Cumulative Risk Assessment in Environmental Impact Assessment

Professor Carmel McNaught
23 August 2020

This submission focuses on the need to consider Cumulative Risk Assessment (CRA) as an essential element in making an environmental impact assessment of any multidimensional project.

The CRA work of Ken Sexton is well known (e.g., Sexton, 2012). A good definition of CRA is in the paper by Callahan and Sexton (2007):
"Cumulative risk refers to the combined threats from exposure via all relevant routes to multiple stressors including biological, chemical, physical, and psychosocial entities. Cumulative risk assessment is a tool for organizing and analyzing information to examine, characterize, and possibly quantify the combined adverse effects on human health or ecologic resources from multiple environmental stressors." (p. 799)

Put simply, if a number of factors impinging on a particular context or project have associated risk, then it is imperative to consider how the adverse effects from each factor might combine together. This is particularly the case when the factors are interrelated.

AGL claim: "The Project has been informed by comprehensive environmental impact assessments that have incorporated community feedback and concerns received during the development of this Environment Effects Statement."

As part of the Environment Effects Statement (EES), 17 specialist studies were conducted. Table 1 is a summary of the risks noted in each of these studies. More details to be found in the document 'GIJPP EES Executive Summary' at https://www.gasimportprojectvictoria.com.au/sites/default/files/2020-07/GIJPP%20EES%20Executive%20Summary.pdf and in the full report (https://www.gasimportprojectvictoria.com.au/).

It is not my intention in this submission to critique the details of any of the 17 specialist studies. Nor is it my intention to argue against the potential usefulness of the suggested mitigation strategies for each of the studies taken in isolation. My expertise lies in evaluation strategies and risk management, and my concern is with an overall assessment of risk for the entire Gas Import Jetty and Pipeline Project (the Project).

Rather, my points are that:

- The areas covered by the 17 specialist studies overlap and cannot be considered in isolation.
- There is no study looking at the overlap areas between the specialist studies, though it is obvious that these overlaps exist. Three examples:
  (1) 'Marine biodiversity' and 'Terrestrial and freshwater biodiversity' studies overlap in marshland and estuary areas.
  (2) There is a clear interface between the 'Social' and heritage ('Aboriginal cultural heritage' and 'Historic heritage') studies.
  (3) 'Groundwater' and 'Agriculture' issues are exacerbated by any amount of 'Contamination and acid sulfate soils'.

- Each of the studies admit to risks, though each of these studies make the claim that the risks can be mitigated. That means that during construction and operation, every aspect of the Project will have admitted risk. To believe that mitigation plans, developed in isolation from the Project as a whole, will manage all of these complex risks with no serious environmental, health or social damage is naïve.
- There is no study looking at the cumulative effects of the risks across all aspects of the Project.
- As such, the EES does not provide an adequate appraisal of the risks involved in the Project.
- A properly conducted CRA must be done in order to put the data from the specialist studies into an integrated context. Only then can a full assessment be made about this proposed Project.

Table 1. Summary of the risks noted in each of the 17 specialist studies

Specialist study	**Summary of risks from the construction impact assessment**	**Summary of risks from the operational impact assessment**
Marine biodiversity	Spills and leaks of contaminants.	Risks to plankton and other small organisms; and by discharge of chlorinated seawater at a lower temperature.
Terrestrial and freshwater biodiversity	Impact on the already limited patches of native vegetation and possible habitat for native flora and fauna.	Disturbance from noise and light and possible food-chain impacts from seawater intakes and discharges from the floating storage and regasification unit (FSRU).
Surface water	Issues with runoff of sediment-laden water which could affect other waterways; trenching and stockpiling of material which could increase flooding in neighbouring properties.	Spilling of hazardous chemicals or substances and changes in floodplain function.
Groundwater	Lowering groundwater levels and quality of groundwater which could affect registered bore users, groundwater-dependent ecosystems and encourage saline intrusion into fresher water.	Impacts on flow paths within the Pipeline Works and impeded groundwater flow.
Contamination and acid sulfate soils	Soil contamination, even though it might be at low levels.	Leaks or spillages from machinery/plant, fuel and chemicals storage, maintenance activities, receipt and addition of odorant and nitrogen and pigging activities, and management of waste streams.
Greenhouse gas	Low but certain contribution to Victoria's annual greenhouse gas emissions.	Certain contribution to Victoria's annual greenhouse gas emissions through the use of fossil fuels and manufacturing processes (for steel or cement, for example).
Air quality	Creation of dust (PM10).	Some exceedances of the State environment protection policy (Air Quality Management) [SEPP (AQM)] design criteria over water within approximately 50 metres of the FSRU for NO_2 and approximately 200 metres of the FSRU, at a number of areas over water to the south and east of the FSRU and a small area of the Crib Point foreshore for formaldehyde.

Noise and vibration	Higher than current levels, including unavoidable night works.	Admitted noise disturbance to residents.
Landscape and visual	Admitted impact to visual amenity.	Admitted impact to visual amenity.
Transport	Road safety and traffic operation would be impacted in relation to traffic volumes, intersection safety, road closures, pedestrians and cycling, as well as potential impacts to public transport.	Impacts to the level of service of key local and declared roads due to additional workforce, nitrogen and odorant truck movements during operation.
Safety, hazard and risk	Workforce would be exposed to hazards such as moving equipment, excavation hazards, heavy lifting, working over water, etc.	Possible release of flammable gas with subsequent ignition leading to a fire or explosion.
Land use	Traffic and amenity impacts, including restricting access to a limited number of premises and the use of agricultural land.	Constraints on existing and future land uses due to restrictions on construction of any permanent structures in the pipeline easement; acquisition of easements for pipeline infrastructure and a small parcel of land for the Pakenham Delivery Facility would be required.
Social	Pipeline through Warringine Park.	Influx of workers could produce both positive and negative impacts. Impact on areas for social activity and active and passive recreation.
Business	Directs impacts such as changes to access and indirect impacts such as noise and dust.	No substantial impacts claimed, though, as noted above, influx of workers could produce both positive and negative impacts.
Agriculture	Reduced access on a temporary basis; potential loss of production; loss or damage to agricultural facilities and capital improvements.	Difficult to assess because of the possibility of soil degradation.
Historic heritage	13 historic sites are located within 100 metres of the Project's construction and operation footprint.	No impacts claimed once operations commence as changes to sites will be final.
Aboriginal cultural heritage	14 registered Aboriginal cultural heritage places are within the construction and operation footprint.	No impacts claimed once operations commence as changes to sites will be final.

References

Callahan, M., Sexton, K. (2007). If Cumulative Risk Assessment Is the Answer, What Is the Question? *Environmental Health Perspectives*, *115*(5), 799–806. https://doi.org/10.1289/ehp.9330

Sexton, K. (2012). Cumulative risk assessment: An overview of methodological approaches for evaluating combined health effects from exposure to multiple environmental stressors. *International Journal of Environmental Research and Public Health, 9*(2), 370–390. https://doi.org/10.3390/ijerph9020370