

Flooding

Roads and bridges

Our department is custodian of Queensland's largest built community asset – the state-controlled road network, comprising around 33 500km of roads and 6 500 bridges and major culverts. The network is essential for connecting communities, industry and business.

Flooding can cause extensive damage to roads, bridges and property. For the safety of all road users, and to protect the road asset, road closures are necessary while flood waters cover roads.

Once the flood water recedes, the department progressively inspects affected roads, bridges and culverts to make sure they are safe, can be re-opened to traffic, and take loads of various sizes.



Saturated pavements damaged by heavy loads

Designing road pavements

Road pavements are designed to match the prevailing conditions and available local materials across Queensland. For example, in western Queensland there is low average rainfall and relatively low traffic volumes. Here, road design concepts give priority to keeping moisture out of the lower quality paving materials that are available in these areas. However, in wetter areas with higher traffic volumes, design details and available materials are used to cope with higher moisture content.

Saturated roads

When a road is inundated, especially for a long time, the materials in the road pavement become saturated. This reduces the strength of the road pavement material.

The department undertakes inspections and testing to re-open roads as soon as possible after inundation. In its custodial role, the department balances protection of the road asset with community and industry access.

Roads that have been saturated must be carefully managed. To do this, road closures, load restrictions and traffic management are the only options available.



Bridge piers scoured by floods

Load restrictions

Once road pavements are saturated, it takes time for moisture to drain from the material and for full-strength properties to return. Restricting the loads on roads during this 'dry-back' period is essential to preserving this important community asset.

Based on technical data, reducing the load by 20% reduces the impact on the road pavement materials by about 50%. Experience shows that a single trip by a fully-loaded transport vehicle may cause permanent failure of the road pavement material, leading to expensive repairs and affecting accessibility to the road network.

The responsible departmental Regional/District Director will progressively lift load restrictions according to the local conditions. The stages include:

- 5 tonne limit to allow access for local residents and emergency services vehicles
- 80% of the legal axle loads on transport vehicles as shown in the table
- removal of load restrictions.

Axle Group	Legal Load	80% Load
Steer axle	varies	no reduction
Single 4 tyre	9.0 t	7.2 t
Tandem 8 tyre	16.5 t	13.2 t
Tri 12 tyre	20.0 t	16.0 t

Reference: Transport Operations (Road Use Management - Mass, Dimensions and Loading) Regulation 2005

In making these decisions, the Regional/District Director relies on specialist advice based on measurement and analysis of road surface movements under test loading of the pavement. This technique models the 'dry-back' process of the road pavement material, and allows the decision to be made about when it is safe to remove the load restrictions and open the road fully to all road users.

Road closures

While flood waters cover the road, road closures are essential for road user safety and to avoid damage to roads and bridges. Sometimes road closures are extended after the water recedes. This can be due to:

- sections being eroded or washed-out
- flood debris on roads and bridges
- damage to bridges and culverts which may compromise road user safety.

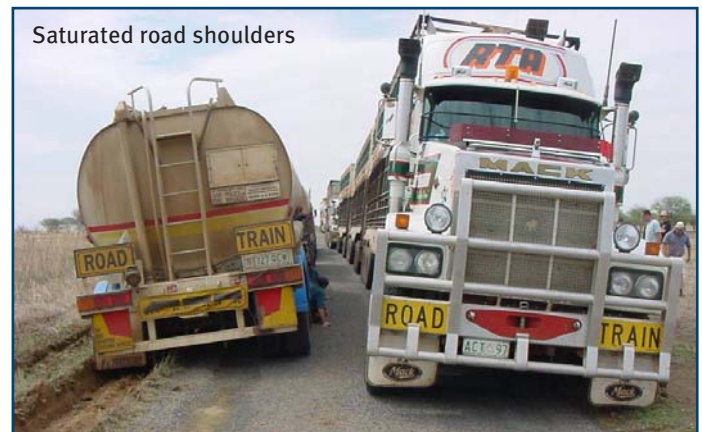
At all times, safety is the number one priority. The department will endeavour to minimise the duration of road closures. However, the length of a closure depends on the time needed to:

- inspect and assess the roads and bridges to ensure they are safe
- remove flood debris
- make the necessary repairs or build temporary sidetracks.

Traffic management

Managing traffic on saturated road pavements as the roads 'dry-back' is important for the safety of road users and for the life of the road asset. Traffic management measures used include:

- using signage to encourage loaded vehicles to travel safely in the middle of the road where possible
- restricting the use of heavy load permits.



Public support

The department understands the impact flooding has on communities and industry, and seeks everyone's assistance in preserving Queensland's road asset following flooding.

The department carefully manages road and bridge closures and load restrictions to avoid permanent damage of saturated roads and to minimise disruptions to road users.

All road users are urged to follow advice provided on road closures and load restrictions, drive safely to match the conditions, obey road signs and speed limits, and look out for roadworkers as they go about their job. In doing so, everyone will play a part in looking after this important community asset.



Damage to bridges

Queensland frequently experiences severe weather changes including flash flooding, causing damage not only to roads but bridges. During high flow flooding, road bridges and approaching roads endure rapid environmental changes which can impact road bridge structures and foundations. Departmental staff adhere to strict inspection guidelines to ensure a safe environment for all road users.

High velocity flooding

Risk of damage to bridges is greater in high velocity flows, where a rapid rush of water occurs over a short period of time, than in low velocity flows. However, most flooding is caused by high intensity rainfall which produces high velocity flows at some stage during the flooding event. These flows may reduce in velocity as the flooding recedes.

Bridge structural damage

High velocity flow flooding across bridges can produce considerable damage to the structure and approaching roads from flood debris. It can also cause erosion or wash-outs (scouring) in the surrounding foundation material which can endanger the bridge and approaching roads.

Bridge inspections

As a consequence, bridges inundated by flooding require thorough structural inspections by trained staff using appropriate equipment. The department undertakes inspections and testing to re-open roads and bridges as soon as possible after inundation.

The department balances protection of the road asset with community and industry access.

Once flood water recedes, the department progressively inspects affected bridges to make sure they are safe and can be re-opened to traffic. These inspections include the following processes.

Visual inspections

Staff inspect the structure to identify any obvious/visual damage caused by water moving at high velocity or impacts by debris carried down in the flood waters.

Under bridge inspections

Under bridge inspections are conducted to identify visual damage to bridge components or to see if the bridge deck has moved off its foundations during the flood event.

Bridge foundations

Tests to identify scouring or undermining of bridge foundations are performed using sounding or sonar equipment or in some cases manual measuring devices.

Load testing

Load testing involves the passing of a load over the structure detecting any movement that may be caused by unknown or hidden damage that is not immediately obvious.

Flooded Macrossan Bridge in northern Queensland



Traffic management

Any irregularities are investigated and repaired prior to opening bridges and approaching roads to the public. This work is conducted under traffic management which includes traffic controllers and traffic warning signs. All road users must abide by traffic management directions for their own safety and also for the safety of roadworkers and inspectors.

Helpful hints

- Plan your route by seeking advice from local authorities before embarking on your journey.
- Be alert for changed road conditions, especially any loose debris from surrounding vegetation and river banks.
- Do not cross affected roads or bridges until they have been declared open by authorities.
- Due to increased driver concentration, plan regular rest stops, especially on your longer journeys.
- Follow directions from roadworkers and State Emergency Service personnel.
- Do not ignore "Road Closed" signs. They have been put there for a reason.

For more information on flooding and roads, contact our Pavements and Materials Branch:

- Phone +61 7 3115 3092
- Visit www.tmr.qld.gov.au

To keep up-to-date with flood incidents and road closures:

- Call the RACQ road conditions reporting service on 1300 130 595
- Visit www.racq.com.au
- Visit www.tmr.qld.gov.au



Contacts for Transport and Main Roads

For more information regarding flood safety, contact the nearest department office.

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