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No worsening is not a thing

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Abstract:

In Queensland, there is no Statutory Law specifically managing discharge of urban stormwater.

Rights and responsibilities relating to stormwater discharge are largely managed through Common Law.

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Under Common Law, the lawfulness or otherwise of discharge is assessed by considering whether or not the discharge has the potential to create nuisance. And Courts interpret "nuisance" to be something substantive having quantifiable costs.

The Queensland Urban Drainage Manual (QUDM) is the "bible" for stormwater design in Queensland (and in other parts of Australia and internationally). Although not a statutory document, QUDM is referenced in most Local Authority Planning Schemes.

Early editions of QUDM introduced the concept of "Lawful Point of Discharge". However, LPOD was often misinterpreted as requiring "no worsening" (post-development stormwater discharge characteristics compared to existing).

Many approving authorities add insult to injury by applying very pedantic interpretations of "no worsening", effectively requiring <u>no</u> change in post-development runoff behaviour compared to predevelopment.

"No worsening" is a substantially more onerous requirement than the general requirement in law for "no nuisance".

The real situation in law is that changes to runoff behaviour are acceptable provided that the changes do not result in nuisance.

The recently released QUDM 4th edition includes an extensive re-write of the section on lawful discharge and nuisance to remove the misinterpretation and incorrect reliance on "no worsening" of runoff behaviour when considering development proposals.

The re-write better explains concepts of nuisance and clearly notes that the "Lawful Point of Discharge" test is satisfied if a proposal does not create nuisance on downstream properties or infrastructure.

In managing urban sprawl, it is important that the land bank is used efficiently.





proposals.

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Applying no worsening (ie no change) requirements to post-development discharge complicates, delays, adds unnecessary costs to, or results in refusal of, otherwise acceptable development

Correctly applying nuisance criteria for lawful discharge removes an unnecessary impediment to development.

This paper shows, using specific project examples, that development runoff changes (ie "worsening") can be entirely acceptable.

Keywords: QUDM, runoff, "no worsening", LPOD

Introduction

In Queensland, there is no Statutory Law specifically managing discharge of urban stormwater.

Rights and responsibilities relating to stormwater discharge are largely managed through Common Law.

The Queensland Urban Drainage Manual (QUDM) is the "bible" for stormwater design in Queensland (and in other parts of Australia and internationally). Although not a statutory document, QUDM is referenced in most Local Authority Planning Schemes.

Early editions of QUDM introduced the concept of "Lawful Point of Discharge". However, LPOD was often misinterpreted as requiring "no worsening" (post-development stormwater discharge characteristics compared to existing).

Many approving authorities add insult to injury by applying very pedantic interpretations of "no worsening", effectively requiring <u>no</u> change in post-development runoff behaviour compared to predevelopment.

Pedantic requirements for no worsening result in:

- Refusal of otherwise perfectly acceptable development proposals
- Inefficient use of the land bank
- Additional costs to the community in providing unnecessary infrastructure

The real situation, as interpreted in Common Law, is that changes to runoff behaviour are acceptable provided that the changes do not result in nuisance.

The 2016 review of QUDM provided an opportunity to clarify commonly misinterpreted guidance in earlier editions relating to discharge law. In particular, the use of "no worsening" as the desired standard in assessment of runoff changes.

In the review, Section 3 Legal Aspects was re-written to remove the incorrect reliance on "no worsening" of runoff behaviour when considering development proposals.





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The re-write better explains concepts of nuisance and clearly notes that the "Lawful Point of Discharge" test is <u>satisfied</u> if a proposal may not substantially damage a third party property.

QUDM 4th Edition 2016 was released in mid 2017 and is the applicable edition, regardless of whether earlier editions are referenced in local Planning Schemes.

Worsening v Nuisance (substantial damage)

Worsening

Inevitably, development increases the impervious area (roofs and hard stand) and reduces the pervious area (grass and vegetation) on a site. In technical terms, the fraction impervious increases.

Increased fraction impervious changes runoff characteristics in a number of ways. It:

- Increases peak off site discharge rates, which, in turn may increase off site velocities
- Increases flow volumes
- Increases the <u>number</u> of small run off events (small event frequency)
- Potentially changes the timing of discharge peaks
- Potentially changes the duration of runoff events

Additionally, developments often result in changes to the distribution of surface flows entering downhill properties.

In most cases it is <u>impractical</u>, if not impossible, for development to occur without resulting in changes to some of the stormwater runoff characteristics of the developed land.

For example:

- Managing peak flow rate by installing a detention tank will increase the duration of a runoff event and won't reduce the increased volume
- Capturing small runoff events might appear to manage the increased frequency of such events. However, the volume of storage required is very large and it is generally not possible to use the captured volume on site
- Managing the increased flow volume by capturing and using the excess on site is rarely, if ever, practical. This is due to the size of the required storage and the lack of re-use opportunities in all but the most specific of developments. A large laundry, for example, might be able to re-use at least a part of the additional runoff volume, provided that the site has sufficient room to accommodate the large storage required. And, of course, large laundries are relatively rare developments.

A blanket "no worsening" requirement is impossible to achieve.

And a Development Approval condition that requires such is an impossible condition and is not allowed under Queensland Planning Law.

The real situation, and an acceptable, reasonable and relevant condition under Queensland law, is that development runoff does not create an <u>actionable nuisance</u>.



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Nuisance v annoyance

So what is nuisance?

In general Common Law terms, nuisance is something that substantially and unreasonably damages or adversely impacts a third party property.

Note that Courts generally require impacts to be "substantial" and/or "unreasonable" and/or "adverse". In other words, actually harmful, rather than just negative.

Damage or interference must be quantifiable and substantial to be nuisance. Less substantial impacts might be an annoyance, but are <u>not</u> nuisance.

Nuisance in a runoff event context

Runoff, overland flow and flooding impacts that <u>might</u> be nuisance in specific instances include:

- Diversion
- Concentration
- Changes to:
 - Peak discharge and the timing of the peak
 - Frequency and duration of runoff
 - o Velocity
 - o Volume
 - o Quality
- Impacts on future use

Nuisance assessment

Runoff nuisance is very site specific:

- In all situations, not all changes in runoff will result in nuisance
- In most situations, most runoff changes do not cause nuisance
- In many situations, no runoff changes cause nuisance.

In law, nuisance is what <u>actually</u> occurs, not what is predicted. This is consistent with it being the developer's responsibility to not cause a nuisance, rather than the regulator's responsibility to assess and condition works to prevent a nuisance.

It's important to note also that the critical impacts of any development are not necessarily those on the adjoining downstream (or upstream) property. It is often necessary to cast a wider net and look for more remote locations where issues might arise.





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Specific project examples

Diversion and concentration potentially causing nuisance

A high density development was approved on the basis of a Stormwater Management Plan which described the intent to maintain the status quo of overland flow on to the downhill neighbour.



Undeveloped site

The downhill neighbour was unhappy with the proposal and appealed the approval to the Planning and Environment Court.

Preparations for the defence of the appeal identified a number of issues with the original SMP. Of major concern was the engineering drawings which showed that runoff from the large external catchment was to be captured, piped through the development, and discharged in a concentrated manner onto the neighbouring property (Fig 2).



High density development approved

Plans included in the SMP showed that a large portion of the external catchment was to be collected and piped to discharge here.





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The drawings did not appear to accord with the intent as outlined in the SMP text.

Initial rain-on-grid 2D hydraulic modelling clearly showed that the intended discharge point was a location which, in the undeveloped state, received very little runoff (Fig 3).



Given the topography of the area, the density of the proposed development, and the somewhat unfortunate orientation of the site across the slope, capture and transport of external catchment flows through the site was a critical design aspect. Unfortunately, that component of the proposal didn't appear to have been given sufficient thought in the design.

The Appeal drew attention to the fact that the arrangement, as detailed, was certainly going to result in nuisance. Without design changes, the Appeal against the approval was destined to succeed.

Guided by focused 2D hydraulic modelling, alterations to the designs were developed to better manage the capture of external catchment runoff, its transport through the site, and its discharge on to the neighbouring properties.

Whilst the redesigned arrangement would substantively change the runoff distribution onto the Appellant's property, modelling demonstrated that it did so in a manner that did not result in nuisance on that property.

The designs partly relied on the diversion of some flows to the southern neighbour (Fig 4). That neighbour wanted the water and was prepared to grant appropriate easements.



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In the final analysis, the Appellant's expert's main concern was that the planned concentration of flows at the detention basin outlets would cause erosion.

Accordingly, designs for the basin outlets were refined until the modelling could demonstrate that post-development discharge velocities were maintained at pre-development levels (Fig 5).



All three stormwater experts (one for each of the two Defendants and one for the Appellant) were finally able to agree that the stormwater management proposed in the revised design, notwithstanding the depth and volume increases and changes to the flow distributions, would not result in nuisance on the downhill property.





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The Court accepted the experts' opinion, changed the approval to incorporate the revised design, and found for the Defendants. This would not have been possible if a "no worsening" criteria was applied.

Diversion and concentration and increase in all runoff characteristics, but with no nuisance

An extension to an existing high density development was proposed. The extension was to generally follow a ridge line.

Existing surface runoff from the area to be developed flowed north west on to rural residential properties and north east to a steep wooded gully (Fig 6).



Initial designs proposed to distribute the development runoff at intervals along the entire western boundary to approximate existing conditions. There was to be some management of peak flows, but discharge volumes and the frequency of flows would increase.

Whilst it could be argued that the rural residential properties to the west would benefit from the additional stormwater runoff, the owners were unhappy and vigorously lobbied Council to refuse the extension.

In response to the neighbours' concerns, designs were altered to collect much of the developed site runoff and divert it east across the ridge and into the steep wooded gully (Fig 7).

Diverting flows from the west catchment to the gully in the eastern catchment clearly results in worsening of all existing runoff characteristics in the gully.





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However, Council accepted that the diversion was not going to have adverse impacts on the property traversed by the gully.

There was worsening, but no nuisance. The proposals received Council approval, but the development could not have been approved if "no worsening" criteria was applied.



Focus on depth increases in isolation can be misleading

A proposed industrial development in a flood impacted area required filling, compensatory earthworks, and some reshaping of an existing (heavily modified) waterway adjacent.

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"Standard" impacts mapping for local storm events showed impacts on the adjoining property which exceeded the Council's "no worsening" expectations (Fig 8).

A fault with standard impacts mapping is that the focus is on the impacts and it's easy to lose sight of the big picture.

To demonstrate that the worsening couldn't possibly cause nuisance, alternative mapping which showed the impacts inside the overall mapped flood extents was provided (Fig 9).









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The alternative mapping clearly shows that the "worsening" occurs in an already flooded area, well away from the edges of the existing flood impacted area, and doesn't increase the flood extents.

Accordingly, there is no possibility that the worsening could adversely impact the adjoining owner's enjoyment of his land. There is no adverse impact and no nuisance, therefore the worsening criteria is irrelevant.

Focus on "no worsening" criteria and standard impacts mapping could have led to the development being refused.

Focus on "no worsening" where flow frequency was actually the critical issue

Development which increases the impervious area on a site will increase the <u>number</u> of small runoff events. This is because small rain events on an impervious surface will result in runoff, whereas the same event on a pervious surface probably will not.

Changes to the frequency of runoff events are only a potential problem in areas of high density development, or downstream of a development with a large impervious surface area, or where a downstream property is particularly susceptible to frequent wetting.

The example below (Fig 10) illustrates a situation where the original designer was focused on managing peak flow rate, but failed to appreciate that flow frequency and duration were actually the critical aspects of the development.

Focussing on the management of peak flow rates from the increased impervious area, the designer of the new house directed all roof and paved area flows to a detention tank at the rear of the property. The tank discharged (via a single small diameter pipe) through the neighbour's fence.









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This arrangement resulted in:

- Frequent wetting up of the neighbour's barbecue area due to the increased frequency of small run off events, and
- Extended duration of flows on to the neighbour's barbecue area following rain, due to the delay effects of the detention tank and the small outlet pipe. Since there was only one discharge pipe, it is likely that it was sized to manage the full range of standard events from 1EY to 1% AEP (which typically means it was smaller than really necessary to manage the mid to larger storm events).

By adopting a standard "no worsening" approach, concentrating only on peak flow rate management, the designer inadvertently (unthinkingly?) caused the neighbour a loss of enjoyment of his property (due to the constantly wet barbecue area).

Demonstrable and significant loss of enjoyment is nuisance.

Rectification of the problem was relatively simple. The new dwelling is two storey and it was easy to intercept the roof downpipes at the mid storey level and pipe all roof flows out to the street at the front of the new dwelling.

The roof water diversion removed the frequent flow problem (and the nuisance) and resolved the neighbour's valid concerns.

Worsening without impact on future use

A large subdivision was planned upstream of privately held land which was traversed by overland flow paths (Fig 11).

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An existing detention basin further downstream had been sized to manage full development of the overall sub-catchment.

A typical "no worsening" approach for the subdivision would have required it to incorporate detention at the discharge point upstream of the road to manage flows across the road and down the flow path traversing the downhill properties.

Council planning overlays constrained the future development of the down slope properties by mapping waterways and green space (Fig 12).

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Given that:

- the downhill land was development constrained due to the overlay mapping,
- the mapped flow paths were sufficiently wide to easily accommodate unmitigated subdivision flows, and
- the cross road drainage was to be upgraded to handle the unmitigated subdivision flows,

the Council agreed that the future use of the downhill land was not impacted.

The development was approved without runoff mitigation and without requiring approvals or easements from the down slope property owners.

If "no worsening" criteria had been applied, the development yield would have reduced (due to land lost to a detention structure) and development costs would have increased (due to the cost of building the detention structure).



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These development impacts flow on to the community in the form of increase in urban sprawl (due to the reduced development density) and increase in land purchase prices.

Correctly adopting "nuisance" (in this case, potential impact on future use) instead of "no worsening" results in a win for all parties (community, Council and developer).

Conclusion

In managing urban sprawl, it is important that the land bank is used efficiently.

Universal "no worsening" is not, and never was, a requirement of QUDM, nor of law.

Applying no worsening (ie no change) requirements to post-development discharge complicates, delays, adds unnecessary costs to, or results in refusal of, otherwise acceptable development proposals.

In many sites, substantive changes to runoff characteristics (ie worsening) are entirely acceptable.

The assessment focus (for both designers and assessors) should be on the critical runoff characteristic(s) of each specific site and development, and whether changes to those critical characteristics have potential for nuisance.

Every site and development proposal is different. There are no simple tick and flick criteria which can be applied universally when assessing the potential for nuisance.

Experienced engineering judgement and a degree of common sense are required.

Understanding that "no worsening" is an impossibility (and frequently irrelevant), and correctly applying nuisance criteria for discharge, removes an unnecessary impediment to development.