NOOSA COASTAL HAZARD ADAPTATION PLAN:
FACTSHEET 04

BACKFLOW DEVICES

This fact sheet provides information on one of a set of adaptation options that were considered in detail as part of the Coastal Hazards Adaptation Plan (CHAP) for responding to coastal hazard risks.

What are they?

Backflow prevention devices are typically placed at the point of stormwater outflow, or discharge, into a natural waterway to help regulate the movement of water. They can be installed on an existing, or incorporated into the design of a new (including replacement) section of the stormwater network. Figure 1 shows an example of such a device ('flapgate').

Backflow prevention devices for stormwater networks can be categorised into four main types, and are appropriate in different circumstances:

- End of line flap gates;
- End of line elastomer valves, often referred to as "Duck Bill" valves;
- In line check valves; and
- Penstock gates.

Figure 1: Installed flapgate (source: Holcim Australia)

Why have they been considered?

In many low-lying coastal communities, the stormwater network relies on gravity to move stormwater through the network and out into nearby waterways; and Noosa is no exception. Tidal waters already intrude into the network during high tides. This not only reduces the capacity of the pipes during high tides, but can also lead to sedimentation and blockages. When the capacity of the network is reduced, this means less stormwater can flow into it leading to more frequent flooding of road corridors (e.g. road and footpath) and surrounding areas; even during moderate rain events.

As sea levels continue to rise, the amount of the network affected by tidal water intrusions will increase, becoming near permanent regardless of tide heights in some locations (e.g. foreshore areas of Noosaville). In some circumstances, this water may intrude far enough to come up and out the stormwater intakes points, and flow out onto the streetscape, a phenomena often called "sunny day flooding". Because the stormwater network is gravity-based, it is difficult to make large-scale structural changes. Therefore, only the economic feasibility of preventing intrusion at the source (the network outlets) was assessed.

Things to consider:

- Purchase cost, reliability, the ease of maintenance and any ongoing costs associated with various devices.
- The ability of tidal waters to breach the shore and flow overland and thus into the network, upstream of such devices.
- Visual appearance and impacts on the landscape (i.e. visible to foreshore or water users).
- Whether the system is automated (e.g. responds on its own to rising water levels) or requires human operation.
- Whether the system requires a stable power-source (e.g. electricity) to operate effectively.
- The risk of head loss (i.e. pressure) resulting in failure of system to allow stormwater to be discharged effectively.
- Functional issues include the potential failure of devices and their susceptibility to being held open by an accumulation of debris or sediment.
- Failure or distortion from mechanical wear and tear and/or persistent or changing lateral forces from river flows and tides.

What did our analysis conclude?

The analysis considered the installation of three different types of devices to prevent the egress of tidal water into the network (e.g. tide flap, duckbill valve or inline check valve). Installation would commence by the year 2040, for sections of the stormwater network considered at high risk from inundation along the Noosa River, Weyba Creek, and lake frontages of Noosaville and Noosa Heads.

The benefits of this option include:

- Avoided loss of tourism revenue and economic activity.
- Avoided reduction in recreational activity.
- Reduced road damage.
- Reduced damage to the stormwater network.

The effectiveness of this option depends on whether controls on overland flows of water are also implemented to prevent ingress of the network by tidal waters at intake points, therefore it was considered in conjunction with the implementation of a system of levees in high-risk locations (further information available on the 'Levees' fact sheet). This combination of adaptation measures is shown in Figure 2. The independent analysis found the combination of these two measures delivers a net benefit to the community of $21.5M (NPV[1]). Some conservative inputs were used as part of the analysis, and therefore it is highly likely that this approach could deliver a greater net benefit to the community.

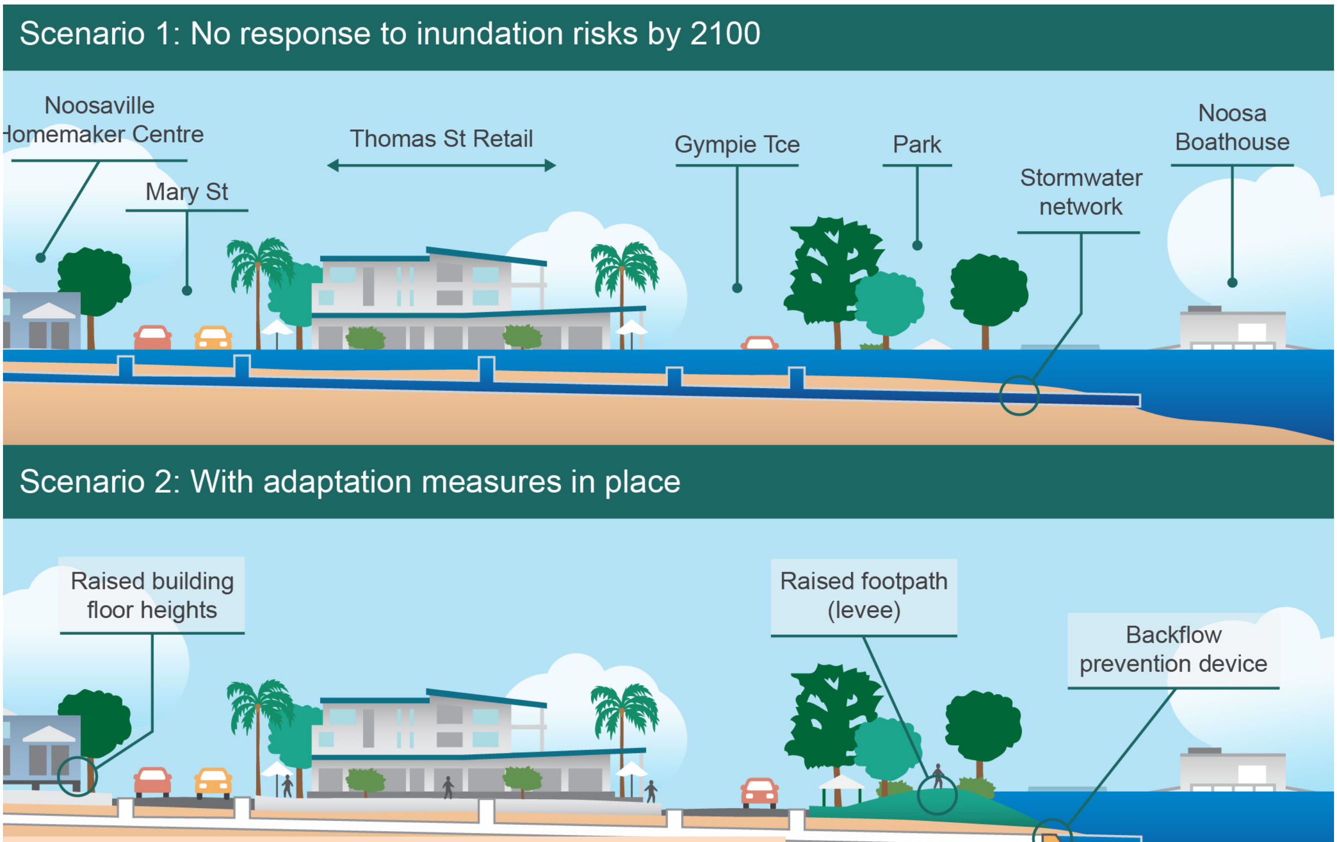

Figure 2: Effect of foreshore backflow devices on frequent inundation

1 – Put simply, Net Present Value is a method of calculating the total return on investment for a project or expenditure by comparing the total costs with the total benefits you expect to result from the investment and translating those returns into today's dollars, so that you can decide whether the project is worthwhile.