



Snapshot

Climate risk assessment for North Queensland Airports

Summary

North Queensland Airports (NQA) operates the Cairns and Mackay Airports, which are situated on the tropical North Queensland coast. Cyclonic activity, flooding and storm surge can damage airport infrastructure as well as impact operations. Under future climate change and associated sea-level rise, these impacts are likely to intensify. To better understand climate risks to the airports both now and in the future, NQA undertook an internal risk screening and risk assessment process using the mapping tools and guidelines published in CoastAdapt. The risk assessment looked comprehensively at current risks as well as future risks in 2030 and 2070, producing a risk register that will inform long term planning.

North Queensland Airports (NQA) operates the Cairns and Mackay Airports on leased state land. Cairns Airport (shown in Figure 1) is one of the largest airports in Northern Australia and an international gateway to the Great Barrier Reef and World Heritage listed rainforests. Mackay Airport (shown in Figure 2) is a key piece of transport infrastructure for the region, servicing residents including fly-in fly-out mining workers, and supporting the local economy.

The airports are situated on the tropical North Queensland coast. Both have been built on low elevation coastal land (reclaimed mangrove ecosystems), are situated in cyclonic regions, experience high temperatures during summer and have climate-sensitive assets and operations.

In particular, intense cyclones and associated storm surges and flooding can damage airport infrastructure as well as impact operations by causing temporary closures. Under future climate change and sea-level rise, these impacts are likely to intensify.

To better understand climate risks to the airports both now and in the future NQA undertook an internal risk screening and risk assessment process using the mapping tools and guidelines published in CoastAdapt.

The risk screening and assessment process looked at present-day and future risks (2030 and 2070).

Keywords

Climate risks, airport, North Queensland, risk screening, transport infrastructure, test case



Figure 1: Aerial image of Cairns Airport. Source: © Google Earth, 2017.



Figure 2: Aerial image of Mackay Airport. Source: © Google Earth, 2017.

A broad range of climate change risks was selected for assessment, including:

- increasing average temperatures
- more extremely hot days (greater than 35 °C)
- increasing evaporation/drought
- average wind speed increase (noting that higher winds affect aircraft operations and ground handling procedures)
- coastal erosion
- increasing frequency and severity of storm surges and storm tides
- more intense rainfall leading to flash flooding
- more intense storms leading to larger riverine and overland flooding
- higher groundwater table during rainfall peaks (affecting pavements)
- more frequent and more intense bushfires (smoke events)
- more intense lightning storms and events (affecting both assets and operations)
- fog events
- cumulative impacts from adjacent development (that address or exacerbate climate change impact).

Risks were identified and assessed using the [first pass](#) and [second pass](#) guidance documentation provided in CoastAdapt (NCCARF 2016a and 2016b). The process followed is outlined in Figure 3.

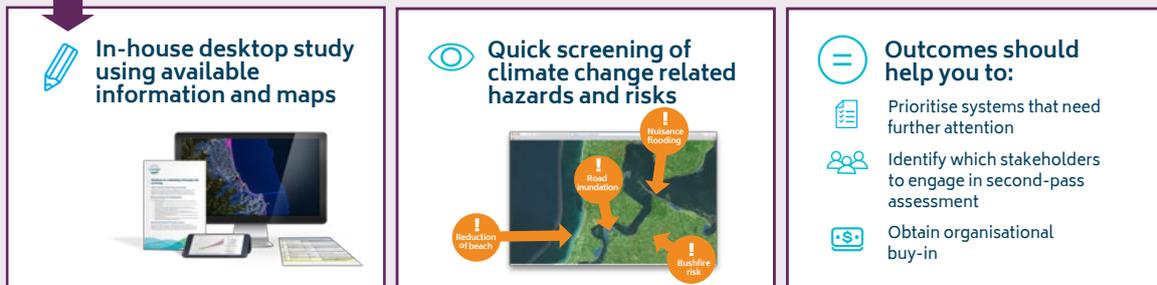
The three-tier climate change risk assessment process of CoastAdapt



1 first-pass risk screening

applicable in C-CADS Step 1

resource use: **LOW** \$



resource use: **MEDIUM** \$ \$

2 second-pass risk assessment

applicable in C-CADS Step 2



⚠️ Third-pass risk assessment may be required if risks determined in second-pass risk assessment are high

3 third-pass risk assessment

applicable in second iterations of C-CADS Step 2

resource use: **HIGH** \$ \$ \$



Figure 3: Infographic showing first, second and third pass risk assessment in CoastAdapt. Source: © NCCARF, 2016.

To inform the assessment, a range of mapping tools and data layers in CoastAdapt were examined in the context of the two airport sites. These included:

- Shoreline Explorer and WOfS (water observations from space) to examine historical flooding across the two sites
- CoastAdapt's future sea-level rise projection tool.

Through a series of facilitated workshops, NQA staff assigned risks on the basis of how they could potentially affect each airport's built assets (i.e. runways, taxiways, buildings, aviation precincts) and/or airport operations (i.e. efficiency, productivity and safety).

Current climate risks at the airports were all assessed as 'Low' on the basis of the range of risk mitigation and treatment measures already being implemented. These included, for example, the use of Personal Protective Equipment (PPE) by staff, scheduling of maintenance activities outside of hot daytime hours, and disaster and emergency management procedures at both airports. Given their existing exposure to coastal hazards, there were also some specific engineering solutions already in place at the airports such as the storm tide levee and pumping system at Cairns Airport and the flood detention drainage system at Mackay Airport.

Future risks from storm surge and tidal inundation exacerbated by higher sea levels were identified as relevant at both airports in the longer term (by 2070). Other future risks include increased flash flooding (from more intense rainfall events) and hence localised erosion.

Following the risk workshops the outputs of the study were sorted into a comprehensive risk register which categorised the climate risks at the airports as 'High', 'Medium' or 'Low' across the three timeframes (present day, 2030 and 2070). The risk register was also developed to allow NQA to understand the comparative risks between the two airport sites – which risks were common to both sites or only significant at one of the sites.

The risk register and associated information will be used by NQA to inform their long term planning, including the company's environmental management plan.

References

NCCARF, 2016a: Guidance on undertaking a first-pass risk screening. CoastAdapt, National Climate Change Adaptation Research Facility, Gold Coast. Accessed 20 February 2017. [Available online at www.coastadapt.com.au/sites/default/files/factsheets/T3M4_1_1st_pass_risk_assessment_0.pdf].

NCCARF, 2016b: Guidance on undertaking a second-pass risk assessment. CoastAdapt, National Climate Change Adaptation Research Facility, Gold Coast. Accessed 20 February 2017. [Available online at www.coastadapt.com.au/sites/default/files/factsheets/T3M4_2_2nd_pass_risk_assessment.pdf].

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