a concern in the City of Swan due to builder's sand entering stormwater systems and becoming sediment.



This occurs as many commercial areas and subdivisions in the City of Swan either have direct or indirect drainage access to catchment areas in the region.



Sediment runoff and sand drift from building sites has contributed to water quality degradation and has led to blocked stormwater entry pits/drains and increased infrastructure maintenance costs, and is a dust nuisance.



1. For the purposes of this case study, the terms "land developers" includes the Subdivision Developer, Industrial Site Developer and large scale Residential Strata Developers, and their consultants and contractors.

Example of unfinished turkey's nest dam washing into adjacent waterway



Using Development Design Specifications for erosion control and stormwater management for subdivision

The City of Swan provides specifications on any activity that requires construction or development including crossovers, drainage, road construction and subdivision.

In their experience, large scale subdivision development is mostly well managed and generally the City of Swan experiences minimal erosion and sediment loss resulting from subdivision development.

This positive outcome can be attributed to the effective implementation of City of Swan's subdivision development regulations, which are guided by their *Western Australia Development Design Specification D7 2010 Erosion Control and Stormwater Management*.

This design specification aims to reduce the erosion hazard of all construction activities which require the disturbance of the soil surface and the existing vegetation. Ground disturbance and vegetation clearing predispose construction sites to erosion and sediment loss in the resultant run-off water.

This design specification states that it is essential to develop measures which reduce the erosion hazard of any particular construction activity. Having done that, it is necessary to control run-off water, which carries the sediment, in such a way as to reduce the amount of that sediment leaving the site to an acceptable level.

The City of Swan applies their *Complimentary Western Australia Specification 211 - Control of Erosion and Sedimentation* as a key management tool for controlling sediment run-off from subdivision sites.

Conditions of *Specification 211* relate to the construction of structures and the implementation of temporary or permanent measures to control erosion and sedimentation.

Development Design Specifications requirements

Specifically, the *Development Design Specifications* requires land developers to control erosion and manage storm water by:

- limiting/minimising the amount of site disturbance
- isolating the site by diverting clean upstream "run-on" water around or through the development where possible
- controlling runoff and sediment movement at its point source rather than at one final point
- staging earthworks and progressively revegetating the site where possible to reduce the area contributing sediment. (This in turn increases the efficiency and effectiveness of the entire sediment control system while decreasing the number and size of controls required)
- providing an effective major stormwater system that is economical in terms of capital, operational and maintenance costs, and incorporates water quality controls as well as facilitates stormwater storage and movement
- retaining topsoil for effective revegetation works
- locating sediment control structures where they are most effective and efficient.

Land developers/contractors are required to plan and carry out site works to avoid erosion and sedimentation of the site, surrounding country, watercourses, waterbodies and wetlands in compliance with the requirements of relevant legislation.

The developer/contractor is responsible for the ongoing maintenance sedimentation control measures to ensure erosion is effectively prevented.

If erosion occurs it is the developer's/contractor's responsibility to clean it up and make the site right to prevent on-going and cumulative impacts to wetlands and watercourses.

Upon completion of sections of works, and upon final completion, it is the developer's/contractor's responsibility to remove any temporary sediment control measures.

The City has also developed guidelines for land developers which state that the development and subdivision of land must minimise adverse effects on the local environment, including those from erosion and dust.



Further information on how to control sediment loss

The City of Swan refers land developers to the Department of Water's *Stormwater Management Manual 2007*, *Vegetation Guidelines for Stormwater Biofilters in the South West of Western Australia (2014)*, and the Cooperative Research Centre for Water Sensitive Cities's *Adoption Guidelines for Stormwater Biofiltration Systems (2017)*.

Local Laws another useful tool for preventing sand drift

PART 10 of the City of Swan's *Consolidated Local Laws 2005* relates to the prevention and abatement of sand drift whereby the owner or occupier of land must take effective measures to stabilise sand on their land and ensure no sand is released or escapes from the land whether by means of wind, water or any other cause. This Local Law has been gazetted to outline regulations relevant to small scale subdivision and residential building sites.

Where this is not the case or sand is released or escapes by means of wind, water or any other cause such as to cause a nuisance, risk to health, a hazard or environmental damage, the City may serve on the owner or occupier of the land a notice requiring the owner or occupier to:

- clean up and make good any damage resulting from the release or escape; and
- take effective measures to stop any further release or escape of sand.

The penalty for non-compliance is \$200.



Historical example of a site subject to erosion without prevention measures to stop sediment entering a creek

Goal of achieving best practice erosion and sediment control supported by our Sustainable Environment Strategy

The City of Swan's *Sustainable Environment Strategy 2012* is a commitment to environmental improvement, including water quality. The Strategy recognises that population growth will impact the environment and that within City of Swan boundaries there are many natural assets that are worthy of protection. In particular the Swan River, which can be a visible expression of an ecosystem under stress, experiencing at times poor water quality, with erosion and biodiversity loss within its flood fringe and catchment. The City has pledged to work internally and with partners in their community to:

1. Preserve and protect the ecology and biodiversity of the City of Swan's natural ecosystems
2. Implement 'best practice' in the management of ground and surface water quality and quantity
3. Prevent and/or manage contamination of developed land and other inappropriate land management practices. (Land developers are required to appoint contaminated sites, geotechnical and acid sulphate soil consultants to determine if sites are suitable for development. If contaminated soils are discovered a plan is developed for the appropriate treatment in accordance with state and local legislation and guidelines).

Our Strategy also commits to amending our Environmental Planning Policy to ensure it supports and delivers appropriate landscaping and Water Sensitive Urban Design outcomes for the subdivision planning process in the City of Swan.

Current poor residential building practices having a considerable economic as well as environmental impact

Whilst large scale land developers are working hard with the City of Swan to comply with conditions for mitigating erosion, sediment loss, sand drift and dust during subdivision development, current residential building practices in regard to sediment runoff and sand drift are resulting in considerable environmental impacts and financial costs.



Example of development impacting a wetland

This includes smaller scale land developers who infrequently carry out subdivision works who are not as familiar with processes and practices. This issue is compounded by the frequent and reliant use on subcontractors who, in the City of Swan's experience, often are less concerned about site requirements and can show little responsible environmental stewardship.

Typically in the City of Swan, sand from smaller scale subdivisions and residential building lots is transferred onto the road during building construction activities and makes its way into the City's stormwater system. Site space is often limited and undoubtedly challenging for builders² to manage all building site materials.



Cumulative impact of sediment contaminated rainwater washing from road to creek at a site that was not fully rehabilitated to control localised erosion

Builders have been observed tipping sand for construction directly onto the road, particularly in laneways. Sometimes the sand is tipped directly on top of or adjacent to a gully grate or side entry pit, which is immediately blocked with sand.

Poor practices are exacerbated by the fact that the installation of sediment fencing on residential building sites in the City of Swan is not a common practice.

2. For the purposes of this case study, the term "builders" includes small scale Residential Strata Developers and residential builders who are responsible for erosion control on individual lots, including owner builders, and their consultants and contractors.



Example of inappropriate separation distances to vegetation and watercourses when infill is brought in

The City of Swan's maintenance team carries out regular drainage maintenance and has spent a significant amount of time clearing drainage systems in new subdivision areas where houses are being built on individual lots. 462 work requests related to drainage were received by the City's Assets Management Department during 2018.

For the 2019/2020 financial year, the City is budgeting approximately \$267,000 for street sweeping costs for new subdivision stages following residential building site works and approximately \$375,000 for cleaning drainage infrastructure full of sand within new subdivisions. **This equates to an annual budget of \$642,000;** a significant cost being borne by the City and its ratepayers.

Barriers to enforcing compliance for residential building sites

Achieving compliance with the City's Local Laws proves difficult in the City's experience as determining where sand has come from is difficult and the City can only act when erosion, the dumping of sand or surface runoff is witnessed or when that particular site is the only site under construction in that street or area, which is rarely the case.

The City of Swan acknowledges that more stringent controls specific to erosion, sediment runoff and sand drift from residential building sites, as well as higher fines to act as a disincentive, would be beneficial so that best practice by small scale land developers, builders and sub-contractors is less dependent on voluntary goodwill. In particular, the inclusion of, or reference to, statutory obligations for sediment control when approving residential building plans would be advantageous.

The City of Swan also acknowledges that additional inspection/compliance officers with powers to issue on the spot fines to facilitate a more effective process to manage the large number of non-compliant residential building sites would improve environmental stewardship and decrease the subsequent detrimental impact on water quality.

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Department of Biodiversity, Conservation and Attractions



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