



**GAS IMPORT JETTY AND PIPELINE PROJECT
ENVIRONMENT EFFECTS STATEMENT
INQUIRY AND ADVISORY COMMITTEE**

TECHNICAL NOTE

TECHNICAL NOTE NUMBER: TN 036

DATE: 19 October 2020

LOCATION: Crib Point Jetty and Pipeline Works

EES/MAP BOOK REFERENCE: Attachment III - Environmental Risk Report Appendix A Consequence Criteria and Appendix B Risk Register

SUBJECT: Response to RFIs 161, 162 and 163 - Section 20.1 Consequence Criteria

SUMMARY Responses relate to subsection: Consequence criteria

REQUEST: This technical note has been prepared in response to the Request for Further Information 161, 162 and 163 provided to the proponents by the Crib Point Inquiry and Advisory Committee dated 16 September 2020.

NOTE:

[RFI 161] Explain the basis for the Consequence Criterion listed in Appendix A, including:

- **Noise: explain how exceedances against Project Criteria will be determined when monitoring is proposed for 6 months following operation commencing**
- **Vibration: explain the criterion to assess impact against, and monitoring proposed**
- **Impact on threatened species and waders and waterbirds: provide the results of current baselines on temporal and spatial distribution and characteristics of waders and waterbirds that will form the baseline for monitoring impact from the Project and assessment against relevant Limits of acceptable change (LAC)**
- **Threatened ecological communities (EPBC Act and FFG Act): explain whether natural variation for communities, including marine mammals has been established and how marine mammals will be measured against "hectares"**
- **Threatening processes: explain EES "threatening processes"**
- **Ecosystem function: describe the baseline condition for each of the ecosystem functions relevant for the Project area**
- **Ramsar site: describe the baseline conditions that will apply to the ecological character to measure impact to critical CPS and LAC**
- **Groundwater dependent ecosystems: explain how groundwater condition and extent of impact will be monitored**

- **Benthic habitats - Marine: explain how the area of 45 hectares was determined as a minor consequence and what information has been relied on to determine that consequences within 9 hectare zone around the FSRU are negligible**
- **Entrainment – Marine: explain how and when a benchmark will be established to understand changes to populations**
- **Groundwater: explain what frequency is proposed to monitor the potential for long-term loss of beneficial uses.**

Noise

1. Noise modelling demonstrated that the Recommended Maximum Levels would be met for the operational scenarios proposed (see Section 8.4.3 of EES Technical Report H: *Noise and vibration impact assessment*).
2. In the Proponent's Day 1 EPRs (Document 174) EPR-NV12 and EPR-NV13 are proposed to mitigate the risk of operational noise at the Gas Import Jetty exceeding the Recommended Maximum Levels. EPR-NV13 requires that noise produced by the Gas Import Jetty Works be measured within six months of the beginning of commercial operations to confirm compliance with the Recommended Maximum Levels at three properties in the Esplanade Crib Point.
3. Compliance noise measurements are not limited to one occasion nor are they limited in that they can only be undertaken within six months of the beginning of commercial operations to confirm compliance with the Recommended Maximum Levels. The frequency and timing of the compliance monitoring will be developed in accordance with the current Victorian EPA requirements.

Vibration

4. The vibration criterion applicable to human amenity is based on British Standard BS6472-1:2008 and German Standard DIN 4150-3 criteria for the assessment of structural damage impacts, as set out in Section 3.2 Construction vibration of EES Technical Report H: *Noise and vibration impact assessment*. These standards are attached to Technical Note 026 (Response to IAC RFI 075, 077, 084) for reference.
5. Vibration monitoring will be undertaken during construction as per EPR-NV06 and CEMP Appendix J Performance Standard E10.

Impact on threatened species and waders and waterbirds

6. The assessments carried out for EES Technical Report B: *Terrestrial and freshwater biodiversity impact assessment* to determine baseline conditions for threatened species, waders and waterbirds in the study area, included collection and review of data from desktop databases, literature reviews and field surveys. The methodology of baseline assessments is discussed in Section 4.0 and the findings of the baseline assessments are discussed in Section 5.0. The baseline assessments considered temporal and spatial distribution and relevant characteristics.
7. Waders and waterbirds within the Gas Import Jetty Works study area (including Woolleys Beach) that were recorded during field surveys or were considered likely to occur based on the background review are documented in Section 5.1.3 and 5.1.4 of EES Technical Report B: *Terrestrial and freshwater biodiversity impact assessment*. Field surveys carried out in 2019 and 2020 provided results about wader and waterbird use in the vicinity of the Gas Import

Jetty Works study area that were largely consistent with extensive existing information that was reviewed by relevant specialists in preparing their reports.

8. The baseline assessments of waders and waterbirds have been founded on decades of waterbird monitoring data in Western Port, as noted in Section 5.1 of EES Technical Report B: *Terrestrial and freshwater biodiversity impact assessment*.
9. As identified in EES Technical Report B: Terrestrial and freshwater biodiversity impact assessment, waterbirds have been counted in Western Port at least three times per year since 1973, in a co-ordinated citizen science survey run by Birdlife Australia. These have focused on strategic sites including high-tide roosts, stretches of coast and nearby wetlands. Between 1973 and 2012 there have been five surveys per year occurring in late summer (January or February), autumn (April or May), winter (June, July or early August), spring (September or October) and early summer (November or December). Spring and autumn counts were discontinued from 1994, and only three surveys per year were conducted thereafter. These surveys have been of high-tide roosts and nearby stretches of coast.
10. Shorebirds 2020 data, obtained from BirdLife Australia, indicates that the same species assemblages for waders and waterbirds have been recorded from the long-term monitoring sites at nearby Hastings Bight, Long Island and Hanns Inlet/Sandy Point during surveys undertaken since 2011 and that habitats at Crib Point have not recorded any listed migratory bird species.
11. The primary and secondary foraging habitats in the intertidal zone offshore from Woolleys Beach meets the criteria for important habitat because all habitats for migratory shorebirds within the Western Port Ramsar site meet the criteria for important habitat as defined in EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Commonwealth of Australia 2017) by virtue of the designation of the Ramsar site.
12. Important habitats in Australia for migratory shorebirds under the EPBC Act include those recognised as nationally or internationally important. As a Ramsar site, Western Port is an internationally recognised area of important habitat for migratory shorebirds. This is supported by numerous studies and survey records over many years (Loyn et al. 2001, Dann et al. 2003, Kellogg Brown & Root 2010, Hansen et al. 2011, Menkhorst et al. 2014, Hale 2016, Melbourne Water 2018). As the importance of shorebird habitat within Western Port has already been recognised, and there is suitable, credible data available, further surveys were not necessary to establish its importance. This is consistent with EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Commonwealth of Australia 2017). Targeted surveys were undertaken to ascertain the types of habitat present in close proximity to the Gas Import Jetty Works study, assess their suitability for shorebirds and to document waterbird presence there.
13. In addition, the assessment methodology for waders and waterbirds and the understanding and knowledge of baseline conditions at Crib Point and the broader Western Port Ramsar site was subject to input and review by the Technical Reference Group that was appointed by the Minister for Planning for the EES, including representatives from the Department of Environment, Land, Water and Planning (DELWP), EPA, Mornington Peninsula Shire Council and the Port Philip and Westernport Catchment Management Authority (PPWPCMA). The methodology was progressively amended and improved in response to the technical guidance provided by the TRG, to ensure a robust set of baseline data were available to inform the risk and impact assessment

Threatened ecological communities (EPBC Act and FFG Act)

14. There are no marine EPBC-listed Threatened Ecological Communities present in the study area. The nearest marine FFG-listed significant ecological community is the San Remo Marine Community around 23 km from the Project.
15. The Project study area contains one EPBC Act listed ecological community (subtropical and temperate saltmarsh) totalling 0.134 hectares, which occurs in one location at KP 20.2, near South Boundary Road East, Pearcedale. This community is listed as vulnerable and is therefore not considered a Matter of National Environmental Significance for the purposes of the EPBC Act (Commonwealth of Australia 2013b). Impacts to subtropical and temperate saltmarsh have been included in the assignment of the consequence rating for risk ID FF1.
16. The Project study area does not contain, and is considered unlikely to impact on, any FFG Act listed ecological communities.
17. Natural variation is not considered to be of relevance to the assessment of threatened ecological communities. Refer to response on natural variation of marine communities below.

Natural variation in marine communities

18. There would be variations in planktonic species or groups at a particular location over relatively short periods due to their spatial patchiness. The consequence criteria for entrainment was developed to account for natural variation in phytoplankton, zooplankton and fish eggs and larvae based on their distribution, breeding season and flushing rates to Bass Strait.
19. Entrainment modelling predictions were compared in the context of natural variation in plankton populations and flushing rates to Bass Strait. Refer to the evidence of Mr Scott Chidgey (Document 71) at page 12:

The model outputs demonstrated the natural dispersion of particles from various modelled zones and confirmed the presence of a flushing gradient along Lower North Arm and into the Western Entrance. The plankton sampling program also showed evidence of this gradient which is an important factor in assessing the incremental effects of entrainment mortality in the context of loss of plankton from inner Western Port to Bass Strait by the natural, continuous process of tidal flushing.

20. Dr Ian Wallis states (Document 163, pdf pg. 33) that:

"Over a 21-day period, and in the month of peak production, approximately 0.3 % of plankton would be entrained. In the months of average production, 0.2 % of plankton would be entrained. ...

The predicted loss of plankton due to entrainment is small relative to the rate at which plankton are flushed from Western Port into Bass Strait.

The assessment of entrainment impact is based an assumed zero survival of all plankton passing through the heat exchangers. This may be a conservative assumption, as there is evidence that about half the plankton could survive."

21. As such, the entrainment percentages predicted for Lower North Arm would not likely be detectable in the context of natural variation in plankton populations or the factors that influence them. The natural system would adapt to the proportionate reduction in primary plankton production in the same way it adapts to an increase in predation.

Marine mammals

22. Marine mammals are not listed as threatened ecological communities and have not been measured against "hectares". Threatened marine mammals in the risk assessment have been assessed using the consequence criteria for 'Impact on threatened species and waders and waterbirds'. This includes consideration of natural variation in mammal populations.

Threatening processes

23. Threatened species and communities of flora and fauna, as well as threatening processes, are listed under the *Environment Protection and Biodiversity Conservation Act 1999* and the *Flora and Fauna Guarantee Act 1988*.
24. A "threatening process" is defined as a key threatening process if it threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community. This includes the introduction of weeds, pests or pathogens causing the loss and degradation of ecosystem function.
25. Threatening processes have been assessed in Section 7.1.1.8 and 7.2.1.5 of EES Technical Report B: *Terrestrial and freshwater biodiversity impact assessment* and performance requirements (refer to Day 1 EPRs (Document 174) EPR-FF03 and CEMP Appendix J Performance Standards R15, S1, S2, S3, S4, S5, S6) have been proposed to prevent the exacerbation of threatening processes.

Ecosystem function

26. The assessments carried out for EES Technical Report B: *Terrestrial and freshwater biodiversity impact assessment* to determine baseline conditions for ecosystem components (vegetation, habitat) in the study area included collection and review of data from desktop databases, literature reviews and field surveys. The findings of the baseline assessments are discussed in Section 5.0.
27. The findings of the baseline assessments that make up the ecosystem components are provided in Section 5.0 of EES Technical Report A: *Marine biodiversity impact assessment*.

Ramsar site

28. This has been addressed in Technical Note 30 -Response to RFIs 155, 156 and 157 - Section 19.1 Baseline assessment of MNES marine species and section 19.2 Western Port Ramsar.
29. The baseline assessments carried out for EES Technical Report B: *Terrestrial and freshwater biodiversity impact assessment* to assess potential impacts on the Ramsar site CPS and LAC included collection and review of data from desktop databases, literature reviews and field surveys. The baseline ecological conditions of the Ramsar site are also informed by decades of existing data on the distribution and status of birds in Western Port. The methodology of baseline assessments is discussed in Section 4.0 and the findings of the baseline assessments are discussed in Section 5.0.
30. Refer to evidence of Mr Lane (Document 76), Table 3, Item 6A:

The technical report was subject to methodological rigour. Survey methods and impact assessment criteria are defined in relevant regulatory guidelines. These guidelines have been followed. These include survey guidelines under the Commonwealth EPBC Act, and the State Biodiversity Kit (DSE 2010) and for native vegetation the Guidelines for the removal, destruction and lopping of native vegetation (DELWP 2017), which follow the state Vegetation Quality Assessment Manual. Impacts have been considered against published criteria such as the EPBC Act Administrative Guidelines on Significance and the

Ramsar Wetland 'Limits of Acceptable Change' for components, processes and services (CPS) of the wetland.

My peer review concluded that the report comprehensively and accurately fulfils the requirements for assessment and reporting of impacts of the relevant biodiversity legislation and regulations. Where any of this information was deemed inadequate, it has subsequently been recognised and addressed in this review.

Therefore, the likelihood of occurrence, status in the Project Area and impact biodiversity have been accurately determined and assessed.

31. The baseline assessments carried out for EES Technical Report A: *Marine biodiversity impact assessment* to assess potential impacts on the critical CPS and LAC of the Ramsar site included collection and review of data from desktop databases, literature reviews and field surveys (including measurement of currents near Crib Point, a 12-month water quality monitoring program, 12-month plankton monitoring program (phytoplankton, zooplankton and ichthyoplankton) and marine benthic habitat, ghost shrimp, epibiota and infauna surveys). The methodology used for each baseline assessment is provided in Section 4.0 and the findings of the baseline assessments are provided in Section 5.0 of EES Technical Report A: *Marine biodiversity impact assessment*.
32. A detailed study of the baseline conditions associated with the Western Port marine environment was undertaken to supplement historical information and studies that have been carried out on Western Port over the last 50 years. Importantly, the marine biodiversity impact assessment methodology included identification of where information was missing, outdated or not available and identified desktop (including computer modelling) and field-based activities that would enable a current and sufficiently detailed baseline understanding of existing conditions to be established.
33. This included the implementation of an extensive field-based sampling program including a 12-month plankton sampling program at multiple sites in Western Port, and the augmentation of an existing, recently developed EPA and Melbourne Water model of the whole of Western Port for the purposes of hydrodynamic modelling. This in-depth analysis aided the establishment of the most current, exhaustive and credible understanding of physical and ecological processes in Western Port, including North Arm where the FSRU is proposed to be moored.
34. The field and desktop based methodologies for establishing baseline marine conditions associated with Western Port (including the Western Port Ramsar site) were subject to input and review by the Technical Reference Group that was appointed by the Minister for Planning for the EES, including representatives from DELWP, EPA, Mornington Peninsula Shire Council and the PPWPCMA. The methodology was progressively amended and improved in response to the technical guidance provided by the TRG, to ensure a robust set of baseline data were available to inform the risk and impact assessment.
35. Section 4.1 of EES Technical Report A: *Marine biodiversity impact assessment* lists relevant scientific reports, literature and Commonwealth, State and Federal government publications that were reviewed by the persons preparing the assessment. These are further supplemented by an exhaustive list of references included in the Reference List of the EES Technical Report A: *Marine biodiversity impact assessment* (pages 451 to 482).
36. Mr Scott Chidgey's Response to Expert Witnesses and IAC RFI (Document 164) further sets out the baseline data relied on to inform the condition of fish, marine mammals, and the

extent of mangroves, seagrasses and saltmarsh communities (Appendix, commencing at page 30).

Benthic habitats – Marine

37. Assigning consequence of risk is discussed in Section 4.5.1 of EES Technical Report A: *Marine biodiversity impact assessment*. The consequence ratings for benthic habitats were developed taking the following into consideration:

- (a) the area of channel in North Arm at low tide is about 6,900 ha;
- (b) the area of the Port of Hastings that is dredged to maintain the access channels and turning basin for the Crib Point Jetty berths is about 90 ha;
- (c) the area that would be occupied by the FSRU and LNG carrier is about 3 ha.

38. According to the consequence criteria defined in Table 4-3 in Section 4.5.1 of EES Technical Report A: *Marine biodiversity impact assessment* a negligible and minor consequence is assigned for potential impacts that are entirely contained within the area corresponding with previously disturbed (ie dredging) Port of Hastings waters. A major or severe consequence is assigned to potential impacts that are detectable over more than 250 ha around the FSRU or over the North Arm and may impact on intertidal or other sensitive areas.

39. Therefore, impacts on benthic habitats that are not detectable against natural variability or detectable within a 9 ha zone around the FSRU would have a negligible consequence and impacts that are detectable up to 45 ha around the FSRU would have a minor consequence.

Entrainment– Marine

40. A benchmark has been established to understand changes to populations resulting from entrainment associated with the FSRU through baseline assessments that have been carried out for the marine biodiversity impact assessment. Baseline assessments included the collection and review of data from desktop databases, literature reviews and rigorous field surveys (including a 12-month plankton monitoring program of phytoplankton, zooplankton and ichthyoplankton). The methodology used for each baseline assessment is provided in Section 4.0 and the findings of the baseline assessments are provided in Section 5.0 of EES Technical Report A: *Marine biodiversity impact assessment*.

41. Section 4.1 of EES Technical Report A: *Marine biodiversity impact assessment* lists relevant scientific reports, literature and Commonwealth, State and Federal government publications that were reviewed by the persons preparing the assessment. These are further supplemented by an exhaustive list of references included in the Reference List of the Marine Biodiversity Impact Assessment (pages 451 to 482).

42. Mr Scott Chidgey's Response to Expert Witnesses and IAC RFI (document 164) further sets out the baseline data relied on to inform the condition of fish (Appendix, commencing at page 30).

43. Resultant from the extensive baseline surveys, Technical Report A: *Marine biodiversity impact assessment* establishes a current and detailed benchmark of marine populations in North Arm of Western Port that may be affected by entrainment from FSRU operations. Changes to populations will be measured against this benchmark.

Groundwater dependent ecosystems/groundwater

44. The key groundwater impacts associated with construction of the pipeline occur due to extraction of groundwater through dewatering of excavations for the pipeline, where these excavations extend below the groundwater level. The excavation works required to install the pipeline are shallow and impacts are of a temporary nature, i.e. days of dewatering. It would be reasonable to expect that the groundwater levels would return to levels close to those prior to excavation over a similar number of days based on the shallow excavation depths and dewatering durations. Therefore, no long-term groundwater impacts are expected with the implementation of proposed mitigation measures.

45. As set out in the evidence of Mr Jonathan Medd, (Document 76, Section 6.3.1.1):

'...the impact assessment is contingent on the assumption that the dewatering of the trenches and excavation are short term and as such it is recommended that the mitigation measure MM-HG04 be amended...as follows:

- *A dewatering plan shall be developed and approved by DELWP Pipelines Group in circumstances where:
 - i. *more than two days (48 hours) of dewatering is required at a trenched section or HDD tie-in bell-hole, or*
 - ii. *more than 10 days (240 hours) of dewatering is required at a thrust bore location, or*
 - iii. *exceedance of these durations is anticipated to occur in the course of the works, in which case the dewatering works should cease, and groundwater levels allowed to rebound until such time as an approved dewatering plan is attained.**
- *The dewatering plan should include distance drawdown estimates to assess potential impacts to groundwater users, installation and monitoring of shallow monitoring wells, and/or groundwater ingress mitigation measures.'*

46. This recommendation has been accepted (see Document 178, Day One CEMP Appendix J, new Performance Standard T14).

47. There would be no ongoing impacts once construction of the Pipeline Works is completed.

48. The Environmental Management Plan (**EMP**) included in the Incorporated Document in the Planning Scheme Amendment to the Mornington Peninsula Planning Scheme required for the Gas Import Jetty Works (including the FSRU) would incorporate measures to protect beneficial uses of groundwater. Groundwater was identified as being present at a depth below the Crib Point Receiving Facility, whereby groundwater is unlikely to be encountered and abstraction required. Groundwater may be encountered during installation of bored piles, however, this construction approach does not necessitate abstraction and is only exposed temporarily before the pile is grouted. On that basis no further assessment was considered necessary. See also Technical Note 010 – response to RFI 053 – section 5.2 in relation to CPRF piles (Document 138).

49. On the basis that no ongoing impacts during operations are predicted, no ongoing monitoring of groundwater is proposed.

[RFI 162] Explain why consequences exclude impacts to individuals, which have been recognised in the EES with greater sensitivity, particularly threatened or critically endangered species, and instead focus on impact to populations as the criteria.

50. A risk assessment was carried out for each specialist study using an approach that is consistent with the AS/NZS ISO 31000:2018 Risk Management – Guidelines. The risk assessment process involved the assignment of consequence and likelihood ratings which were combined to give an overall risk level for each identified impact.
51. The consequences of a risk occurring were assigned using a consequence guide i.e. specific consequence categories were developed by the specialists using the consequence framework provided in Chapter 5 Key approvals and assessment framework and in consideration of existing conditions in the study area.
52. The consequence ratings for entrainment in Technical Report A: *Marine biodiversity impact assessment* were developed taking into consideration that the effects of entrainment could reduce plankton primary productivity in the North Arm and fish larvae. Based on the outcomes of assessments around natural mortality and natural variation of populations due to flushing, consequence ratings related to percentage change in population has been developed. A more stringent consequence was defined for the fish breeding months in spring and summer with a less stringent consequence for months outside the principal fish breeding season.
53. The consequence ratings for threatened species and waders and waterbirds in Technical Report B: *Terrestrial and freshwater biodiversity impact assessment* which are focussed on detectable population changes were developed considering existing conditions in the study area. Consequence criteria developed for the Terrestrial and freshwater biodiversity impact assessment has focused on the potential impact to populations rather than potential impacts on individuals for significant species as this is in line with the assessment approach outlined in the Significant Impact Guidelines 1.1.
54. Potential impacts on significant species, including those listed as threatened or critically endangered, as a result of the Project have been assessed in accordance with the Significant Impact Guidelines 1.1. Under these guidelines, the assessment of whether an action is considered likely to have a significant impact on a species that is critically endangered, endangered or vulnerable is focused on whether there is likely to be impacts to the species population rather than individuals. As outlined in the Significant Impact Guidelines 1.1, an action is likely to have a significant impact if there is a possibility that it will:
- (a) Lead to a long-term decrease in the size of a population
 - (b) Reduce the area of occupancy of the species
 - (c) Fragment an existing population into two or more populations
 - (d) Adversely affect habitat critical to the survival of a species
 - (e) Disrupt the breeding cycle of a population
 - (f) Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the
 - (g) species is likely to decline
 - (h) Result in invasive species that are harmful to a critically endangered or endangered species becoming
 - (i) established in the endangered or critically endangered species' habitat
 - (j) Introduce disease that may cause the species to decline, or

- (k) Interfere with the recovery of the species.

55. Although, the consequence criteria is related to detectable population change of the identified species, certain species that have been recognised in the EES with greater sensitivity (e.g. significant species including Southern Brown Bandicoot, Growling Grass Frog, Merran's Sun-orchid etc.) were assigned a separate risk ID and were assessed individually in the impact assessment to allow for the development of specific and targeted mitigation measures.

56. For example, impact on Merran's Sun-orchid (*Flora and Fauna Guarantee Act 1988* listed, endangered in Victoria) was identified as having a severe consequence due to the initial construction mitigation measures only avoiding approximately 60% of the individuals or habitat of this species. Additional changes to the construction methodology by including a single 650-metre-long horizontal direction drilling is proposed to avoid this habitat entirely, reducing the consequence to minor.

[RFI 163] Review the risk register so that the consequence of an inherent risk and residual risk remains the same irrespective of the Mitigation Measures, particularly for the following identified risks:

- **Risk ID FF9 Southern Brown Bandicoot**
- **Risk ID FF12 Merran's Sun-orchid.**
- **Risk ID FF13 Gaping Sun-orchid and Pallid Sun-orchid**
- **Risk ID FF18 Waders and waterbirds/migratory birds**
- **FF19 Impacts to Western Port Bay**
- **FF 01 Operational Gas Import Jetty: Waders and waterbirds/migratory birds**
- **FF 06 Gas import Works operational activities impact on Western Port Ramsar Site**
- **ME5A Entrainment of pelagic and demersal fish into FSRU (Spring)**

FF9 Southern Brown Bandicoot

57. The consequence of the initial risk is 'Moderate', and the consequence of the residual risk is 'Minor'. The planned removal of 1.1 hectares of bandicoot habitat is considered minor due to the temporary nature of works and the implementation of mitigation measures including MM-FF04 Contractor awareness (EPR-FF04; Performance Standard A7) and MM-FF09 (EPR-FF09; Performance Standard B11) Southern Brown Bandicoot (including measures to exclude Southern Brown Bandicoots from entering the impact area and rapid reinstatement of suitable native shrubs or vegetation of a similar structure) which would ensure that short-term impacts are reduced as much as practicable to avoid impact on population viability.

FF12 Merran's Sun-orchid

58. The consequence of the initial risk is 'Severe', and the consequence of the residual risk is 'Minor'. Originally, it was proposed to use a combination of HDD and open trench construction through the area occupied by the population of this orchid. However, this would have resulted in a loss of approximately 13% of the population and this was considered to represent a severe consequence. Accordingly, the pipeline design was altered, and it is now proposed to avoid any disturbance to the orchid population from trenching by using HDD beneath the entire population at this site. Remaining individuals within the ROW would be avoided using exclusion

fencing. Performance Standard B12 Merran's Sun-orchid, Pallid Sun-orchid and Gaping Sun-orchid would ensure that impacts to the Merran's Sun-orchid are avoided. Therefore, with the alteration of the pipeline design and implementation of mitigation measures, the consequence is considered minor, with no impact on population viability.

FF13 Gaping Sun-orchid and Pallid Sun-orchid

59. The consequence of the initial risk is 'Severe', and the consequence of the residual risk is 'Minor'. Targeted survey of the area found two individuals of both Gaping Sun-orchid and Pallid Sun-orchid growing with Merran's Sun-orchid on the existing pipeline easement beside Woolleys Road between KP 1.13 and KP 1.7. The pipeline design has been altered to ensure that these plants would be avoided by HDD. Suitable habitat for this species co-exists with areas supporting Merran's Sun-orchid along the easement adjacent to Woolleys Road. Performance Standard B12 Merran's Sun-orchid, Pallid Sun-orchid and Gaping Sun-orchid would ensure that impacts to the Gaping Sun-orchid and Pallid Sun-orchid are avoided. Therefore, with the alteration of the pipeline construction design and implementation of mitigation measures, the consequence is considered minor, with no impact on population viability.

FF18 Waders and waterbirds/migratory birds

60. The consequence of the initial risk is 'Moderate', and the consequence of the residual risk is 'Negligible'. With the implementation of MM-FF01 Unplanned vegetation loss (EPR-FF01; Performance Standard B1), MM-FF03 Invasive weeds, pests, pathogens and waste (EPR-FF03; Performance Standards S1, S2, S3, S4, S5 and S6), MM-FF04 Contractor awareness (EPR-FF04; Performance Standard A7), MM-FF08 Injury and/or disturbance to fauna (EPR-FF08; Performance Standards B6, B7, B8 and B9), MM-FF12 Migratory birds (EPR-FF12; Performance Standard B12), MM-FF13 Surface water sedimentation and runoff (EPR-FF13; Performance Standard T5, WC3, WC4, H9, C7), MM-FF14 Surface water contamination (EPR-FF14; Performance Standard F2, F4, F9, F11), MM-FF15 Lighting impacts to fauna (EPR-FF15; Performance Standard B12) and MM-FF16 Dust impacts to flora/fauna (EPR-FF16; Performance Standard E2), the Project is not considered to have a significant impact on waders and waterbirds/migratory birds or their habitat. The Project would not involve any direct physical disturbance of intertidal flats and is not expected to have any measurable indirect impact on these communities. Trophic impacts that might affect waterbirds are also considered to be unlikely. Therefore, the consequence is considered negligible, with no detectable population change outside natural variation.

FF19 Construction impacts to Western Port Bay

61. The consequence of the initial risk is 'Moderate', and the consequence of the residual risk is 'Negligible'. With the implementation of MM-FF01 Unplanned vegetation loss (EPR-FF01; Performance Standard B1), MM-FF03 Invasive weeds, pests, pathogens and waste (EPR-FF03; Performance Standards S1, S2, S3, S4, S5 and S6), MM-FF04 Contractor awareness (EPR-FF04; Performance Standard A7), MM-FF08 Injury and/or disturbance to fauna (EPR-FF08; Performance Standards B6, B7, B8 and B9), MM-FF12 Migratory birds (EPR-FF12; Performance Standard B12), MM-FF13 Surface water sedimentation and runoff (EPR-FF13; Performance Standard T5, WC3, WC4, H9, C7), MM-FF14 Surface water contamination (EPR-FF14; Performance Standard F2, F4, F9, F11), MM-FF15 Lighting impacts to fauna (EPR-FF15; Performance Standard B12) and MM-FF16 Dust impacts to flora/fauna (EPR-FF16; Performance Standard E2), the Project is not considered to have a significant impact on the Western Port Ramsar site and the critical elements of the ecological character of Western Port. Limits of Acceptable Change defined within the Ecological Character Description for the Western Port Ramsar site are unlikely to be exceeded for impacts as per the discussion in Section 7.1.5 of Technical Report B: Terrestrial and freshwater biodiversity impact

assessment. Therefore, the consequence is considered negligible, with no measurable change in ecological character.

FFO1 Operational Gas Import Jetty: Waders and waterbirds/migratory birds

62. The consequence of the initial risk is 'Minor', and the consequence of the residual risk is 'Negligible'. Operation of the FSRU and pipeline would generate noise, vibration and light that has the potential to impact upon waders and waterbirds/migratory birds.
63. Section 7.2.1.3 Noise and vibration in Technical Report B: Terrestrial and freshwater biodiversity impact assessment provides information about potential noise impacts on waders and waterbirds/migratory birds associated with the operation of the Project. A noise level of 45 dB(A) is comparable to a quiet conversation and this noise level is predicted to occur at parts of secondary foraging habitat for waterbirds closest to the Gas Import Jetty and Receiving Facility and levels will continue to attenuate at greater distances.
64. The predicted noise levels at these locations and further beyond them into areas of secondary and primary foraging habitats for waterbirds, are well below levels that would be expected to elicit any response by any species of bird. It is not expected that noise of the levels predicted for operational activities associated with the Project at Crib Point Jetty would have measurable effects on use of foraging habitat by any species of waterbird that uses Western Port. Roost sites used by waterbirds are of vital importance to the natural functioning of their populations. These sites are approximately 3.5 and 4 kilometres, respectively, from the Crib Point Jetty and noise from operations at and near the jetty can be expected to attenuate to the point of inaudibility to birds at those and all other known roost sites. It is thus improbable that noise from operations of the Project at Crib Point would be sufficient to impact in any measurable way on any roost sites of any listed threatened or migratory birds.
65. Section 7.2.1.4 Lighting in Technical Report B: Terrestrial and freshwater biodiversity impact assessment provides information about the potential artificial lighting impacts on migratory shorebirds and other waterbirds. The operational lighting associated with the Project is not expected to constitute a measurable impact on waterbirds. Lighting calculations undertaken for the Project and the review of existing literature on the impacts of light to fauna suggest that the operational phase of the Project is unlikely to disrupt or displace wildlife from important habitat, nor is it likely to prevent wildlife from undertaking critical behaviours including foraging, reproduction and dispersal. An adaptive management framework would also be incorporated into the OEMPs for the Project to detect and respond to any documented impacts of artificial light on migratory birds. Adaptive mitigation measures may include utilising red filters, shields and directional lighting where practicable and within the constraints of relevant health and safety requirements.
66. Therefore, with the implementation of recommended mitigation measures the consequence of operational impacts to waders and waterbirds/migratory birds is considered to be negligible.

FFO6 Gas import Works operational activities impact on Western Port Ramsar Site

67. The consequence of the initial risk is 'Minor', and the consequence of the residual risk is 'Negligible'. With the implementation of EPR-FF04 Contractor awareness, EPR-FF08 Injury and/or disturbance to fauna, EPR-FF12 Migratory birds, EPR-FF15 Lighting impacts to fauna and adherence with marine mitigation measures, the operation of Project is not considered to have a significant impact on the Western Port Ramsar site and the critical elements of the ecological character of Western Port. Limits of Acceptable Change defined within the Ecological Character Description for the Western Port Ramsar site are unlikely to be exceeded for impacts as per the discussion in Section 7.1.5 of Technical Report B: Terrestrial and freshwater

biodiversity impact assessment. Therefore, the consequence is considered negligible, with no measurable change in ecological character.

ME5A Entrainment of pelagic and demersal fish into FSRU (Spring)

68. The consequence of the initial risk is 'Moderate', and the consequence of the residual risk is 'Minor'.
69. Pelagic eggs are usually buoyant therefore, as an initial mitigation, the seawater inlets on the side of the FSRU would be designed at least two metres from the surface to minimise entrainment of some species. In addition, as initial mitigation the seawater intake velocity would be minimised to less than 0.15 metres per second to allow mobile marine biota to swim away and the seawater inlets would be fitted with a screen with bar grilles (100 millimetre horizontal by 100 millimetre vertical spacing) to avoid impingement of larger biota. With the implementation of initial mitigation measures outline above, the entrainment for North Arm at the peak intake rate is 0.22 %, which corresponds to a significant reduction in numbers of fish larvae and eggs.
70. Most fish only produce eggs and larvae during the spring and summer in particular areas according to the preferred breeding habitat and environmental condition preferences of the adults. The high concentrations present and the restricted habitats they prefer are not widespread in Victoria. Hence, at the peak intake rate, with initial mitigation, the consequence of reduced recruitment success during spring and summer is classed as moderate.
71. With a reduction in the average intake rate (limit to below 315,000 m³/day over a 14-day period), the entrainment is 0.14% which corresponds to a small reduction in the numbers of fish larvae and eggs. Although, there is potential for some fish larvae and eggs to be entrained at the reduced intake rate the consequence is considered minor with the implementation of this additional mitigation measure.

CORRESPONDENCE: N/A

ATTACHMENTS: N/A