Sediment Task Force submission to the DLGSC's

Local Government reform - Summary of Proposed Reforms for public comment

https://www.dlgsc.wa.gov.au/local-government/strengthening-local-government/public-consultations/local-government-act-reform-consultation

(Compiled by Bronwyn Scallan, Sediment Task Force Coordinator, Perth NRM, on behalf of Sediment Task Force members with contributions by STF members.

[redacted]

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Consultation Information

The Department of Local Government, Sport and Cultural Industries (DLGSC) is inviting comments from local governments and the wider community to inform implementation of the proposed reforms. The feedback received will inform the drafting of legislation. The consultation period runs between 10 November 2021 and 5pm 25 February 2022. This summary of proposed reforms lists specific proposals under each of the six themes, with space for local governments or members of the public to submit comments against each proposal. Anyone may submit comments either directly by email, or by adding comments to the Summary of Proposed Reforms document and emailing the document to actreview@dlgsc.wa.gov.au Comments must be received no later than 5pm 25 February 2022 to be considered.

Sediment Task Force Comments Addressing Proposed Reforms 2.2, 2.4, 6.2 and 6.3

Comments in this submission are related primarily to preventing sediment pollution during urban development and the subsequent sedimentation of waterways and wetlands, which is currently occurring in Western Australia (WA) due to poor on-site sediment and water management practices.

This submission addresses the four proposed Local Government Act Reforms that provide an opportunity for Local Governments (LGs) across Western Australia to prevent on-site sediment loss at its source to improve environmental, economic and social outcomes (including streetscape, amenity, recreational and cultural outcomes).

The responsibility for minimising the potential for sediment pollution during urban development is a shared responsibility. All parties have a role to play and all relevant stakeholders need to take actions that collectively address the issue. These actions should not unfairly pass any associated costs onto one party. (For example, Governments must not simply pass the costs on as an "upfront tax" to new homebuyers during their build and/or pass the costs of "cleaning up" to ratepayers in isolation). Co-investment in infrastructure to capture the "sediment that got away" (and the ongoing maintenance of this infrastructure) provides one opportunity for collaborative action.

Prevention of sediment pollution to meet legislative requirements should be a focus for the construction and land subdivision industries, for State and Local Government (i.e. in terms of verge, road and median management, road drainage networks, roadworks and other transport infrastructure), and for homeowners and residents. This includes home renovations as well as for any other activity that disturbs the soil (e.g. landscaping a garden, a new driveway or paths or having a swimming pool installed).

More effective management by Local Governments of sediment run-off from verge, road and median strips on managed road reserves in established locations is imperative. Poorly managed road reserves in WA, in particular medians and verges without curb-controls, is currently resulting in the washing of sand and vegetation debris (including mulch) into the road-drainage network after every rain event. (Many of these road drainage networks connect in-line to new subdivision or infill locations).

Verge watering of established trees and shrubs planted during subdivision where residential building at a lot scale is still occurring is also contributing to the sediment pollution in instances where “loose” and/or uncovered sediment on lots, verges and on the road is mobilised into the drainage network during watering due to “overspray”. The spraying of weeds on verges and median strips by Local Governments can also result in soil erosion and consequent sediment runoff during rain events.

The issue (during urban development)

Soil, sand (which includes imported builders sand), silt and mud (sediment) can be blown or washed from building, subdivision and construction sites, and roadworks. When sediment and other building Basic Raw Materials are allowed to drift from site they often enter the drainage system and contribute to the fouling of the drainage system and pollution of local parks and sensitive environments such as rivers, wetlands and oceans.

There is much anecdotal evidence in Western Australia of soil erosion and sediment runoff during urban development; this is easily observable after rain, wind and storm events and currently occurs in most Local Government jurisdictions in WA.

The cumulative environmental impact of unmitigated on-site soil erosion (including wind-blown soil erosion) and water-borne sediment runoff during land development can be significant, is detrimental to drainage system and ecosystem health and currently results in considerable financial cost to local government but cost benefits to private developers.

Sedimentation of waterways and wetlands is a clear early warning sign that more action and investment is needed to effectively manage pollution and urban run-off, including sediment surface run-off (HLW, 2021).

Stakeholder and community concern

There has been significant community concern and discussions between stakeholder groups in Western Australia over many years regarding the need to improve sediment management practices during land development to prevent water pollution and maintain ecological integrity.

60 participants representing State Government, Local Government, environmental consultancies and concerned community members attended the *Shifting Sands Forum* in 2014 to discuss this important issue. They concluded that sediment runoff from urban development is a significant contributor to water pollution (i.e. soil/sand, chemicals, pathogens and nutrients) due to:

1. Legislative requirements commonly not being complied with and/or enforced.
2. Limited voluntary industry adoption of best practice measures to prevent erosion and sediment runoff at source.
3. Fines for non-compliance with legislative requirements being cheaper than the costs of prevention.

The Sediment Task Force (STF) was established in 2014, in response to a recommendation of this forum. (Refer to Appendix 1 for information on the Sediment Task Force). Some positive change has occurred since this time however sedimentation caused by inadequate erosion and sediment control on subdivision, public works and building sites is still a significant non-point source of water pollution in Western Australia.

Local Government plays a key role in preventing unmitigated sediment loss

A key role of Local Government is to manage land-use change whilst minimising environmental, economic and social impacts. The environmental and financial impacts of soil erosion and sediment loss from urban development are considerable (refer below) and are being managed by Local Governments across Western Australia in a diversity of ways, to varying levels of success.

Preventing and controlling sediment loss from urban development is a significant issue for Local Governments in Western Australia. The recently launched *Restore our Rivers Campaign*, a collaborative approach supported by the South Eastern Alliance of Local Governments, is testament to the importance placed by some Local Governments and the scientific and wider community and by those responsible for caring for WA’s waterways to facilitate best practice management, including for erosion and sediment control during urban development (refer to https://www.perthnow.com.au/community-news/southern-gazette/eastern-block-of-councils-to-lobby-federal-government-to-save-the-rivers-c-5294124).

A recent survey undertaken by SERCUL helps provide further insight into current management by Local Governments regarding sedimentation and the measures and development controls that they have in place to prevent sediment making its way into waterbodies. In this survey, 21 LGs stated they have at least one non-structural measure implemented to prevent sediment entering the river via stormwater drains and 17 LGs stated they have sediment management regulations in place. (Refer to https://www.sercul.org.au/fertilisewise/).

As an example of best practice by a Local Government in WA, the Shire of Augusta Margaret River (SAMR) has successfully implemented a new management regime for sediment and erosion control (ESC) on construction sites to amplify water quality outcomes. This regime comprised the gazettal of their Erosion and Sediment Local Law 2019 (which includes provision for infringements) and the development of a sediment and erosion control 'toolbox' to guide owners and occupiers of land on best practice sediment and pollutant management. The SAMR has also made a commitment to ongoing engagement and education for the construction industry to improve management practices, with an emphasis on behavioural change, and with the overall aim of putting sediment management at the "forefront", as a key part of the everyday activity at building and development site. Shire staff involved concluded some good progress was made by builders during 2021 when there was ongoing monitoring for compliance with the new Erosion and Sediment Control (ESC) Local Law by Shire staff. Having the new ESC Local Law helped staff as they knew they could enforce a clean up effort. Furthermore it meant that the industry and the community started to understand what the Shire was concerned about. Approximately $7500 has been received by the Shire in paid fines which can now be used to fund additional street sweeping, drainage maintenance works and/or education and awareness to reduce the impacts of sedimentation in local waterways.

Best practice erosion and sediment control during land development will maintain and/or enhance water quality and hydrological regimes, which in turn protects public health and supports healthy ecosystems. For example, effective erosion and sediment controls on building sites in South East Queensland can prevent the loss of around 1 tonne of soil on a 500m2 lot, or 10 tonnes (one dump truck load) less soil lost for every 10 houses built (Healthy Land and Water, 2019).

(Refer to Appendix 2 for a list of benefits of erosion and sediment control during land development and to Appendix 3 for a table summarising best practice management of works during subdivision).

Local (and State) Governments need to ensure Government delivered or sponsored development projects demonstrate effective erosion and sediment control in a manner that reflects best practice standards and policy (i.e "they need to walk the talk" to be deemed credible). This includes responsibility for verge, road and median strips.

Local Governments should identify key barriers to successful management within their own organisation and externally, and adopt new strategies to overcome these. This could include more proactively assisting some builders and land developers to understand and fulfil their legislative obligations, and of opportunities for voluntary adoption of best practice erosion and sediment controls.

The Sediment Task Force recommends that Local Governments ensure that:

1. All subdivision and building proposals/applications contain best practice soil erosion and sediment control measures to prevent the export of nutrient and non-nutrient contaminants including sediment from entering water resources during land development.
2. Mitigating the risks of sediment loss from sites is considered at the earliest possible stage of the planning process (e.g for subdivision at the very beginning of the re-zoning and structure planning process rather than as a 'second add-on" for engineering design), and all subsequent stages.
   (Refer to Appendix 4 for erosion and sediment loss risk mitigation information).
3. Rapid, temporary revegetation of exposed soil is a requirement at every stage of the subdivision process.

The Sediment Task Force recommends that appropriate erosion and sediment controls be installed and effectively maintained on all subdivision, residential, commercial, industrial developments, and road work sites and:

- All erosion and sediment controls installed on sites should be in accordance with International Erosion Control Association Australasia (IECA) best practice.
- Investing in controls for predicted and unexpected weather events is necessary.

- Regular inspection and maintenance is required for controls to be effective.
- Collection of data on how effective individual ESC controls are once they are installed is important.
- The potential impacts of predicted long term climatic changes, which suggest higher risks of environmental harm, should be considered.

The magnitude of the problem of unmitigated sediment loss during land development

There is a risk of soil erosion and sediment runoff whenever vegetation is removed, soil is disturbed, or the natural overland flow of stormwater runoff is altered. This is directly proportional to the intensity of rainfall and storm events, the amount of soil exposed to water and the slope of the exposed land.

Research undertaken recently by the University of Western Australia/CRC for Water Sensitive Cities (and sponsored by the Sediment Task Force) at Heron Park in Armadale shows that approximately 17,000 kg/ha of exposed sand can escape into the environment, stormwater drains, rivers and waterways for every hectare of building development every year (Oldham C.E., Eynon F. and Ocampo, C.J, 2020). UWA/CRCWSC's research conclusions and recommendations confirmed that:

- Active management is essential for all phases of land development.
- Exposed sand/soil is a major problem (including uncovered stockpiles).
- Not emptying side entry pits has significant impacts, especially prior to heavy rainfall events.
- There is consistent sediment deposition in drains at low baseflows and potential for groundwater intrusion to flush-out sediments already in the system particularly during earthworks on sites where there is known, or anticipated, water table rise in low lying areas.
- There is a lack of monitoring for water-borne sediment during subdivision.

Recent research in southeast Queensland estimated that annual sediment contribution (unmitigated loads) from construction activities can be up to 202,000 tonnes of mobilised sediment per annum (Healthy Land and Water, 2019).

At the local scale, wind-blown sand erosion from vacant blocks and/or uncovered soil/sand stockpiles can be a source of sediment pollution in adjacent bushland and/or foreshore areas and waterways and wetlands, as well as a nuisance to neighbours. For example, one 442m2 vacant block at Cygnia Cove housing estate in Waterford, that was seeded with rye-grass and sprayed with hydro-mulch at the conclusion of the subdivision process and has high limestone verges on the property boundary, was subject to considerable wind erosion, with wind-blown sand from the lot onto the adjacent pathway over 444 days equating to 0.95 tonnes of sand.

The environmental impacts of sediment pollution

Sedimentation of waterways and wetlands has detrimental impacts on water quality, hydrologic and biological functioning and biodiversity, including adversely impacting recreational fishing assets. Sedimentation results in increased water temperatures, decreased oxygen levels, increased incidence of pathogens and a decrease in the number of natural predators, as well as aquatic weed infestations. Sediment leaving construction sites can accumulate in permanent pools of rivers, destroying critical habitat. Free floating sediment can clog the gills of fish and reduce the available light required for photosynthesis in aquatic plants, causing ecosystem collapse. Sediment can also contain high levels of introduced nutrients and sometimes toxic chemicals depending on previous land use, promoting toxic algal blooms and causing water contamination.

The economic costs of unmitigated sediment pollution

During and after urban development activities, local and state governments in WA are often left to bear the costs of sweeping roads, repairing and maintaining stormwater and high groundwater management infrastructure, of remediating/restoring environmental assets, of retrofitting poorly designed or maintained erosion and sediment control infrastructure, and for enforcement. The examples below demonstrate some of the significant private financial benefits to land developers by not actively managing sediment runoff.

Required Management Action	Cost ($)	Source/Reference
Sweeping sediment off roads and paths and educting sediment.	$1.4 million per annum	City of Cockburn 2020
Council budget for cleaning drainage pits and pipes full of sand within new subdivisions and for street sweeping of new subdivision stages after residential building. (462 work requests related to drainage during 2018).	$642,000 per annum	City of Swan 2019
Sediment Basin Failure (subdivision) – costs to repair embankment/outflow and removal sediment deposits.	Up to $12,000	Healthy Land and Water (QLD) 2019
Cleaning out of drainage infrastructure –pipe blocked by sand & rubble.	$387 per lineal metre	City of Armadale 2018
Maylands Lakes restoration project (8000m^3 sediment removed).	$1.2 million	City of Bayswater 2019
Single subdivision/building site - cost to dredge sediment leaving Heron Park estate research site.	up to $60,000	UWA/CRCWSC 2020
Manual cleaning of Mabel Talbot wetland (7 Tonnes gross sediments removed).	$36,000 (one incident)	City of Subiaco 2019

Further economic costs are related to the loss of storage capacity and reduced design life for reservoirs, dredging costs to maintain navigable channels, increased water treatment costs, reduced flood capacity (bridges, culverts), bank erosion, reduced lifespan of stormwater infrastructure and increased maintenance costs. Economic costs resulting from declining tourism, recreation and cultural and heritage values are also evident, and further costs are predicted (Healthy Land and Water, 2019).

There are also often unquantified financial costs to Local Governments including:
- Restoring drainage pits (e.g. repairing washout and scouring of swales or basins).
- Retrofitting poorly installed/poorly maintained controls (e.g. raingardens damaged by soil, silt, sand or mud).
- Revegetating where plants are damaged or were washed away.

And, often unquantified financial costs to developers as per above list above where relevant, and also including:
- Impacts on neighbouring properties (e.g. clean-up and repair costs, fines and lost productivity).
- Stop Work orders (costs of "lost time production").
- Fines and legal costs for non-compliance with legislation.

Sediment removal works planned by the City of Busselton in early 2022 to remove sediment from the Lower Vasse River with the aim of improving water quality could provide a locally relevant case study for Local Governments in terms of the economic costs and environmental impacts that could be avoided if sedimentation is prevented at source (https://www.busselton.wa.gov.au/news/lower-vasse-river-sediment-removal-works-to-commence-in-early-2022).

The public health impacts of sediment pollution

Sedimentation of waterways and wetlands can lead to the establishment of isolated surface water pools, increased deposition of sediment in existing pools therefore making them shallower, and in the formation of "alluvial fans" along waterways. This in turn increases flood plain mosquito breeding habitats for pest mosquitoes and can lead to an increase the diversity of flood plain mosquito species. Sedimentation also results a decrease in the number of mosquito predators, and as such is considered a "trigger" for increased mosquito populations (SERCUL, 2017).

Improved management of soil erosion, sediment runoff and sand drift during land development will help prevent the occurrence of mosquito-borne diseases and mosquito nuisance, especially in close proximity to wetlands and waterways. (Local Government Environmental Health Officers (EHOs) could help reduce sedimentation risk by reporting incidences of sediment loss and/or sedimentation. Indicators of sedimentation may or may not be obvious and should the presence of mosquitos or mosquito larvae, stagnant water (in drains also), flooding, a change in flow and depth of rivers, pools and/or streams over time, sediment deposition and/or the infilling of lakes and estuaries).

Sediment can obstruct and/or damage stormwater and high groundwater management infrastructure, causing localised flooding, and can be a public safety hazard.

Looking forward - how will this issue be exacerbated in the future?

Population Growth

A large amount of land is currently being developed in WA and there is a considerable amount of land predicted to be developed in the future to meet population growth estimates (for subdivision, infill housing and transport infrastructure). This means the cumulative effect of unmitigated sediment discharge to waterways over the next few years poses a considerable environment risk due to the increased potential for sedimentation if poor management practices continue.

Climate Change

Anticipated climatic changes will further challenge efforts to maintain water quality. Effective erosion and sediment control management will become more important as more frequent and intense rain events can increase erosion and result in greater amounts of unmitigated sediment washing off site into gutters and drains, wetlands and rivers.

Preventing sediment runoff after bushfires

Post-fire, the natural vegetative ground cover is mostly gone, soils are depleted of organic carbon and nutrients, and soils often become water repellent (ICEA, 2021). Local Governments also play an important role in determining what can be done post-fire, in both peri-urban areas and natural areas, to limit erosion, protect soil resources, and reduce the resultant sediment loads from having a detrimental flow-on impact in WA's waterways and wetlands. This includes implementation of appropriate engineering solutions that **do not exacerbate** the problem.

Sediment Task Force's Comments relating to *Proposed Reform 2.2 – standardisation of crossovers*

To minimise sediment loss during land development, the Sediment Task Force recommends that the *Local Government (Uniform Local Provisions) Regulations 1996* are amended with the aim of standardising the process for the entire road reserve (including crossovers), for residential properties and residential developments on local roads.

Standardising the process for the entire road reserve should aim to ensure land developers and builders are responsible for keeping crossovers, verges, paths, nature strips, gutters, drains and roads free of sediment as a condition of planning approval/building permits. The area requiring management should comprise the road reserve and gutters for a particular lot, as well as to the middle of the road directly in front of a particular site and immediately adjacent to a particular site.

As per above, effective management by Local Governments of verge, road and median run-off from road reserves is required, therefore the Sediment Task Force recommends that this process is also standardised. Specifically, Local Governments need to identify road reserves under their management where sediment loss has the potential to be/is currently an issue. These include medians and verges without adequate curb-controls that allow sediment and vegetation debris such as lawn clippings and mulch to wash into the road-drainage network during rainfall events.

Conditions of approvals/permits should be consistent with best practice erosion and sediment control. The Sediment Task Force recommends that site-specific Erosion and Sediment Control Plans (ESCPs) be required for all development sites including residential building sites, and in the case of subdivision, be approved in conjunction with a Subdivision and Development Water Management Report, before site works begin. (Refer to Appendix 5 for further details of ESCPs).

The Sediment Task Force recommends that approvals/permits should stipulate that all forms of sediment must NOT be swept or hosed into the gutters or drains but instead recovered (eg. by end-of day sweeping) and returned to

site. They should also stipulate that all forms of sediment (including imported building sand and "brickies sand") must be adequately revegetated after subdivision (e.g with rye grass) **and/or** contained (e.g. for building sites, sand stockpiles covered; use of sediment control fences etc), with a requirement to check this is the case prior to forecasted rain, wind and/or stormy weather.

When effectively managed, on-site dust suppression (as a condition of approval) often serves a dual benefit in managing a majority of the risk surrounding sediment run-off (HIA, 2021).

Vehicular access over the road reserve during building and for delivery of building supplies is a significant contributor to sediment being transported from sites onto the road and the Sediment Task Force recommends this should be effectively managed as an urgent but "easier to quickly remedy" priority. (Refer to Appendix 6 for local examples of this impact).

The Sediment Task Force recommends that the DLGSC work with land developers and builders and their industry representatives (e.g. HIA, MBA, UDIA) to develop standardised design and construction standards for the road reserve (including crossovers and gutters), with the aim of identifying practical methods the land development industry can adopt to prevent sediment leaving sites and causing sediment pollution.

Sediment Task Force's Comments relating to *Proposed Reform 2.4 Streamline Local Laws*

Effective legislation and regulation for soil erosion and sediment loss from building, subdivision and construction sites is essential, and, more importantly, requires successful adoption and implementation.

Local Government has the opportunity and responsibility to regulate sediment management through Local Laws, policies, guidelines, planning approvals, permits, bonds, advice notes and management plans and the State Government legislative provisions of the Environmental Protection (Unauthorised Discharges) Regulations 2004, the Planning and Development Act WA 2005 and the Local Government Act 1995.

Local Laws are a significant tool for Local Governments to manage erosion, sediment loss, sand drift and dust during subdivision, building and road construction. Existing Local Laws for managing erosion and sediment control gazetted in WA are many and varied. They relate to soil erosion, sediment and sand drift, environment, health, private property, public thoroughfare, dust, liquid waste and nuisance management.

Local Laws specific for Erosion and Sediment Control in WA are proving more effective. Local Governments in WA who have gazetted a specific Local Law for soil erosion, sediment runoff, sand drift and dust control include:

1. City of Rockingham Sand Drift Prevention and Abatement Local Law 2000
2. Shire of Jerramungup Dust and Sand Local Law 2011
3. City of Kalamunda Sand Drift and Litter Control Local Law 2006.
4. Shire of Serpentine-Jarrahdale Dust and Sand Local Law 2008
5. City of Nedlands Site Erosion and Sand Drift Local Law 2014
6. Town of Claremont Site Erosion and Sand Drift Local Law 2016
7. City of Wanneroo Site Erosion and Sand Drift Local Law 2016.
8. Shire of Augusta-Margaret River Erosion and Sediment Control Local Law 2019

The Sediment Task Force recommends that a standardised (model) Local Law for erosion and sediment control based on current best practice is developed* to help to assist Local Government and the building industry effectively address on-site sediment loss. (Achieving this outcome could be feasible via the DLGSCI's policy advisory and support role to both the Minister of Local Government and to Local Governments to *improve the capacity of local governments to respond to community demands and expectations, and improve levels of accountability and legislative compliance, or by other means).*

Consistency in legislation will be beneficial for both Local Governments and for land developers and builders, for reasons of cost-effectiveness, clarity and equity. It will also prevent situations whereby land developers, builders and/or road construction managers in breach of Local Law conditions claim to be unaware of the specific on-site soil erosion and sediment control requirements for the individual Local Government jurisdictions.

Local Government Officers (LGOs) have identified the advantages of a Local Law specific to erosion and sediment control as:

1. "It is easy to show the true impact of the issue";
2. "Understanding the intent of the Local Law is easier for LGOs, builders and land developers";
3. "It is more relevant when the name of the Local Law clearly communicates its purpose"; and
4. "New Local Laws can be gazetted for a minimal charge comparatively".

A proven Erosion and Sediment Control Local Law (or a combination of key content from various Erosion and Sediment Control Local Laws) could be utilised to draft a model (standardised) Local Law for Erosion and Sediment Control. The City of Nedlands and the Shire of Augusta-Margaret River (refer above) have offered their Erosion and Sediment Control Local Law as a template for this purpose. This approach however should first require a review of the effectiveness of existing Erosion and Sediment Control Local Laws in WA.

The Sediment Task Force recommends that standardised regulations for on-site erosion and sediment control include a concise and clear set of conditions, requirements and responsibilities for land developers/site managers/builders/builders and contractors (including delivery of supplies and parking to avoiding vehicular tracking of sand), **for each stage of development and for each identified risk**. It is also recommended that anticipated seasonal impacts (e.g. groundwater intrusion and seasonal winds) are addressed.

Local Government Officers support consistency in sediment management legislation

100% of LGOs who participated in the ECU/STF's 2017 survey believed there is benefit in having consistent legislation across all Local Governments to manage sediment loss from building sites as:

- "All Local Governments have the same issues regarding sediment control";
- "Currently there are different rules for different LGs and this is confusing for builders, contractors and developers";
- "This will be useful as all builders, contractors and developers will know what is expected of them when developing sites";
- "A Standardised Local Law will improve the enforcement process for LGOs and builders";
- "A Standardised Local Law will result in better compliance from builders who can expect these regulations/conditions to apply across jurisdictions";
- "All building permits can refer to the Local Law as an advice note"; and
- "LGOs who work over time for different LGs will not be required to learn/understand a new Local Law".

Further useful insights from the Edith Cowan University/STF's Local Government Officers survey

- 61% of LGOs were either unaware or unsure of the existence of their LG's Local Law for sediment loss;
- Local Laws are not being utilised due to a lack of ownership by various LG departments;
- Many LGOs did not believe their LG's compliance process is effective; and
- Many LGOs believed there is a great reliance on responding to complaints (100%) and LGO observance (67%) due to lack of resources for monitoring and enforcement. (Only 22% of LGOs reported undertaking scheduled monitoring of building sites as a tool for assessing compliance).

Further useful insights from the STF's case study series *Examples of Local Government's response to erosion resulting from urban development in WA*

- LGOs experience difficulty in determining where soil and building sand has come from and 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;
- Sometimes no statutory obligations for sediment control applied when approving residential building plans/permits;
- Smaller scale developers who infrequently carry out subdivision works are not as familiar with processes and practices to prevent erosion, sediment runoff or sand drift during subdivision development;
- The installation of sediment fencing, and/or other suitable erosion sediment control prevention treatments on residential building sites is not a common practice in many LG areas;
- The primary issue observed with residential building construction is the frequent and reliant use on subcontractors. Whilst builders may have the best intention, subcontractors and in some cases their subcontractors, are far less concerned about site requirements;
- Persistent population growth for a number of years has resulted in a very high number of new residential builds; through subdivisional works in many LG areas, often resulting in far too many non-compliant building sites and far too few resources for LGs to adequately manage this issue; and
- Some LGs are in a challenging financial position where rate rises have been minimal or small and the LG's asset base continues to grow each year with gifted roads, drainage, parks, and natural reserves.

Building industry support for consistency in sediment management legislation
Sediment Task Force representatives from the Housing Industry Association (WA) and the Master Builders Association (WA) have supported the introduction of consistent legislation for erosion and sediment control during from urban development. HIA (WA) has in the past liaised with builders and discovered that a consistent Local Law regarding sediment control from building sites is something that the builders support and desire, as the myriad of differing Local Laws and requirements across LGs is disparate and is causing confusion for builders and building sub-contractors as to what is expected of them in each locale, and can cause unnecessary conflict and environmental harm.

Other support for consistency in sediment management legislation
A standardised model Local Law in WA for erosion and sediment control on construction sites was supported in principle by the Water Sensitive Transition Network Policy and Governance Subcommittee in 2020, with the caveat of more discussion regarding practicalities and barriers be undertaken.

Greater penalties and resourcing by LGs for monitoring and compliance is required
Even with a model (standardised) Local Law in place across WA, however, industry adoption of best practice erosion and sediment control is not likely to occur without greater penalties and sufficient resourcing by LGs for monitoring and compliance.

In WA, Local Laws currently reflect fines as listed in the Local Government Act 1995. Fines for non-compliance (infringements) currently range from $200 (min) to $5000 (max) and prosecution is rare and unknown to the Sediment Task Force). (Refer to Appendix 7 for examples of fines in Australia, New Zealand and internationally).

Current poor erosion and sediment control practices are exacerbated by the fact that a truckload of sand only costs $352, so it is cheaper for builders to replace soil than return it to site using manual labour (e.g. street sweeping) and/or invest in, and maintain, effective preventative erosion and sediment control treatments/methods.

The Sediment Task Force recommends that fines for non-compliance should be based on the perceived environmental impact, and act as a disincentive to poor practices being adopted. Furthermore, higher and more frequently applied penalties should facilitate cost recovery for monitoring and compliance and for "cleaning up" and for costs associated with maintaining stormwater and high groundwater management infrastructure.

It will be necessary to determine what level of fine is effective/comparable in terms of acting as a deterrent to change land developer, builder and sub-contractor behaviours, and in terms of the cost of administering the process and of proving non-compliance, in order to recoup costs to Local Governments. Some Local Governments nationally have reported that a "sliding scale" of fees is a more effective mechanism for repeat offences, whereby fines increase due to the number of offences and impacts.

Local Governments in WA should ensure they have adequate technical knowledge and skills and an adequate level of resourcing to effectively monitor for compliance for soil erosion, sediment runoff, sand drift and dust resulting from urban development. This could include employing a "Sediment Pollution" Compliance Officer; by one or more Local Governments to manage this issue more effectively. (Refer to Appendix 8). This is likely to result in significant savings for many Local Governments as unbudgeted expenditure borne by Local Governments to deal with this issue reactively (i.e. "cleaning up" and for environmental remediation) is often a greater financial cost.

Sustained compliance and enforcement are required
There is much evidence that confirms that sustained and consistent erosion and sediment control compliance and enforcement activities can result in high levels of effective onsite erosion and sediment control performance (HLW, 2019).

Monitoring for compliance, to mitigate potential sediment pollution on site and meet legislative requirements, should be of paramount concern, particularly when a significant impact on water quality is expected. This should include commitments for industry "self-auditing", as well as Government compliance activities, particularly as sedimentation of waterways is cumulative over time and it is often difficult to determine the source of pollution in the absence of water quality monitoring and/or well-resourced monitoring for compliance programs.

Greater industry capacity building including the capacity of LGOs is required to prevent soil erosion and sediment loss during land development in WA. For example, legislative requirements (e.g. Environmental Protection (Unauthorised Discharges) Regulations 2004 (Schedule 1), and Local Laws (as well as policies, guidelines, planning approvals, permits, bonds, advice notes and management plans etc.) must be well understood by the Officers enforcing these laws, the project proponent and all site personnel, as well as best management practices for erosion and sediment control. Up-to-date information regarding the negative environmental, economic, social and cultural impacts of sediment pollution resulting from urban development and education should be provided to planners and other personnel involved with stormwater and high groundwater infrastructure and land development application approvals. This could include "International Erosion Control Association Australasia - Approved" accredited training.

Time period for reviewing Local Laws

The Sediment Task Force recommends that a review of Local Laws occurs earlier than after 15 years if there is a need to review Local Laws to improve environmental outcomes (including sediment management) to prevent or address a problem or a risk, and/or to meet community expectations or aspirations. This should include ensuring Local Laws are having the desired effect, they address/include new systems and/or innovations and new technologies, and are consistent with current industry best practice standards.

Sediment Task Force's Comments relating to *Proposed Reform 6.2 Simplify Strategic and Financial Planning*

Strategic Planning

The Sediment Task Force recommends that all planning decisions related to development applications and building permits including verge, road and median strip management and transport infrastructure should consider cumulative impacts on water resources (sediment pollution).

To assist Local Governments in their strategic planning processes for erosion and sediment control, a useful guide is Healthy Land and Water's *Soil Erosion & Sediment Control Internal Management Systems Review Report Template & Action Plan).* This template (and accompanying step-by-step guideline) is a suggested plan for Local Governments and has been written to help them focus on what is locally relevant and important. It can be used as a baseline for comparison with any future investigations to demonstrate the progress and success of implemented changes to improve erosion and sediment control outcomes during land development activities. A copy of this publication can be provided on request by the Sediment Task Force or Healthy Land and Water.

The Sediment Task Force recommends that consideration should also be given to erosion and sediment monitoring innovation and technologies (refer to Appendix 9), and if Local Government has a role to play in encouraging their adoption.

Monitoring of water-borne sediment to inform strategic planning processes

Water-borne sediment runoff during and after land development should be measured to determine sediment pollution occurrence, and subsequently potential. This will assist in determining the effectiveness of erosion and sediment control preventative measures and if need be, guide remediation actions, including Water Sensitive Design. Monitoring programs can help mitigate risk and demonstrate compliance with Local Laws and provide locally relevant data on the magnitude and potential impacts of on-site water-borne sediment loss for future planning purposes. Sampling and assessment plans should comprise regular sampling regimes and a requirement for monitoring to be undertaking during and/or after unpredicted events such as infrastructure failure (e.g. sediment basin collapse) and during and after heavy rainfall, storms and high winds. Monitoring requirements should include a commitment to regular maintenance of erosion and sediment control infrastructure as well as after medium to high-risk events.

Financial planning

The Sediment Task Force recommends that financial planning should identify current known costs as well as current private financial benefits and externalities related to sediment loss caused by poor sediment management practices during urban development. This applies to both where the cost of remediative action is being borne by Local

Governments and where Local Government has responsibility for actively managing sediment runoff (e.g. verge, road and median strips, watering trucks etc).

Specifically, *Service proposals/Service plans* should be used to predict/include costs being expended by individual Local Governments during and after urban development activities (e.g. subdivision, building and transport infrastructure development, including road reserve management).

This includes costs incurred to sweep roads, repair and maintain stormwater and high groundwater management infrastructure blocked and/or damaged by sediment, and costs incurred for remediating/restoring environmental assets, retrofitting poorly designed or maintained erosion and sediment control infrastructure and for enforcement. (Refer to the STF's *Economic Cost of Erosion and Sediment Loss from Construction Sites* Report for further examples).

Resources must be allocated within Local Government to ensure their own actions are not contributing to sediment pollution.

Exploration of various methods/mechanisms available for Local Government to better manage this issue in partnership with the land development industry is recommended, along with the relevant budget allocation and resource allowances; rather than just focusing on further requirements for the land development and construction industry to control and manage sediment.

Sediment Task Force's Comments relating to *Proposed Reform 6.3 Rates and Revenue Policy*

The Sediment Task Force recommends that individual Local Governments report costs of remedying the impacts of poor sediment practices during land development to ratepayers (as per comments above for 6.2).

* The STF has been advocating for the introduction of consistent legislation for erosion and sediment control since 2014. The Western Australian Local Government Association (WALGA) has been a key proponent in this regard. To encourage the voluntary gazetting of a Local Law specifically for site erosion and sand drift, the STF developed an information sheet for LGOs in 2017, titled Regulation for Effective Sediment Management. In 2018, the STF made a submission to the Local Government Act Review calling for a consistent approach by LG for ESC in response to Q10 - *Which regulatory measures within the Act should be removed or amended to reduce the burden on LGs?*

The Sediment Task Force's Strategic Plan includes the action to pursue/support the introduction of a model Local Law for sediment loss for LGs in WA. The Task Force has been advised that the Western Australian Planning Commission's Joint Standing Committee can review a model Local Law for unintended purposes, however this is expensive (costing approximately $20,000). In addition, a model Local Law may be disallowed many times, requiring the process to begin again once relevant amendments have been made, at additional expense. No funds are currently available from the STF for this purpose. (Alternatively, LGs often have an in-house lawyer and could gazette their own Local Law for Erosion and Sediment Control).

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Sediment Task Force's *Keeping Soil on Site* Information Sheet series. 2021. (www.perthnrm.com/resource/sediment-management/)

Sediment Task Force Local Governments' Response to Sediment Loss from Building Sites. 2019. (www.perthnrm.com/resource/sediment-management/)

Sediment Task Force Taking Action to Control Sediment. 2018. (www.perthnrm.com/resource/sediment-management/)

Other useful References/Resources

Sediment Task Force - On site erosion and sediment management checklists, WA Local Government best practice case studies and other information at www.perthnrm.com/resource/sediment-management/

CRCWSC - *A review of existing funding models, economic regulatory frameworks, policies and mechanisms,* 2020.

Guidelines for Erosion and Sediment Control at Building Sites in the South West of WA.

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Soil Erosion and Sediment Control Basic Principles and Practices. Healthy Land and Water Revised version 2018.

Local Government Guidelines for Subdivisional Development.

Erosion Sediment and Control Manual for the Darling-Range.

Sediment and Erosion Project Report (Swan River Trust 2014); (Cities of Armadale and Gosnells).

ESS Southern River Sediment and Erosion Final Report (March 2010).

International Erosion Control Association Australasia (IECA) Association website https://austieca.com.au (best practice information and technical advice).

- ICEA Australasia's Best Practice Erosion and Sediment Control (ESC) Guidelines 2008
- ESC Road Construction Field Guides (roads, bridges and culverts)
- Quarterly Australasian Chapter Newsletters
- Free downloads
- Seminars/webinars/conference papers/YouTube videos
- Details of designs, technologies, services and products that that received IECA's Environmental Excellence Awards; aimed to raise the standards of the erosion and sediment control industry by celebrating innovation and outstanding achievement.
- Further information/resources are available to members. IECA membership costs $220 for individuals and various costs for corporate membership.

New South Wales Government. 2004. "The Blue Book". Managing Urban Stormwater: Soils and construction.

New Zealand Auckland City Council. 2017. Erosion Sediment Control Guide for Land Disturbing Activities Auckland Region Guiding Document.

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Appendices

Appendix 1 - The Sediment Task Force

The Sediment Task Force was established in 2014, in response to a recommendation of the *Shifting Sands Forum 2014*. Facilitated by Perth NRM, the Sediment Task Force represents a collaborative approach to the development of solutions to prevent sediment run-off particularly, but not exclusively, from building sites.

The Sediment Task Force brings together stakeholders from state and local government, the building industry and the community to explore opportunities to improve coordination and collaboration amongst stakeholders and develop sediment management solutions to sediment loss from subdivision, building sites and roadworks entering our storm drains and waterways, and encourage their implementation.

The Sediment Task Force is funded by the Department of Biodiversity, Conservation and Attractions (DBCA) and supported by Perth NRM. A 0.3FTE Coordinator is currently appointed to support the activities of the Task Force.

A multi-stakeholder group, it has representatives (who participate on a voluntary basis) from:

Leading housing industry groups

Housing Industry Association (WA), Master Builders Association (WA), Urban Development Institute of Australia (WA)

Government Environment Managers and enforcement agencies

Department of Biodiversity, Conservation and Attractions, Department of Health, Main Roads WA, Water Corporation, WA Local Government Association and the Cities of Canning, Cockburn, Kwinana and Subiaco.

Community environmental groups

Perth NRM, South East Regional Centre for Urban Landcare

Former member organisations are the Cities of Gosnells and Armadale, the Departments of Water and Environmental Regulation and Housing, and WESROC.

Appendix 2 - The benefits of erosion and sediment control during urban development

- Protect hydrological functions of wetlands, rivers and other waterways
- Reduce the risk of flooding houses and roads as a result of blocked stormwater drains
- Prevent sediment from smothering the reeds, plants and seagrasses that keep our wetlands, rivers and oceans healthy
- Protect aquatic invertebrates and benthic algae populations, whose presence is necessary for wetlands and waterways to remain healthy ecosystems
- Prevent fish, prawns, crabs and other aquatic wildlife being killed due to the detrimental effects of sediments entering ecosystems
- Prevent sediment from covering grass in the parks that receive stormwater runoff
- Reduce nutrient enrichment of wetlands and waterways and associated algal blooms
- Prevent the creation of breeding grounds for pest and potential disease causing mosquitoes and midges and protect public health from mosquito-borne diseases and pathogens
- Help to maintain stormwater management systems such as biofilters, pervious paving, infiltration cells and tree pits that are critical to protecting our wetlands, rivers and oceans
- Reduce the risk of obstructing and/or damaging stormwater and high groundwater management infrastructure
- Reduce the risks of accidents on roads and paths.

Success in erosion and sediment control during urban development will:

- Reduce the costs to governments and the community for stormwater and river and wetland management
- Protect wetland hydrological and biological functions and water quality values
- Protect our local parks (where stormwater is often discharged)
- Protect the aesthetic value of wetlands, rivers and oceans that are icons of the natural beauty of Perth and regional WA
- Reduce sand and sediment build up on roads and paths
- Reduce the costs of supplying sand for building sites and fill for urban development.

Appendix 3 - Best Practice Management of Works during Subdivision

The table below outlines best management practices recognised as providing effective management of water-borne sediment erosion in Western Australia, and the stage at which they are generally most effective. (Modified by UWA 2020; from Essential Environmental Services, 2010; updated by the STF as per advice from Peet Limited 2021).

Best management practice	Subdivision – site clearing and bulk earthworks	Subdivision – infrastructure and lot construction	Development – building construction
Minimise clearing of natural vegetation, taking into consideration site constraints and construction methodologies	■	■	
Use of a water cart during construction	■	■	
Construction period/earthworks programmed for periods of lower stormwater runoff[1].	■	■	
Monitoring of dust emissions	■	■	
Works undertaken so that a minimum amount of ground is disturbed at any one time, taking into consideration site constraints and construction methodologies	■	■	
Perimeter fencing of the works area, with windmesh attached	■	■	
Brushing on steep slopes where practicable following the completion of works; revegetation or seeding is preferred practice	■	■	
Hydro-mulching following completion of works or during periods of dormancy (if vacant land for less than 3 months only; seeding often used instead as it provides longer term soil/sand stability)	■	■	
Seeding	■	■	
Replacement of topsoil to encourage revegetation	■	■	
Temporary surface water management measures including sediment basins	■	■	■
Signs and fencing restricting access	■	■	■
Regular street sweeping	■	■	■
Stabilised and controlled vehicle access	■	■	■
Location and protection of stockpiles (e g trenching of stockpiles subject to wind erosion)	■	■	■
Verge cover			■
Geotextile sausage/socks			■

[1]Essential Environmental Services (2010) recommended that land disturbance be undertaken during times with low winds, to minimize wind-borne sand erosion. This recommendation has been adapted by UWA for management of water-borne sediment erosion.

Timing and staging should be undertaken to minimise environmental harm. Planning for each phase of development should be based on perceived risk. For example, clearing of site vegetation should not occur during periods of seasonally high-speed winds and avoiding seasonally wet periods should be considered. Knowledge of potential water table rise in low lying areas is also important. Actions to minimise wind and water erosion should be undertaken at all times (e.g., covering of stockpiles, emptying of side entry pits etc). Consideration must be made to both the potential for erosion and sediment loss of soil present at site and of imported sand (e.g. builders sand, brickies sand). There is evidence in WA of the dumping of unused imported builders sand no longer required on land development sites in, or near to, wetlands and waterways.

Appendix 4 –Risk Mitigation (erosion and sediment loss during land development)

The assessment of potential risks and identification of management actions to prevent soil erosion and sediment loss during all phases of subdivision (initial earthworks, civil works and landscaping) is critical and should be required as part of a subdivision applications and/or building permits before site works begin. This should include the effective management vehicular access points to minimise sand tracking onto roads.

Ascertaining the perceived level of risk can be achieved by using approved risk management analysis methodologies such as a risk assessment matrix (RAM). RAMs can define the level of risk by considering the category of probability or likelihood against the category of “consequence severity”, to identify soil erosion and sediment loss risks and help with decision making. RAMs

should consider: legislative requirements; best practice documents including Australian Standards, policies, codes and guidelines; the total area of soil surface to be exposed, including areas of cut and fill; vegetation removal; lot, road and access way creation and identification of mandatory and temporary hold points. (Hold points are normally imposed at a stage where further activity could cause environmental damage if the appropriate protection measures are not in place).

Appendix 5 – Erosion and Sediment Control Plans

Erosion and Sediment Control Plans are successfully being used by other states of Australia and internationally to prevent on-site soil erosion and sediment runoff). ESCP's should assess risk factors for the individual site, take into consideration each stage of development and outline measures for ongoing and adaptive management. Risk factors need to be well defined. For example:

Low Risk	Medium Risk	High Risk
Soils comprised of coarse sand	Soils comprised of mainly sandy clays or silts	Soils comprised mainly of clay and silt material
Undisturbed vegetation onsite	Property and surrounding slopes between 1:10 and 1:4	Presence of dispersive clay soils onsite and downstream
Property and surrounding slopes <1:10	No waterways (creeks, rivers, streams, wetlands) within the development boundary or within 100m downstream	Property and surrounding slopes > 1:4
No waterways (creeks, rivers, streams, wetlands) within the development boundary or within 250m downstream	No downstream drainage infrastructure (roadside entry pits, grates, pipes, Water Urban Sensitive Design infrastructure (rain gardens etc)	Downstream waterways (creeks, rivers, streams, wetlands) within 100m of property boundary (including any waterways within the property) Waterways (creeks, rivers, streams, wetlands) within the development boundary or within 250m downstream

Erosion and Sediment Control Plan should aim to ensure:

- The potential for erosion and sediment runoff from your site is considered at an early stage in the planning process;
- There is minimal disturbance of the site resulting in minimal amounts of erosion and sediment movement;
- Erosion and Sediment Control measures and practices are an integral part of the initial site development plan and are in line with IECA best practice recommendations;
- Construction activities and Erosion and Sediment Control measures and practices are jointly planned and implemented and communicated to all involved; and
- They are a 'stand-alone' document, consisting of drawings and notes that can be fully interpreted by all site personnel.

Appendix 6 - Local examples of sediment tracking onto roads (inappropriate vehicular access)

(Research project undertaken by Perth NRM at Cygnia Cove, Waterford, 2021).

A) "Brickies sand" delivery to one 450m2 site (photo below-note double drain is directly over the road) where sand has been transported onto the road due to vehicle driving through sand pile (probably at time of delivery) = 53 x 11L buckets = 0.61m3 sand = 0.93 tonnes sand. Cost of sweeping up and returning to "spilt" sand on road back onto site is labour cost of a brickie or builder (average cost in Perth $30/hr). Sand took 45 minutes to clean up therefore labour cost is approx. $22.50 to sweep up ie $127.50 cheaper than buying replacement sand.	
B) 165L of soil and sand was lost from one lot due to vehicular tracking over a 3-week period.	

C) Example of sand loss from site dur to vehicular tracking (parking).	

Appendix 7 - Applicable financial penalties for non-compliance with erosion and sediment control legislation and examples of penalties issued (Australia and New Zealand).

Government Authority	**Applicable financial penalties**
Queensland State Government Environmental Protection Act 1994	Regulatory penalties: (e.g. Infringement Notices and court penalties) $8,835 - $736,250 (or 5 years imprisonment) Environmental Protection Act 1994, (as at 01 July 2015).
Brisbane City Council (QLD)	Fines for failure to implement appropriate erosion and sediment control measures can be up to $13,000 for development related offences.
Mackay City Council (QLD)	On the spot fines of $2,000 a day, prosecution costs of up to $416,500 or 5 years in prison for individual; more for a company.
Sunshine Coast City Council (QLD)	Under local laws, council can fine those who do not use the correct erosion and sediment control measures. For example, council can issue an on-the-spot fine of $2,000. Fines may reach over $1 million in court proceedings for major offences causing environmental harm. Stop-work notices may be issued.
New South Wales State Government Environment Protection Authority	Water Pollution fines issued by Councils/Shires are Individuals $4,000 and Corporations $8,000. EPA fines - $8,000 - $15,000 for each identified non-compliance incident. (On-the-spot fines of up to $8,000). Prosecutions in court: $1 million for corporations, $250, 000 for individuals (Protection of the Environment Operations Act 1997) with a further penalty for each day the offence continues. More serious offences can result in penalties of up to $5 million.
Sediment Blitz (NSW) (Sydney and Central Coast- collaborative management)	2016 - $127,000 fines for non-compliance issued for 204 sites. 2018 - $212,000 in fines issued from 746 site inspections. 2019 - $291,000 in fines issued from 784 site inspections.
NSW Environment Protection Authority	Gold mine operator fined almost $200,000 in penalties and costs for allowing muddy water to pollute waterways due to failure to install adequate sediment and erosion controls.
NSW Environment Protection Authority	City of Newcastle fined $55,000 for water pollution from 3 cases of faulty sediment ponds by EPA NSW.
Port Stephens Council (NSW)	Company fined $18,000 for water pollution offences when sand and soil entered stormwater pits.
NSW Environment Protection Authority	EPA NSW fined construction company $15,000 for polluting local waterway when sediment basins fail.
NSW Environment Protection Authority	Coal mine fined $15,000 when sediment laden, saline water was discharged into Nine Mile Creek.
Wingecarribee Shire Council (NSW)	Construction company fined $10,000 for polluting local waters by pumping sediment laden wastewater into public stormwater drains.
Orange City Council (NSW) fined construction company for potential risk of water pollution	$8,000 fine and $4,180 in court costs. (Total of $12,180). (Conviction for not putting in proper sediment control measures at a construction site).
Northern Beaches Council (NSW)	Penalty payable under a penalty notice issued by a Council officer for water pollution under the Act is $8,000 for a corporation and $4,000 for an individual.

City of Canada Bay (NSW)	If an individual or company is found to be polluting waterways or the stormwater system, they can be liable for fines of up to $8000 per pollution incident. $6000 fine issued after a construction site allowed sediment to run into a storm water drain.
Inner West Council (NSW)	Construction site fined $4000 fine for sediments being discharged.
Victorian State Government Department of Land and Water Conservation 2001	$1,500 on-the-spot fine if soil, cement slurry or other building materials to enter the stormwater system.
EPA Victoria	Construction company fined more than $8000 for sending streams of sediment, turbid water and a haze of excavation dust along a busy Melbourne Street.
EPA Victoria	Construction company $7929 for discharging sediment laden water into a conservation zone.
South Australia State Government Environmental Protection Act	Maximum fines of $4,000 for an Environment Protection Order, $120,000 for a corporate body and $60,000 for a person for a Clean-up Order.
Tasmanian Government Urban Drainage Act (UDA) 2013 Environmental Management and Pollution Control Act 1994	$500 commonly - Local Government By-law Up to $16,400 for an individual breach under UDA (Delegated Officers) Unlawfully causing an environmental nuisance by the emission or discharge from: a. residential premises of a pollutant in water, wastewater or any other form of liquid – first fine $308 per offence. b. any premises or place, other than residential premises, of a pollutant in water, wastewater or any other form of liquid - $770 per offence.
Northern Territory	Local Government By-laws apply (various)
Australian Capital Territory Environment Protection Act 1997	Offence to allow any substance other than rainwater to enter the stormwater system. Contraventions of the Act can lead to an on-the-spot fine of up to $200 for an individual and $1,000 for a company. More serious offences can lead to penalties of up to $50,000, six months in jail and a criminal record.
New Zealand Resource Management Act 1991	Failure to follow the directions of Abatement Notices may result in infringement fines of $750 for every day of failure to comply. Prosecution possible and enforcement orders sought to prevent any further building work taking place. If there is deliberate intent to ignore the directions or ongoing non-compliance council can prosecute, with fines of up to $300,000.
Auckland City Council, New Zealand 2019	$67,000 Remuera property developers fined for polluting streams with sediment for repeatedly polluting waterways by washing sediment into the stormwater system.
Auckland City Council, New Zealand 2019	Dean Hu, Mender Construction Limited and Tao Ma were sentenced in the Environment Court for charges relating to the RMA 1991$50,551 in fines was imposed by the court for all three defendants in respect of offending in Wright Road, Redvale.
Auckland City Council, New Zealand 2019	$42,500. The penalty was handed down in the NZ Environment Court after the company allowed sediment from a subdivision site to enter the river.
Hamilton City Council, New Zealand	Transfield Services (NZ Ltd) and Schick Construction and Cartage Ltd were fined $7370 and $6000 respectively for breaching the Resource Management Act by allowing sediment to flow into a stream while they built a passing lane near Te Kuiti.
Ottawa Environment Province, Canada 2017	Construction company convicted of discharging construction sediment into a drain that flows into the Jock River in 2013; fined USD $275,000.
Kentucky, USA 2019	Large housing development halted for multiple violations. Stop Work Order imposed. Developers required to install ESC controls, replace the material that they excavated from a ditch and move 100,000 cubic yards of fill from the floodplain at their own cost.

Appendix 8 - Costs of employing Erosion and Sediment Control/Compliance Officers and roles and responsibilities (Sediment Task Force, 2020)

Organisation	Role	Responsibilities (examples)	Cost
Brisbane City Council 2017	Erosion and Sediment Control Officer (1)	Interprets plans relating to erosion and sediment control in a legislative and regulatory context, in accordance with the current International Erosion Control Association (IECA) standards and undertakes investigations and compliance enforcement actions, including the issuing of statutory notices and high value infringement notices.	$70,000 pa (listed salary)
Ipswich City Council 2020	Senior Environment Officer and 2 Environment Officers.	Investigations regarding erosion and sediment control on construction sites for 50% of officer's time required to respond to all environmental nuisances and licensable activities.	Unknown
DEP Tasmania (2010)	Regional Sediment and Erosion Control Officer	Works with councils/building industry in greater Hobart region to improve soil/water management practices on construction sites: - series of site audits across six municipalities current level of compliance with best practice soil and water management and comparing results to initial review conducted in 2006. - undertake 150 building and construction site inspections during 2010 across six Southern Tasmanian municipalities, indicating where controls are required and educating builders where improvements can be made, and ensuring Council building compliance staff often attend inspections. - development of a new system for regulating soil and water management on building and construction sites. - creation of new training programs for building practitioners and council staff in regulatory roles.	$100,000 per annum
Kingborough Council (Tasmania)	Stormwater Investigation Officer	Focus on stormwater impacts on recreational water quality, including weekly stormwater sampling program that includes sand and sediment as a parameter.	Unknown Permanent full-time
Auckland City Council/*Close the Gap*	Regulatory Compliance officers (2)	Ensure adequate sediment controls are in place (800 - 1,000 small sites that start each month are checked for compliance). • provide evidence of the extent of non-compliance and requirements for installation of appropriate erosion and sediment controls prior to 'first cut' (before development begins). • improve internal notification that development is about to begin. • investigate administrative implications of introducing a mandatory pre-start sediment control inspection. • assesses options for a self-certification process if the erosion and sediment control devices are installed by an approved 'installer'. • 'Tool Box Talks' for developers (12) and Small Building Sites Demonstrations (2).	Unknown

Appendix 9 - Erosion and sediment control infrastructure and monitoring innovation and technologies

Infrastructure innovations and technologies

At Source Sediment Control/Capture Devices are proving to be a very popular and effective solution in other states of Australia and internationally, and new technology is, and will continue to be, available.

Monitoring innovation and technologies

New erosion and sediment monitoring innovation and technologies include automated monitoring systems designed specifically for earthworks. These could be trialled at land development sites in the short-term and become a requirement in the longer term. Two examples are:

1. Low-cost open-source Internet of Things (IoT) platforms based on hobbyist electronics are rapidly expanding. Monitoring systems to use on earthworks sites can be built for hundreds, rather than thousands (or even tens-of-thousands) of dollars. Whilst they are not as precise as traditional automated monitoring systems, these new technologies are enabling much better spatial and temporal resolutions for data collection, to the point that all erosion and sediment control systems can have devices to measure water quality parameters (IECA.org live webinar).

2. Innovative digital techniques have been employed in the Waikato River region (NZ) to manage bulk earthworks and produce erosion and sediment control plans, where a lack of accurate and up-to-date topographical and aerial imagery existed for the site. Topographical survey data and digital tools were used to design sediment retention ponds, which were then accurately constructed with GPS-enabled excavators. 3D as-built models of the erosion control devices were used to confirm compliance with design criteria and sediment control guidelines (IECA.org live webinar).