Supplementary Statement Technical Studies Summary

Air Quality

INTRODUCTION

A full assessment of the potential impacts on air quality from the project was completed as part of the EES. The modelling undertaken in the EES showed no exceedances of adopted air quality criteria for nitrogen dioxide, carbon monoxide, sulfur dioxide, benzene, formaldehyde, polycyclic aromatic hydrocarbons and particulate matter at any of the sensitive receptors in the study area. The EES study concluded that air quality impacts from floating storage and regasification unit (FSRU) operations, even during winter peak gas output, would be minor and localised in the vicinity of Refinery Pier and the Geelong Refinery, meet regulatory requirements and be unlikely to have regional or State significant effects on the air environment.

As part of the Supplementary Statement process further work was undertaken to confirm that the operational impact of the project on air quality would be acceptable. This summary provides an overview of the supplementary Air Quality study conducted in response to the Minister's Directions for the EES. The final report will be made available for comment through the EES public exhibition process anticipated in mid-2024. Feedback on the supplementary Air Quality study and this document is welcome and can be provided via email to energyhub@vivaenergy.com.au.

STUDY OUTLINE

The Minister's Direction relevant to the supplementary Air Quality study was Recommendation 11 which required sensitivity testing to be undertaken on the air quality model to confirm that operational impacts on air quality would be acceptable, considering:

a) The significance of the wake effects of the floating storage and regasification unit (FSRU) i.e. the effect on plume dispersion caused by the presence of buildings near a stack.

b) A 'worst-case' scenario for air emissions (but based on the use of best available technology [BAT])

c) The implication of bubble limits and stack specific limits for sensitive receptors.

METHODOLOGY

The following approach was taken to address the three items of further work:

- **Recommendation 11a: The significance of the wake effects of the FSRU**

Sensitivity testing in the EES showed that the model predicts ground level concentrations with no wake effects to be much lower compared to ground level concentrations with wake effects.

To understand how the configuration and orientation of the FSRU may influence the significance of wake effects and associated predicted pollutant ground level concentrations at sensitive receptors, sensitivity analysis for a number of different configurations and two different FSRU orientations with and without an LNG carrier berthed alongside the FSRU was conducted.

- **Recommendation 11b: A 'worst-case' scenario for air emissions (but based on the use of BAT)**

Sensitivity testing in the EES and supplementary Air Quality study showed that the worst-case scenario for air emissions during normal operation would be the Esperanza FSRU, operating at peak load, with its bow facing southeast and with an LNG carrier berthed alongside.

To address concerns regarding a potential increase in air pollutants above background concentrations, further analysis of the worst-case operating scenario was undertaken (noting that the Esperanza FSRU is accepted as representative of the use of current BAT).

- **Recommendation 11c: The implication of bubble limits and stack specific limits for sensitive receptors**

Air emission limits could be stack specific or bubble limits. A bubble limit was proposed in the Victorian EPA Development Licence application submitted as part of the EES.

To enable a comparison of long-term (annual) air emissions and air quality impacts on sensitive receptors for stack specific limits only and for a combination of stack specific and bubble limits, both were calculated as part of the supplementary Air Quality study.

Stack limits refer to the maximum amount of pollutant allowed to be discharged to air from an individual stack, while bubble limits refer to the maximum amount of pollutant that is allowed to be discharged to air from a whole site.

Consistent with the EES, sensitivity testing was conducted for the peak load scenario as a worst-case. The peak load scenario would involve the operation of four natural gas-fuelled engines and two natural gas-fuelled boilers operating at 100 percent load, producing 620 terajoules per day (TJ/d) and operating in closed loop mode. Peak load represents the highest air quality impact during normal operations and is only expected to be used an average of two days per winter month, per year. As described in the EES, closed loop is not preferred as the usual operating mode as it uses up to 2.5 percent of the LNG cargo to heat the LNG and has higher greenhouse gas emissions than open loop operation. Closed loop operating mode would only be utilised in the unlikely event that the FSRU was unable to discharge water through the seawater transfer pipe to the refinery, for example due to a pump or pipe failure.

As for the EES, the study area for the supplementary Air Quality study included the area within a 10 by 10 kilometre grid surrounding the FSRU encompassing nearby populated areas which include many sensitive receptors.

FINDINGS

The significance of the wake effects of the FSRU

In summary, predicted air quality impacts for the different FSRU configurations vary only slightly. However, lower ground level concentrations at onshore sensitive receptors are predicted when the bow is facing northwest compared to facing southeast.

The Esperanza FSRU with its bow facing southeast and with an LNG carrier berthed alongside is predicted to be the worst-case scenario among all configurations and orientations assessed. Nonetheless, all modelled pollutants are predicted to comply with the relevant criteria at all sensitive receptor locations for this worst-case operating scenario. It is noted that the southeast orientation is the preferred orientation for the FSRU due to maritime and port operations safety reasons.

The findings of this supplementary study are consistent with those of the EES and have confirmed that operational impacts on air quality would be compliant with regulatory criteria and acceptable considering the significance of the wake effects of the FSRU.

A ‘worst-case’ scenario for air emissions (but based on the use of BAT)

In summary, time-series concentration analysis demonstrated that air quality impacts from worst-case operation of the Esperanza FSRU would be negligible, would not result in additional exceedances of regulatory criteria (beyond those attributable to background concentrations) and, in most cases, would not be discernible from background pollutant levels.

The findings of this supplementary assessment are consistent with those of the EES and have confirmed that operational impacts on air quality would be acceptable considering a worst-case scenario for air emissions.

The implication of bubble limits and stack specific limits for sensitive receptors

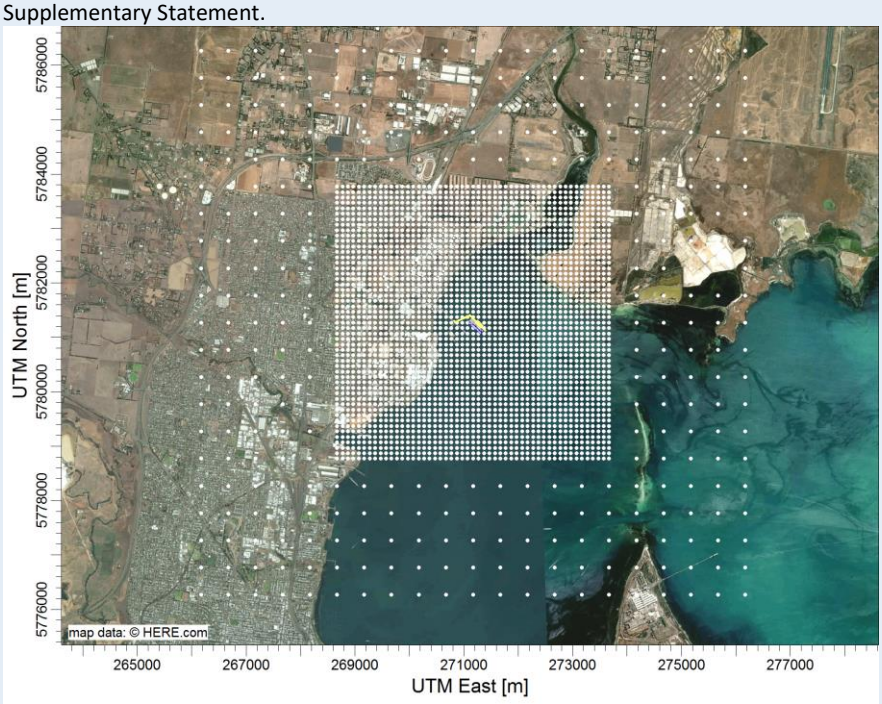
It was determined that a combination of stack specific limits and annual bubble limits would be most suitable for the project and this will be proposed in the amended Development Licence application resubmitted as part of the Supplementary Statement. This combined approach would result in lower annual emissions and lower ground level annual average concentrations at sensitive receptors compared to stack specific limits only, noting that the emissions would be compliant with regulatory requirements under either licensing approach.

The approach takes into consideration a gas production profile which fluctuates throughout the year in response to gas demand and minimises air emissions while providing flexibility to operate the FSRU at 100 percent gas production load when required. The bubble limits were calculated based on the preferred, open loop operating mode, with closed loop operating mode for peak load to cover any potential need to use the boilers, noting that the peak load scenario would be infrequent, approximately two days per winter month on average.

EPA Victoria will ultimately determine the stack specific limits and/or annual bubble limits which would form part of the licence conditions for the FSRU following approval.

DIAGRAMS AND MAPS

The below figure shows the location of the gridded receptors used for the operation impact assessment for both the EES and Supplementary Statement.



The below figure shows the location of the sensitive and industrial receptors selected for the operation impact assessment for both the EES and Supplementary Statement.