

21. RESPONSE TO SEWPAC SUBMISSION

This chapter provides Arrow's response to the submission by the Australian Government Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) on the Surat Gas Project Environmental Impact Statement (EIS). In addition, the chapter presents Arrow's response to submissions on Matters of National Environment Significance (MNES) raised by other submitters.

Arrow's response to SEWPaC comments is provided in Table 21.1. Responses to issues raised by other submitters are set out in Table 21.2.

Table 21.1 Response to SEWPaC submission

Issue No.	Issue	Reference	Response
1	<p>The draft EIS is well presented and easy to understand. It generally meets the department's requirements in respect of matters of national environmental significance (MNES), however some more detail, particularly around impacts on MNES, is required.</p> <p>While we understand that a number of our comments below can be addressed by information, studies and reports already provided in the draft EIS, the MNES chapter must be a standalone chapter that exclusively and fully addresses MNES listed as controlling provisions for this project. Cross-referencing to other parts of the EIS can be provided in the MNES chapter, but important information (such as quantification of impacts, rationale for determinations of non-significance and assessment of cumulative impacts on MNES) must be provided in the MNES chapter.</p>	<p>EIS Attachment 3</p> <p>SREIS Attachment 1, sections 5.5 and 9 and appendices A and C</p>	<p>Noted. The EIS Matters of National Environmental Significance (MNES) attachment relies on information in the EIS to provide background, context and detailed information such as survey methods. SREIS Attachment 1, Matters of National Environmental Significance, provides additional clarity on MNES including key information on the estimated quantification of impacts (Section 9 and Appendix C), the rationale for the determinations of non-significance (Section 5.5), and a review of cumulative impacts on MNES for each community/species (Appendix C). SREIS Attachment 1 addresses comments made by the Department of Sustainability, Environment, Water, Population and Communities (SEWPaC) on the EIS (Appendix A) and includes further information requested as well as specific references to sections in chapters, attachments and appendices in the SREIS.</p>
1a	<p>The draft EIS provides a broad discussion of the threats to MNES and the mitigation measures proposed. However we require predictions of threat, impact and the benefits of any mitigation measures to be clearly stated for each individual MNES and supported by evidence and rationale to support these statements. For the listed threatened or migratory species that are believed not likely to be impacted by the action, but for which suitable habitat is present and could be impacted by the action, we require detailed information to clearly demonstrate that a likely impact on the species will not occur.</p>	<p>EIS Appendix K, sections C, E and I (appendices)</p> <p>SREIS Attachment 1, sections 5.5, 8 and 9 and Appendix C</p>	<p>Profiles (dossiers) of all MNES species potentially occurring in the project development area have been compiled and are included in EIS Appendix K, Terrestrial Ecology Impact Assessment, Sections C, E and I (Appendices).</p> <p>SREIS Attachment 1, Matters of National Environmental Significance, Appendix C provides updated dossiers for MNES species and communities prepared in accordance with the criteria set out in the Significant Impact Guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999. Cross references to the EIS and SREIS have been provided where information already exists, as well as further explanation of the rationale to support the determination of significance supplied in SREIS Attachment 1, Section 9. This includes the discounting of any species unlikely to be present within the project development area (SREIS Attachment 1, Section 5.5).</p> <p>General mitigation measures, inclusive of those presented in the EIS and newly developed for the SREIS that are applicable to all species are provided in SREIS Attachment 1, Section 8. Species specific mitigation measures are provided in the species specific assessments within Appendix C in each dossier, where required.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
1b	<p>We require information on the survey methodology used, including any limitations of the methodology and data collected for each matter of MNES, as well as a justification for the survey methodology employed, including how these follow relevant Commonwealth survey guidelines where available at the time of surveying (e.g. the Survey Guidelines for Australia's Threatened Birds (SEWPaC)). We also require information around what targeted surveys were undertaken, where they were undertaken and for what species they were undertaken. Please include the justification as to why surveys were not undertaken in areas where there are known records of listed threatened species and communities and listed migratory species in the project area.</p>	<p>EIS Chapter 17, Section 17.2.3 and Appendix K, Section 4.4</p> <p>SREIS Chapter 2, Section 2.3.1, Attachment 1, Appendix C, Attachment 2 and Appendix 9, Section 5.6</p>	<p>Information on the survey methodology used is provided in the EIS, Appendix K, Terrestrial Ecology Impact Assessment, Section 4.4 and Chapter 17, Terrestrial Ecology, Section 17.2.3.</p> <p>The size of the project development area (8,600 km² at the time of the EIS) made detailed survey for listed species and communities impractical. Consequently, Arrow developed two approaches to identify and understand the extent of MNES present within the project development area.</p> <p>Firstly, desktop study and detailed dossiers on species identified those species and communities potentially present and potentially at risk based on habitat. Field surveys were used to validate the viability of habitat assessed as most sensitive to impacts. This information was then used to compile constraints mapping that identified no go areas and areas of high, moderate and low constraint to development.</p> <p>The types of development that were appropriate for each level of constraint were identified as well as the appropriate level of environmental management i.e., standard or procedural, detailed and site specific controls. This approach is known as the 'environmental framework' and is designed to protect MNES through avoidance (Arrow knows what is constrained and why) and minimisation (what controls are required for each level of constraint to reduce the potential impact).</p> <p>Areas presented in the EIS as potential facility locations have been further refined for the SREIS and have been surveyed to further refine habitat mapping and species. Detailed site assessment have been undertaken at four potential central gas processing facility locations and one potential accommodation village location with detail provided at the property scale. SREIS, Appendix 9, Supplementary Terrestrial Ecology Assessment, Section 5.6 provides detail of each of these properties and describes MNES likely to be present on each property.</p> <p>Used in gas field design, this approach has been supported by ecological surveys of areas of interest as part of the detailed design process, again aimed primarily at avoidance and secondarily at minimisation of impacts on listed species including MNES. Finally (i.e., if not covered by the ecological surveys), preconstruction clearance surveys will implement procedures for the management of MNES identified in areas to be cleared, such as translocation.</p> <p>SREIS Chapter 11, Terrestrial Ecology, Section 11.5 includes an overview of Arrow's approach to site validation of environmental values, including preconstruction clearance surveys that will be undertaken. Details of survey requirements in accordance with guidelines are detailed within Appendix C of SREIS Attachment 1, Matters of National Environmental Significance.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
1b (cont'd)			This structured and rigorous approach while not specifically addressing the survey requirements of the EPBC Act for the entire project development area, allows for the identification, management and in some instances, protection of MNES, as part of the coal seam gas field planning, design and execution processes.
1c	We require a discussion of the extent to which identified impacts can be forecast or predicted. Consistent with Section 3.01(c) of Schedule 4 of the EPBC regulations a statement whether any of the relevant impacts are likely to be unknown, unpredictable or irreversible must be provided for each individual MNES for each project. Please include, where available, common names as well as scientific names for EPBC listed species throughout the draft EIS – this will assist the public understand what species are being considered.	SREIS Attachment 1, Appendix C	SREIS Attachment 1, Matters of National Environmental Significance, Appendix C provides updated profiles (dossiers) for MNES prepared in accordance with the criteria set out in the Significant Impact Guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999 and Section 3.01(c) of Schedule 4 of the Environment Protection and Biodiversity Conservation Act 1999 regulations. This includes a statement whether any of the relevant impacts are likely to be unknown, unpredictable or irreversible for MNES species and communities. Common names for each species are provided where available in the SREIS and specifically SREIS Attachment 1.
1d	When discussing impacts on MNES in the MNES chapter you may wish to consider the following approach: <ul style="list-style-type: none"> • Discuss the relevant species or community in respect of generalised known threats and those threats posed by the proposed action; • Quantify and discuss likely direct, indirect and cumulative impacts from the proposed action; • Describe and assess effectiveness of avoidance and mitigation measures to deal with relevant impacts and provide supporting information; • Quantify and discuss residual impacts (and maximum disturbance limits, where relevant); and • Make a conclusion on the level of impact and its significance, and provide a rationale for this determination. 	EIS Attachment 3, Table 8.1 and Appendix 1 SREIS Attachment 1, Appendix C	Detailed assessments for each identified MNES are presented within SREIS Appendix 1, MNES, Appendix C. These dossiers provide an overview of known threats and those threats posed by the proposed action, potential impacts from the proposed action and avoidance and mitigation measures to reduce residual impacts. Table 8.1 within EIS Attachment 3, Matters of National Environmental Significance, presents the significance of the potential impacts determined for each species identified from the EPBC Protected Matters search that potentially occur within the project development area. Discussion of the rationale for the conclusion on significance is also provided for each species or community specific MNES assessment within Appendix 1, of EIS Attachment 3. The significance assessment approach adopted by Arrow for the EIS is underpinned by management measures that are effective and proven, based on industry standards where practical. The management measures set out in the EIS have been reviewed by various departments within Arrow to confirm they can be implemented from a technical feasibility and financial perspective, and that they will be effective in managing the identified impacts. Consideration for the outlined approach has been given during preparation of the SREIS.

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
2	We require quantification of suitable habitat onsite for each EPBC listed threatened ecological community (e.g. how much of RE 11.3.1, 11.4.3, 11.4.10, 11.4.9.5 and 11.9.6 is present or potentially present onsite and the total amount of suitable habitat for Brigalow onsite).	EIS Chapter 17, Section 17.3.3 SREIS Attachment 1, Section 5.2, Appendix 9, Section 2, Section 5, Table 4 and Table 6	<p>An estimate of the extent of habitat in the project development area has been presented in EIS Chapter 17, Terrestrial Ecology, Section 17.3.3, as the area of regional ecosystems (vegetation classification system used by the Queensland Government). As part of the updated project description presented in SREIS Appendix 9, Supplementary Terrestrial Ecology Assessment, Section 2, the project development area has been reduced from 8,600 km² to 6,100 km².</p> <p>The relationship between regional ecosystems, MNES communities and habitat for MNES species is discussed within SREIS Attachment 1, Matters of National Environmental Significance, Section 5.2. This relationship has been further refined through the SREIS process to provide an estimate of the amount of each community and habitat present within the revised project development area. These estimates are based on a set of criteria and process as outlined in SREIS Appendix 9, Supplementary Terrestrial Ecology Assessment, Section 5, Table 4 and Table 6.</p>
2a	Although maps have been provided that identify EPBC listed communities in the project area, it would assist us (and the public) if these maps clearly differentiated between each of the ecological communities.	EIS Attachment 3, figures 4.3 a-c SREIS Attachment 1, figures 5.2 a-c	<p>Figures 4.3 a-c from EIS Attachment 3, Matters of National Environmental Significance, have been updated within SREIS Attachment 1, Matters of National Environmental Significance, Figures 5.2 a-c to differentiate between different EPBC listed ecological communities.</p>
2b	We note that the Queensland Water Commission released the Underground Water Impact Report Surat Cumulative Management Area – Consultation Draft (May 2012). Please discuss how the release of the Queensland Water Commission's report will inform the supplementary EIS in respect of MNES (if at all).	EIS Chapter 14 Appendix G SREIS Attachment 1, Section 5.5.1	<p>The Surat Underground Water Impact Report (QWC, 2012) prepared by the Queensland Government validates the findings of the groundwater impact assessment presented in EIS Chapter 14, Groundwater; and EIS Appendix G, Groundwater Impact Assessment, as it confirms that Arrow's assessment is conservative. The additional information within this report which was previously unavailable to Arrow and the implications of this information on MNES has been presented in SREIS Attachment 1, Matters of National Environmental Significance, Section 5.5.1.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
3	Please provide a description of the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin (including location, distance from project area, hydrological requirements and relevant surface/groundwater systems that link the community and the project area) and an analysis of impacts on this community (in particular indirect impacts to groundwater quality and quantity).	<p>EIS Chapter 14, Section 14.3.3 and Appendix K, Section 6.8.6</p> <p>SREIS Chapter 8, Chapter 11, Section 11.4.8 and Attachment 1, Section 5.5.1</p>	<p>Spring complexes and groundwater dependent ecosystems were discussed in EIS Chapter 14, Groundwater as well as within EIS technical studies Appendix G, Groundwater Impact Assessment, and Appendix K, Terrestrial Ecology Impact Assessment.</p> <p>In EIS Appendix K, Terrestrial Ecology Impact Assessment, Section 6.8.6 states that there are no known groundwater dependant ecosystems in the project development area.</p> <p>SREIS Attachment 1, Matters of National Environmental Significance, includes a cross reference to an updated version of Figure 14.6 from the EIS titled 'Approximate location of known groundwater springs within the groundwater model extent', (Section 5.5.1) which includes data on the locations of spring complexes presented in Surat Underground Water Impact Report (OGIA, 2012).</p> <p>New information presented in Surat Underground Water Impact Report prepared by the Queensland Government has been reviewed and acknowledged within the SREIS.</p> <p>Initial review of the report identified further spring complex (Figure 8-2 of the OGIA report) that was not identified in the EIS. The relationship of that spring complex with potentially affected groundwater systems is provided in SREIS Chapter 8. Arrow will also continue to contribute to the Spring Impact Mitigation Strategy as detailed in SREIS, Chapter 11, Terrestrial Ecology, Section 11.4.8.</p>
3a	Please identify any listed fauna species associated with springs that may be impacted by the project, and provide a description of the species and analysis of impact (for e.g. the Queensland Water Commission's Surat Underground Water Impact Report identifies three listed flora species associated with spring complexes in the Surat Basin; <i>Eriocaulon carsonii</i> (Endangered), <i>Arthraxon hispidus</i> (Vulnerable) and <i>Phaius australis</i> (Endangered)).	<p>EIS Chapter 14, Section 14.3.3 and Appendix K, Section 6.8.6</p> <p>SREIS Chapter 8, Chapter 11, Section 11.4.8 and Attachment 1, Section 5.5.1, Appendix 1, Figure 5.5</p>	<p>Spring complexes and groundwater dependent ecosystems were discussed in EIS Chapter 14, Groundwater, Section 14.3.3 as well as within EIS technical studies Appendix G, Groundwater Impact Assessment, and Appendix K, Terrestrial Ecology Impact Assessment.</p> <p>In EIS Appendix K, Terrestrial Ecology Impact Assessment, Section 6.8.6 states that there are no known groundwater dependant ecosystems in the project development area.</p> <p>Since the EIS was finalised, additional information on groundwater dependent ecosystems has become available, as discussed in SREIS Chapter 8, Groundwater and SREIS Chapter 11, Section 11.4.8. A number of desktop studies and field investigations (hydrogeological, ecological and botanical) have been conducted within the Surat Cumulative Management Area (CMA), and used to inform the Underground Water Impact Report (UWIR) (OGIA, 2012) prepared by the Queensland Government.</p> <p>A reduced groundwater level, and/or changes to groundwater quality in groundwater dependent ecosystem source aquifers are the primary mechanisms by which detrimental impacts can occur on MNES species associated with the ecosystem. The groundwater modelling results presented in the Surat CMA UWIR confirm that the findings of the groundwater impact assessment presented in Chapter 14 of the EIS, Groundwater; and Appendix G of the EIS, Groundwater Impact Assessment, are conservative in relation to predicted groundwater drawdown levels.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
3a (cont'd)			<p>One spring complex, identified since the EIS was finalised, was assessed for the potential presence of Groundwater Dependent Communities and Species of interest under the EPBC Act and the Vegetation Management Act (VM Act). This complex is located 35 km west of the project development area and may be inter-related to the groundwater systems potentially impacted by the Surat Gas Project.</p> <p>The spring is located outside of the project development area, and is unlikely to be directly impacted by project related activities. This area will not be exposed to Arrow's clearance activities nor any direct disturbance by Arrow. Terrestrial ecology values associated with the identified spring complex are unlikely to be impacted.</p> <p>Groundwater dependent ecosystems are recognised in Queensland in discharge areas of the Great Artesian Basin, and not located in Tertiary aquifers (younger geological units associated with overlying fluvial and alluvial sediments), as part of regional ecosystems 2.3.39, 4.3.22 and 6.3.23 which are listed as Endangered under the VM Act. These regional ecosystems are not present in the project development area and were not found to be present during field investigations (Unpublished Report)</p> <p>The Fitzroy River turtle (<i>Rheodytes leukops</i>) is also described within the context of a groundwater dependent ecosystem due to the potential movement between spring-fed watercourses identified in the Surat CMA.</p> <p>The Fitzroy River turtle is only known to occur within the Fitzroy Basin, not the Murray-Darling Basin (within which the vast majority of the project development area is situated). A small portion of the project development area falls within the Dawson River catchment of the Fitzroy Basin.</p> <p>No specimen of Fitzroy River turtle has been recorded within the project development area. Database search results did return the species as 'possibly' occurring within the small portion of the project development area occurring within the Dawson River catchment.</p> <p>Three EPBC Act listed flora species, <i>Eriocaulon carsonii</i>, <i>Arthraxon hispidus</i> and <i>Phaius australis</i>, were identified as being potentially present in association with the spring complex (situated outside of the project development area) (Figure 8-2 of the QWC report) . The supplementary terrestrial ecology assessment (SREIS Appendix 8, Section 5.2.3) excludes these species from being present within the project development area. Field investigations found these species to be absent from the spring complex (Unpublished Report).</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
3a (cont'd)			<p>The additional information on groundwater dependent ecosystems allows a greater understanding of potential source aquifers and the ecological communities they support. The information indicates that the following types of groundwater dependent ecosystems have the potential to occur within the project development area:</p> <ul style="list-style-type: none"> • Springs, spring wetlands and spring-fed watercourses. • Groundwater discharge to rivers and wetlands. • Ecosystems dependent on the subsurface presence of groundwater via plant roots accessing shallow groundwater. <p>This additional information was previously unavailable to Arrow. The implications of this information on the assessment of MNES in the project development area are discussed below. The approximate location of known groundwater springs, spring wetlands, and spring-fed watercourses presented in the EIS and those identified in the Surat Underground Water Impact Report are shown on SREIS, Appendix 1, Matters of National Environmental Significance, Figure 5.5.</p> <p>Should the groundwater level and quality data collected as part of the Spring Impact Management Strategy and the Water Monitoring Strategy show significant changes in spring function or associated source aquifer groundwater levels that could potentially impact vegetation communities and associated species, Arrow will determine the required action through the periodic reporting and review obligations under the UWIR. These requirements will also determine the actions to be taken in the event that a previously unidentified groundwater dependent ecosystem is identified. Arrow is also involved in the preparation of a Joint Industry Plan for an Early Warning System for the Monitoring and Protection of EPBC Springs with other coal seam gas proponents operating within the Surat CMA.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
4	<p>Where suitable habitat exists within the project area please provide quantification of suitable onsite habitat for each EPBC listed threatened species. You may consider presenting this information in Table 4.2.</p> <p>Please provide maps that clearly identify areas of suitable habitat (both on site and regionally) for each EPBC listed threatened species that identify important habitat (where known) for those species, such as habitat type and use (core breeding, foraging habitat etc.). We note that the maps currently provided (4.4a to 4.4c) only show known and possible core habitat for records of EPBC listed threatened species and do not clearly differentiate between suitable habitat onsite for each individual species. A map that identifies habitat for each key species onsite (e.g. endangered or critically endangered species, or species that are known or likely to occur onsite) provides a useful visual that allows the department to understand the landscape, available habitat and connectivity of habitat within and adjacent to the project site. We recognize some habitat for species will overlap and it should be identified for which species this overlapping habitat is suitable.</p>	<p>EIS Chapter 17, Section 17.2.2, Attachment 3, figures 4.4 a-c and Appendix K</p> <p>SREIS Chapter 17, Section 17.2.2, Attachment 1, Appendix C, Appendix 9, Appendix A2</p>	<p>Conservation-listed species records are shown on Figures 4.4a-c within EIS Attachment 3, Matters of National Environmental Significance in relation to the project development area. Many species (particularly migratory species) potentially present in the study area are generalist species and it is not possible to isolate a particular habitat type of importance to the species in question.</p> <p>SREIS Attachment 1, Matters of National Environmental Significance, Appendix C presents a dossier for each EPBC listed community and species potentially occurring within the project development area. Individual maps are contained within each dossier with habitat displayed as per the updated mapping criteria (also found within each dossier) refined from the species dossiers found in EIS Appendix K, Terrestrial Ecology Impact Assessment.</p> <p>The updated maps and mapping criteria are informed by the SREIS desktop assessment as described in SREIS Appendix 9, Supplementary Terrestrial Ecology Assessment, Appendix A2, as well as updated regional ecosystem mapping (Version 7.0 EHP 2012d; regrowth mapping EHP 2012a) and targeted surveys of individual properties identified as potential locations for four central gas processing facilities and one temporary workers accommodation facility. Where mapping wasn't available for a species, the potential habitat preference for the individual species was analysed against known ecological niches as described in EIS Chapter 17, Terrestrial Ecology, Section 17.2.2.</p>
5	<p>Consistent with previous comments, these maps should state common names for all species records in addition to scientific names.</p>		<p>Figures within the SREIS show common names (where available) for all species records in addition to scientific names.</p>
6	<p>Consistent with previous comments, we recommended including quantification of suitable habitat available onsite for each species in this table.</p> <p>Where it is determined that a species is unlikely they occur (such as the Red Goshawk) a logical rationale for this determination is required, including discussion of suitable habitat and whether any suitable habitat exists onsite (particularly if there are known records of a species onsite). Where suitable habitat is present onsite detailed information must be provided to demonstrate that the species is unlikely to occur, and / or that an impact on the species is unlikely.</p>	<p>EIS Appendix K</p> <p>SREIS Attachment 1, Appendix C, Appendix 1, sections 5.2.3 and 5.3</p>	<p>The assessment of the impacts upon each individual MNES followed the criteria set out in the Significant Impact Guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999, and any species or community specific guidelines as detailed under each species or community profile. An estimate of core habitat and suitable habitat within the project development area has been presented in SREIS Attachment 1, Matters of National Environmental Significance, Appendix C; where the species can be associated with particular regulated vegetation habitats (identified as regional ecosystems). This is largely based upon existing information on species' habitat preference and core habitat already contained in the Species Profiles attachment to EIS Appendix K, Terrestrial Ecology Impact Assessment.</p> <p>This process included discounting species unlikely to occur, and presenting a rationale as to why this is the case and why impacts upon the species from the Surat Gas Project are likely to be non-significant. The process has been continued into SREIS Appendix 9, Supplementary Terrestrial Ecology Assessment, sections 5.2.3 and 5.3 which contain further detail on species unlikely to occur based on further desktop study and fieldwork.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
6a	<p>If a species has been recorded in the area (e.g. the Five-clawed worm skink) this must be stated, and should be included in Table 4.2.</p> <p>If suitable habitat is deemed not to be present onsite, we require a rationale why this is the case.</p>	<p>SREIS Attachment 1, Appendix C</p>	<p>Further clarification on species records and potential habitat use for each individual MNES species is provided in SREIS Attachment 1, Matters of National Environmental Significance, Appendix C within the species specific dossiers.</p>
6b	<p>For species that occur downstream of the project area, we required a detailed discussion around presence downstream and potential downstream impacts (e.g. for the Fitzroy River Turtle, Murray Cod and Bell's turtle).</p>	<p>EIS Chapter 16, Section 16.6</p> <p>SREIS Attachment 1, Section 5.5</p>	<p>Arrow's Coal Seam Gas Water and Salt Management Strategy is provided in SREIS Attachment 5. Rationale as to why downstream impacts are not expected for MNES species Fitzroy River turtle, Murray Cod and Bell's turtle is provided in SREIS Attachment 1, Matters of National Environmental Significance, Section 5.5.</p> <p>EIS Chapter 16, Aquatic Ecology, Section 16.6 identifies a number of mitigation measures (commitments) that Arrow will implement to protect water quality and reduce the potential for downstream impacts. Commitments have been updated for the SREIS to include:</p> <ul style="list-style-type: none"> • Develop and implement emergency response and spill response procedures to reduce impacts that could occur as a result of releases of hazardous materials or loss of containment of storage equipment (Commitment C036). • Ensure appropriate spill response equipment, including containment and recovery equipment, is available on site, or can be mobilised to the impacted site within an acceptable response time and that relevant personnel are appropriately trained (Commitment C037). <p>Arrow will develop a strategy for the discharge of coal seam gas water to watercourses in accordance with relevant legislation. The strategy will incorporate a water quality monitoring program with locations upstream and downstream of the discharge point to inform site specific water quality objectives. A detailed environmental flows assessment informed by water quality monitoring data and an aquatic ecology monitoring program will inform the discharge strategy. Periodic inspections of the physical form and hydrology of the watercourse are to be incorporated in the strategy to monitor geomorphic performance (Commitment C498).</p> <p>The specific details of options for coal seam gas water disposal will be developed further through detailed engineering design. Chosen management options will be detailed in the coal seam gas water management plan required for the EA or EA amendment application. The management plan will include detailed coal seam gas water and brine impacts assessments and management strategies in accordance with the EHP Guideline "Application requirements for petroleum activities".</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
6c	<p>When talking about populations, particularly for species listed as vulnerable, please ensure that terms such as “significant” or “important population” are (preferably) used in the traditional EPBC Act context or (at least) clearly defined.</p> <p>We require justification for determinations of ‘possible’ likelihood of occurrence for a species when it is known to occur onsite (e.g. the ‘ooline’ is determined to have a ‘Possible’ likelihood of occurrence, however there is a known population in the southern portions of the project development area).</p>	<p>EIS Appendix E of Appendix K</p> <p>SREIS Attachment 1, Appendix C</p>	<p>SREIS Attachment 1, Matters of National Environmental Significance, Appendix C provides updated dossiers for MNES species and communities prepared in accordance with the criteria set out in the Significant Impact Guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999, which includes definitions of important populations.</p> <p>Regarding determinations of possible likelihood of occurrence for a species, and specifically ooline, Appendix E of EIS Appendix K, Terrestrial Ecology Impact Assessment states:</p> <p><i>Possible. The taxon is represented within the southwestern part of the PDA (on Kindon Station in the Wyaga Creek area) by two Herbarium collections. The records are very low precision (16000m) and dated from 1919 and 1938, however EPA (2002) identify ‘Wyaga-Kindon Ooline’ as a Special Biodiversity Area where ooline approaches its eastern limit of distribution. It is possible that the records occurred in habitats associated with part of brigalow/belah forests along Wyaga Creek and further detailed surveys are required. The majority of ooline habitat in this area has been cleared however, there remains a possibility of isolated paddock trees and any vegetation associated with RE11.7.1. Ooline is also recorded in brigalow open forest and fragmented softwood scrub vegetation in the Stones Country Resources Reserve West Gurulmundi area located to the west of the PDA. Steep basaltic scree slopes on Captains Mountain near Millmerran are considered low potential habitat and require further survey.</i></p> <p>The above analysis provided in the technical report clearly demonstrates that the species is unlikely to be present and that evidence of its ‘possible’ presence is based on records dating back to 1919 and 1939. Further, threatening processes, particularly vegetation clearing, have significantly reduced the potential for the species to occur in the project development area. The ooline is provided as an example of how the EIS presents this information.</p> <p>Information on likelihood of occurrence for each species identified in the EPBC Protected Matters search within the project development area can also be found in the EIS, Appendix K, Terrestrial Ecology, Appendix E. SREIS Attachment 1 provides an update to this assessment based on further desktop study and fieldwork at potential infrastructure locations.</p>

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6d	We require locations, such as 'the Dalby to St George Stock Route' to be shown on maps (or where maps exist, cross references provided).	<p>EIS Appendix K, Figure 13</p> <p>SREIS Attachment 8</p>	<p>EIS Appendix K, Terrestrial Ecology Impact Assessment, Figure 13 shows the location of state significant habitat within the Queensland bioregional significance framework including the Dalby – St George Road reserve (Dalby – Moonie Road).</p> <p>The size of the project development area (8,600 sq km at the time of the EIS) made detailed mapping of locations such as the Dalby to St George Stock Route for the purposes of the EIS and SREIS impractical.</p> <p>However, such locations were included in constraints mapping that identified no go areas and areas of high, moderate and low constraint to development, which are reflected in EIS Attachment 10, Preliminary Constraints Maps and SREIS Attachment 8, Constraints Mapping Update.</p> <p>The types of development that were appropriate for each level of constraint were identified as well as the appropriate level of environmental management i.e., standard or procedural, detailed and site specific controls. This approach is known as the 'environmental framework' and is designed to protect MNES through avoidance and minimisation (what controls are required for each level of constraint to reduce the potential impact).</p>
7	Consistent with other controlling provisions, if a migratory species has been recorded in the project development area please provide a map that depicts where that species has been recorded, in what type of habitat and in what numbers. Where suitable habitat is present onsite for a migratory species listed in table 4.3, include a discussion around habitat type, amount of habitat (ha) and importance for each individual species.	<p>SREIS Attachment 1, Section 5.4 and Appendix C</p>	<p>Listed migratory species have been discussed in their representative groups of 'Migratory Shorebirds', 'Terrestrial Migratory Birds' and 'Other Migratory Wetland Birds within SREIS Attachment 1, Matters of National Environmental Significance, Section 5.4 and Appendix C. Clarification on habitat type, amount of habitat (ha) and potential for use will be provided for each category where practical.</p> <p>Listed migratory species such as the rainbow bee-eater or the great egret are likely to be widespread throughout the project development area in suitable habitat – these species are wide ranging and associated with many different habitats. No important populations of listed migratory species were identified.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
7a	It is important that the information is provided to support the rationale for your determinations of 'possible' likelihood of occurrence for a species when it is known to occur onsite (e.g. the Australian Painted Snipe has been identified as having a 'possible' likelihood of occurrence, however it has been recorded onsite (table 4.3, page 4-35)).	<p>EIS Attachment 3, figures 4.4 a-c and Appendix K</p> <p>SREIS Attachment 1, Section 5.5, Attachment 1, Appendix C and Appendix 9, Section 6</p>	<p>The Excluded Species list, contained within EIS Appendix K, Terrestrial Ecology Impact Assessment, outlines the excluded fauna species. This list also outlines the reasoning behind exclusions, which include a lack of recent records and/or a lack of suitable habitat. Some of the species included in this table are still addressed within EIS Attachment 3, Matters of National Environmental Significance. Further, conservation-listed species records are shown on Figures 4.4a-c of EIS Attachment 3 in relation to the project development area.</p> <p>SREIS Attachment 1, Matters of National Environmental Significance, Appendix C presents a dossier for each EPBC listed community and species potentially occurring within the project development area. Individual maps are contained within each dossier with habitat displayed as per the updated mapping criteria (also found within each dossier) refined from the species dossiers found in EIS Appendix K, Terrestrial Ecology Impact Assessment.</p> <p>SREIS Attachment 1, Section 5.5 and SREIS Appendix 9, Supplementary Terrestrial Ecology Assessment, Section 6 provide an update to this assessment based on further desktop study and fieldwork at potential infrastructure locations.</p>
8	<p>Please provide specific cross references for the "further details of activity assessment and project phases are provided within the EIS main report" (page 5-39).</p> <p>In respect of Section 5. Issues and Potential Impacts, provide detailed information about all potential direct, indirect, downstream and cumulative impacts (including quantification (where possible) and disturbance limits) for each listed threatened species, ecological community and migratory species. For example, we note that weed dispersal or groundwater impacts are not relevant to all species, but will be of specific concern to certain individual listed species and should be discussed in respect of species vulnerable or likely to be affected by such impacts.</p>	<p>EIS Appendix E of Appendix K</p> <p>SREIS Attachment 1, Section 6 and Appendix C</p>	<p>Dossiers of all MNES communities and species potentially occurring in the project development area were compiled and included in EIS Appendix K, Terrestrial Ecology Impact Assessment. The dossiers form the basis for preparing community or species specific assessments in accordance with the criteria set out in the Significant Impact Guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999. Cross-references have been provided where information already exists.</p> <p>General impacts and issues that are applicable to all species are discussed in SREIS Attachment 1, Matters of National Environmental Significance, Section 6. Where potential impacts and issues are of particular concern to a specific species, they are provided in the species specific assessments provided in Appendix C.</p>
9	This section of the draft EIS talks about corridors. We require identification of which corridors are being referred to (and depict on maps where possible), which species those corridors are important for, and detail (including quantification) around impacts to those corridors in respect of listed species.	<p>SREIS Attachment 1, Appendix C, Attachment 2, Section 5.4.2 and Appendix 9, Section 5.4</p>	<p>Maps of suitable habitat (core, known and possible) for each EPBC listed species are provided in species dossiers within SREIS Attachment 1, Matters of National Environmental Significance, Appendix C.</p> <p>Terrestrial, flora and fauna specialist input was sought in the preparation and discussion of these maps. Satellite imagery was used where possible to identify potential wildlife corridors, and a discussion has been provided in SREIS Appendix 9, Supplementary Terrestrial Ecology Assessment, Section 5.4.2 on species likely to use those corridors. Desktop assessment of narrow vegetation tracts of (potential corridors) connecting vegetation stands were identified as highly constrained (to inform constraints mapping for areas of importance to MNES species).</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
9a	<p>This section of the draft EIS states that “Arrow does not plan to construct well sites or production facilities near aquatic systems”. We require clarification around what constitutes ‘near’ (e.g., 100 m or 1 km), and what constitutes ‘aquatic systems’. Where buffer zones are intended, they should be clearly described.</p>	<p>EIS Chapter 16, Section 16.3.1 and Attachment 3, Table 7.1</p>	<p>Queensland legislation prescribes buffers to environmentally sensitive areas and watercourses. The buffers are set out in conditions on environmental authorities for petroleum activities. The buffers have been included as constraints as part of the ‘environmental framework’ and delineated as ‘no go’ or highly constrained areas depending on the type of activities precluded by Queensland regulations. Aquatic ecosystems associated with environmentally sensitive areas such as Lake Broadwater are protected, as well as sensitive reaches of rivers and streams in the project development area. The environmental framework does not preclude pipeline crossings of watercourses but does preclude the development of wells and production facilities in buffers included as conditions on environmental authorities.</p> <p>Arrow will implement agreed (conditioned) buffers in accordance with regulatory requirements at the time.</p> <p>EIS Chapter 16, Aquatic Ecology, Section 16.3.1 defines aquatic ecosystems within the study area as diverse with permanent, semi-permanent and highly seasonal lotic (flowing water) and lentic (non-flowing water) environments.</p> <p>The standard environmental authority (EA) conditions imposed on all mining and oil and gas developments in Queensland include buffers on watercourses according to stream order. These conditions currently regulate the Dalby Expansion Project, also operated by Arrow. The conditions describe a no-impact buffer zone (for vegetation clearance or fill placement) from the high bank of watercourses. Alternative buffer requirements exist under the Regional Vegetation Management Code for Brigalow Belt Bioregion and New England Tableland (DERM, 2009) which describe a buffer for streams of the first or second order.</p> <p>Arrow has committed to the protection of aquatic systems and implementing appropriate buffer zones from the high bank of all watercourses within the project development area for the Surat Gas Project, in accordance with regulatory requirements at the time.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
10	<p>This section of the draft EIS states that “Lake Broadwater has been identified as potential habitat for MNES species”. We require this section to identify for which species Lake Broadwater is potential habitat (including habitat type and use). Specific impacts to Lake Broadwater must be discussed in respect of individual listed species.</p> <p>Vague and general statements, such as “other unmitigated impacts”, should be avoided or more clearly stated (e.g. what are those unmitigated impacts in respect of listed species).</p>	<p>EIS Attachment 10, Figure A10.7</p> <p>SREIS Attachment 1, Section 5.5.1, 5.6.1 and Appendix C</p>	<p>Lake Broadwater is a Category A Environmentally Sensitive Area under Queensland legislation that is protected by buffers that preclude certain types of development. Arrow will develop buffers in accordance with legislative requirements applicable at the time.</p> <p>The buffers protecting Lake Broadwater are included in constraints mapping prepared as part of the ‘environmental framework’, as ‘no go’ and highly constrained areas. Figure A10.7 within EIS Attachment 10, Preliminary Constraints Maps, specifically shows the ‘no go’ and highly constrained areas that reflect the buffers on Lake Broadwater. As development activities are precluded from Lake Broadwater, project activities are unlikely to impact on habitat for MNES associated with Lake Broadwater. Arrow will implement agreed (conditioned) buffers in accordance with regulatory requirements at the time.</p> <p>Habitat type and use will be described for individual listed species where specific habitat requirements exist. SREIS Attachment 1, Matters of National Environmental Significance, Section 5.6.1 provides further discussion about Lake Broadwater and how Arrow’s management measures intend to protect species that may use Lake Broadwater as habitat. Maps of suitable habitat (core, known and possible) for each EPBC listed species are provided in SREIS Attachment 1, Appendix C, and demonstrate where Lake Broadwater is core, known or possible habitat for each MNES species.</p>
11	<p>Consistent with previous comments, we require information on individual species that are likely to be impacted by fauna mortality and discussion around the level of impact.</p>	<p>EIS Chapter 8, Section 8.5 and Attachment 5</p> <p>SREIS Attachment 1, Appendix C, Attachment 2, Appendix 9, Section 11.5 and Attachment 10</p>	<p>The environmental framework, as presented in EIS Chapter 8, Environmental Framework, Section 8.5, is an internal process developed by Arrow for managing impacts in the planning phase and in the construction and operation phases through the application of environmental controls that reflect the sensitivity or vulnerability of environmental values. Constraints mapping, an integral part of the environmental framework, is informed by the environmental impact assessment and guides site and route selection that seeks to avoid and reduce impacts, thereby protecting environmental values. The EIS presented preliminary constraints maps which have updated to reflect the values identified in the EIS; see SREIS, Attachment 8, Constraints Mapping Update.</p> <p>While knowledge of species susceptible to fauna mortality would be useful information, it does not negate the primary focus of site and route selection, which is avoidance. Ecological surveys carried out as part of detailed design and/or preconstruction clearance surveys will seek to identify fauna thereby reducing the potential for mortality impacts through consideration of translocation and other measures. An outline of Arrow’s management approach, inclusive of the framework, survey requirements and buffers is provided in SREIS, Appendix 9, Supplementary Terrestrial Ecology Assessment, Section 11.5. SREIS Attachment 2, Strategic Environmental Management Plan (EMP) details the management measures required to manage the potential impacts resulting from project activities.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
11 (cont'd)			<p>Potential impacts were identified for each species as part of the species specific assessments provided in SREIS Attachment 1, Matters of National Environmental Significance, Appendix C, including the potential impacts from alteration of ecological processes. The assessment of these impacts follows the significant impact guidelines for MNES as stipulated under the Environment Protection and Biodiversity Conservation Act 1999. Revised or new mitigations for MNES in accordance with the assessment of impacts are presented in SREIS Attachment 2, Strategic Environmental Management Plan.</p>
12	<p>Consistent with previous comments, we require information on individual species that are likely to be impacted by edge effects, where the impacts are likely to occur and discussion around the level of impact.</p>	<p>EIS Chapter 8, Section 8.5 and Attachment 5 SREIS Attachment 1, Appendix C and Appendix 9, Section 11.5</p>	<p>The environmental framework, as presented in EIS Chapter 8, Environmental Framework, Section 8.5, is an internal process developed by Arrow for managing impacts in the planning phase and in the construction and operation phases through the application of environmental controls that reflect the sensitivity or vulnerability of environmental values. Constraints mapping, an integral part of the environmental framework, is informed by the environmental impact assessment and guides site and route selection that seeks to avoid and reduce impacts, thereby protecting environmental values. The EIS presented preliminary constraints maps which have been updated to reflect the values identified in the EIS; see SREIS, Attachment 10, Constraints Mapping Update.</p> <p>While knowledge of species susceptible to edge effects is useful information, it does not negate the primary focus of site and route selection which is avoidance. Ecological surveys carried out as part of detailed design and/or preconstruction clearance surveys will identify habitat/species vulnerable to edge effects and recommend appropriate responses, primarily realignment or relocation of infrastructure. An outline to Arrow's management approach, inclusive of the framework, survey requirements and buffers is provided in SREIS, Appendix 9, Supplementary Terrestrial Ecology Assessment, Section 11.5.</p> <p>As part of the species specific assessments provided in the SREIS, Attachment 1, MNES, Appendix C, potential impacts have been identified for each species including edge effects.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
13	Consistent with previous comments, we require information on individual species that are likely to be impacted (including indirect impacts, such as hydrological impacts from emergency discharge or changes to surface water flows) and discussion around the level of impact.	EIS Attachment 5 SREIS Attachment 1, Appendix C	Arrow's Coal Seam Gas Water and Salt Management Strategy is provided in SREIS Attachment 5. As part of the species specific assessments provided in SREIS Attachment 1, Matters of National Environmental Significance, Appendix C, potential impacts have been identified for each species including the potential impacts from alteration of ecological processes. These impacts have been provided following the significant impact guidelines for MNES as stipulated under the Environment Protection and Biodiversity Conservation Act 1999. Arrow will develop a strategy for the discharge of coal seam gas water to watercourses in accordance with relevant legislation. The strategy will incorporate a water quality monitoring program with locations upstream and downstream of the discharge point to inform site specific water quality objectives. A detailed environmental flows assessment informed by water quality monitoring data and an aquatic ecology monitoring program will inform the discharge strategy. Periodic inspections of the physical form and hydrology of the watercourse are to be incorporated in the strategy to monitor geomorphic performance (Commitment C498).
14	Consistent with previous comments, we require information on individual species that are likely to be impacted from each component of the action and discussion around the level of impact, including quantification where possible.	SREIS Attachment 1, Appendix C	As part of the species specific assessments provided in SREIS Attachment 1, Matters of National Environmental Significance, Appendix C; potential impacts are identified for each species as a result of each component of the proposed project activities. An estimate of habitat at risk has been determined based on conceptual field layouts, RE mapping, and input from the terrestrial, flora and fauna specialist.
15	We require evidence in the MNES chapter to demonstrate the proposed mitigation methods will be effective. Note that mitigation measures that are to be relied upon to reduce the level of significance of impact must use commitment language and must not use terminology such as 'may' or 'should'. Terms such as 'where practical', 'where appropriate', 'minimise' or 'where possible' must be explained, and if relevant, other mitigation measures must be provided to ensure the level of impact will be appropriately mitigated (e.g. avoiding listed threatened communities 'where possible' is not a certain and measurable mitigation measure and cannot be relied upon to reduce the level of impact). Please refer to comments about offsets below.	EIS Chapter 8, Section 8.5, Attachment 3 and Attachment 8 SREIS Chapter 2, Section 2.3.1, Chapter 11, Section 11.5.3 and Attachment 4	The environmental framework (EIS Chapter 8, Environmental Framework) was developed by Arrow to manage the impacts of coal seam gas development where the location of infrastructure becomes progressively known over the life of the project. The identification of sites and routes for project activities is informed by the constraints imposed by environmental values including habitat and buffer requirements. Constraints mapping, an integral part of the environmental framework, will guide site and route selection through the avoidance and/or minimisation of disturbance to sensitive vegetation communities and listed species during infrastructure design and layout, thereby protecting the environmental values. Where possible, Arrow will be flexible in the placement of wells and infrastructure, which will be informed by site-specific ecological surveys. SREIS, Chapter 11, Terrestrial Ecology, Section 11.5 3 outlines Arrow's approach to the identification of environmental values at proposed infrastructure sites, ecological surveys and environmental management.

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
15 (cont'd)			<p>The significance assessment approach adopted by Arrow for the EIS is underpinned by management measures that all available evidence suggests are effective at minimising and mitigating impacts. The management measures set out in the EIS have been reviewed by various departments within Arrow to confirm they can be implemented and will be effective in managing the identified impacts.</p> <p>The terms 'where practicable', 'where appropriate' and 'where possible' are used to account for site specific conditions where implementation of the proposed mitigation measure may not be feasible or may result in additional impacts. They can be relied upon, as their effectiveness in reducing and managing impacts is proven, provided the site conditions permit. Where the measure cannot be implemented site specific controls will be developed and implemented by Arrow to achieve the desired outcome.</p> <p>The mitigation measures presented in the EIS, and replicated within EIS Attachment 3, Matters of National Environmental Significance, are presented as a list of commitments in EIS Attachment 8, Commitments Summary. This list is updated in SREIS Attachment 4, Commitments Update with any amended or new commitments required as a result of additional studies undertaken for the SREIS.</p> <p>As set out in SREIS Chapter 2, Project Approvals, environmental authority (EA) or EA amendment application(s) will be lodged in accordance with statutory requirements, including supporting technical information that contains further site-specific measures to reduce potential project impacts, where applicable.</p>
15a	Some mitigation measure specified in section 7 need to be more clearly defined (e.g., the mitigation measure "avoid construction activities in waterbodies frequented by migratory species" (section 7.6, page 7-48) needs to provide detail around what constitutes "waterbodies frequented by migratory species".	EIS Appendix K SREIS Appendix 9	Listed migratory species assessed in the EIS Appendix K, Terrestrial Ecology Impact Assessment and SREIS, Appendix 9, Supplementary Terrestrial Ecology Assessment have the potential to use a range of habitats including dams, lakes, ponds, creeks, billabongs, rivers and fields. On this basis that many are transient visitors utilising a variety of habitats, mitigation measures would not be effective in managing potential impacts. However standard mitigation measures relating to works near waterbodies would afford a level of protection to any migratory species temporarily utilising that resource. No important populations were identified of any listed migratory species.

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
15b	When available, please provide the statutory or policy basis for the mitigation measure, and the expected cost of the mitigation measure. Please also provide the name of the agency responsible for endorsing or approving each mitigation measure or monitoring program. We note that this information is required under Section 4.01 of Schedule 4 of the Environment Protection and Biodiversity Conservation Regulations 2000.	<p>EIS Chapter 2 and Attachment 5</p> <p>SREIS Chapter 2, Attachment 1, Section 3 and Attachment 2</p>	<p>The cost of mitigation will be determined through a competitive tendering process for the construction of the Surat Gas Project facilities and infrastructure. Consequently, it is not possible to provide insight into that actual cost of mitigation. It is important to note that all mitigation measures have been reviewed by various departments within Arrow to confirm they can be implemented. The review considered technical feasibility and cost.</p> <p>EIS Chapter 2, Project Approvals provides a list of relevant legislation and expected permits, consents and licenses required by the project. EIS chapters 9 to 26 identify legislation of specific relevance to each environmental value. SREIS Chapter 2, Project Approvals, and SREIS chapters 5 to 15 provide updates to this list.</p> <p>SREIS Attachment 2, Strategic Environmental Management Plan (EMP) provides discussion on Arrow's environmental management plans and procedures for the Surat Gas Project. The Strategic EMP provides the framework for further environmental management plans and procedures that will identify any permits or consents and the legislation and responsible agency.</p>
16	While this table is useful and well presented, it would be appreciated if you could limit the information on proposed buffer distances in respect of MNES matters (not State matters/categories). This will be particularly helpful for the public to delineate between state and commonwealth interests.	<p>SREIS Attachment 1, Section 9 and Table 9.1</p>	<p>Table 9.1 has been amended in SREIS Attachment 1, Matters of National Environmental Significance, Section 9, to focus solely on Commonwealth interests. However, state interests, such as the definition of regional ecosystem types have been used to assist in defining matters of Commonwealth interests such as habitat for listed species.</p>
17	For species with Recovery Plans, please discuss in the MNES chapter how the proposed actions identified in the EIS relate to relevant Species Recovery Plans, and if applicable, please provide a rationale as to why they are not consistent with the relevant Recovery Plans.	<p>EIS Attachment 3, Section 7.7 and Appendix K</p> <p>SREIS Attachment 1, Appendix C</p>	<p>Relevant details from the recovery plans described in EIS Attachment 3, Matters of National Environmental Significance, Section 7.7 have been considered in the assessment of impacts and implementation of mitigation and management measures.</p> <p>Dossiers of all species potentially occurring in the project development area were compiled and included in EIS Appendix K, Terrestrial Ecology Impact Assessment. The dossiers reference the Recovery Plans relevant to the species in discussion and have been used to inform the mitigation measures proposed.</p> <p>These dossiers form the basis for species specific assessments in accordance with the criteria set out in the Significant Impact Guidelines 1.1 - Environment Protection and Biodiversity Conservation Act 1999, presented in SREIS Attachment 1, Matters of National Environmental Significance, Appendix C. A clear statement is made up-front in each dossier as to whether a recovery plan exists for that species, and mitigation measures for that species, if required, is informed by said recovery plans.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
18	<p>Although the draft EIS states that offsets will be provided, we require information around what offset is proposed, what the offset compensates for, and how the offset complies with relevant Commonwealth guidelines and policies. We also require an offset strategy that specifically addresses MNES to be provided. Note that a consultation draft of the most recent EPBC Draft Environmental Offsets Policy is available (http://www.environment.gov.au/epbc/publications/consultation-draft-environmental-offsets-policy.html) and should be used as a guide for developing the offsets strategy (and referenced appropriately in the EIS). We appreciate that this information will evolve as assessment progresses, but an indication of options being considered should be provided.</p>	<p>EIS Chapter 8, Section 8.5 SREIS Attachment 7</p>	<p>Arrow has already successfully implemented the environmental framework described in EIS Chapter 8, Environmental Framework, Section 8.5.</p> <p>It has been applied to site selection for facilities associated with approved developments, specifically the Dalby Expansion Project. In those instances, ecological surveys comprised an important part of the planning process, confirming the suitability of sites identified using constraints mapping. They also informed the design of the facility layouts to avoid habitat of MNES.</p> <p>For the Surat Gas Project, the regional environmental constraints identified in the EIS will be used to guide field development plans across the project development area, and have informed the selection of four potential central gas processing facility locations and one temporary workers accommodation facility. Ultimately, site selection will aim to avoid constrained areas and will ensure that those areas designated as 'no go' e.g., Lake Broadwater Conservation Park, are avoided. Early identification of sensitive areas (including critical habitat) allows Arrow the best opportunity to avoid sensitivities to the greatest extent practicable.</p> <p>Following completion of the EIS and the SREIS, the ongoing refinement of constraints maps will inform field development plans. Once additional preferred locations for project infrastructure are known, targeted ecological and preconstruction clearance surveys will be conducted. At this time, a suitably qualified person(s) will determine whether the site comprises MNES species or ecological communities, and if required, further investigation into whether they comprise important populations or additional control measures are required.</p> <p>Arrow proposes to develop an offset strategy that incorporates a landscape approach for actual vegetation losses. An offset strategy that is based on the actual disturbance and not an estimate of disturbance based on a conceptual field development layer is considered more appropriate. Arrow's offset calculations will be developed as the field development layout is refined and further ground-truthing is undertaken. SREIS Attachment 7, Draft Environmental Offsets Strategic Management Plan, presents the results of GIS analysis to facilitate identification of potential offset sites.</p>
19	<p>This section is particularly important during the public consultation stage. Therefore, please ensure that the summary provided identifies all the key elements for the following aspects:</p> <ul style="list-style-type: none"> • All the identified impacts on MNES; • Summary of the proposed mitigation measures; • Residual impacts on MNES; and, • The proposed offsets measures to address the residual impacts; and • Conclusion on whether or not there will be significant impacts from the proposal on each of the controlling provisions. 	<p>SREIS Chapter 4</p>	<p>Public consultation for the Surat Gas Project EIS has been completed and is reported in the EIS. SREIS Chapter 4, Consultation provides an update on the latest round of consultation which presented the findings of the EIS to the communities of the Surat Basin.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
20	While this table is a useful summary of impact assessment on MNES, this table would be provide a more useful summary (or 'snapshot') if it included information such as the quantification of pre-mitigated and residual impacts, maximum disturbance limits and identification of whether offsets will be provided for each MNES with a residual impact. We note that this information must be provided somewhere in the MNES chapter.	SREIS Chapter 11. Section 11.4.9 and Attachment 7	<p>The size of the project development area (8,600 km² at the time of the EIS) made detailed survey for listed species and communities impractical. Consequently, Arrow developed two approaches to identify and understand the extent of MNES present within the project development area.</p> <p>Firstly, desktop study and detailed dossiers on species identified those species and communities potentially present and potentially at risk based on habitat. Field surveys were used to validate the viability of habitat assessed as most sensitive to impacts. This information was then used to compile constraints mapping that identified no go areas and areas of high, moderate and low constraint to development.</p> <p>The types of development that were appropriate for each level of constraint were identified as well as the appropriate level of environmental management, i.e., standard or procedural, detailed and site specific controls. This approach is known as the 'environmental framework' and is designed to protect MNES through avoidance (Arrow knows what is constrained and why) and minimisation (what controls are required for each level of constraint to reduce the potential impact).</p> <p>Areas presented in the EIS as potential facility locations have been further refined for the SREIS and have been surveyed to further refine habitat mapping and species. Detailed site assessment have been undertaken at four potential central gas processing facility locations and one potential temporary workers accommodation facility (TWAF) location with detail provided at the property scale. SREIS Chapter 11, Supplementary Terrestrial Ecology Assessment, Section 11.4.9 provides detail of each of these properties and describes MNES likely to be present on each property.</p> <p>Used in gas field design, this approach has been supported by ecological surveys of areas of interest as part of the detailed design process, again aimed primarily at avoidance and secondarily at minimisation of impacts on listed species including MNES. Finally, (i.e., if not covered by the ecological surveys), preconstruction clearance surveys will implement procedures for the management of MNES identified in areas to be cleared, such as translocation.</p> <p>An outline of the content of management plans is provided in SREIS Attachment 2, Strategic Environmental Management Plan. This includes measures for management of MNES species and methods for translocation of MNES species, amendments to clearing plans (in terms of methods used and/or timeframes) and offsets. Management measures are dependent on what species or habitat is identified.</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
20 (cont'd)			<p>This structured and rigorous approach while not specifically addressing the survey requirements of the EPBC Act for the entire project development area ensures the identification, management and in some instances, protection of MNES, as part of the coal seam gas field planning, design and execution processes.</p> <p>Arrow proposes to develop an offset strategy that incorporates a landscape approach for actual vegetation losses. SREIS Attachment 7, Draft Environmental Offsets Strategic Management Plan, presents the results of GIS analysis to facilitate identification of potential offset sites.</p>
20a	<p>Consistent with previous comments, we also require a rationale for determinations of significance (why a residual impact is low, moderate or high), and a rationale why mitigation measures will be effective in reducing impacts (e.g. there is around 9,899 HA of potential Brigalow onsite, yet there is no quantification of pre-mitigated and residual impact or rationale why the 'general mitigation measures' will reduce this impact to only moderately significant). This information does not need to be provided in table 8.1 but must be provided in the MNES chapter.</p>	<p>EIS Attachment 3, Table 4.1</p> <p>SEIS Appendix 9, Attachment A4</p>	<p>EIS Chapter 17, Terrestrial Ecology, Section 17.3 set out the rationale for the determination of significance of impacts. Further desktop assessment has led to refinement of the significance assessment as presented in SREIS Appendix 9, Supplementary Terrestrial Ecology Assessment, Attachment A4.</p> <p>The significance assessment approach adopted by Arrow for the EIS is underpinned by management measures that are effective and proven. The management measures set out in the EIS have been reviewed by various departments within Arrow to confirm they can be implemented and that they will be effective in managing the identified impacts.</p> <p>EIS Attachment 3, Matters of National Environmental Significance states that field observations and regional ecosystem mapping suggest that Brigalow dominant and co-dominant communities are a common, although highly fragmented, ecosystem. These communities are recognised under the Vegetation Management Act as regional ecosystems (REs) 11.3.1, 11.4.3, 11.4.10, 11.9.5 and 11.9.6.</p> <p>Arrow has made a commitment to aim to avoid Brigalow communities (REs 11.3.1, 11.4.3, 11.4.10, 11.9.5 and 11.9.6). This will be achieved through implementation of the environmental framework.</p> <p>The Brigalow present within the project development area exists in isolated patches (as opposed to contiguous belts). The environmental framework will provide for the best opportunity in maximising the extent to which Brigalow is avoided.</p>
21	<p>Table 9.1 is a very useful summary of disturbance limits for listed threatened ecological communities. We require disturbance limits in this table to be completed.</p> <p>It would be useful to have a similar table for disturbance limits for listed threatened species and listed migratory species.</p>	<p>SREIS Attachment 1, Section 4.4 and Attachment 6</p>	<p>Disturbance limits have been derived as part of Arrow's offset strategy, which incorporates a landscape approach for determination of actual vegetation losses. SREIS Attachment 6, Draft Environmental Offsets Strategic Management Plan, presents the results of GIS analysis to facilitate identification of potential offset sites.</p> <p>The relationship between regional ecosystems and habitat for MNES is discussed in SREIS Attachment 1, Matters of National Environmental Significance, Section 4.4, as well as an estimate of the amount of each EPBC listed threatened ecological community and habitat present within the project development area. This information can then be tabulated as an estimate of the existing habitat present within the project development area for threatened species (and where possible, listed migratory species).</p>

Table 21.1 Response to SEWPaC submission (cont'd)

Issue No.	Issue	Reference	Response
21a	<p>The draft EIS states that ecological and preconstruction clearance surveys will be undertaken. We require more detail around when these surveys will be undertaken, proposed methodology and how these surveys will inform location of infrastructure to provide context around how these measures will successfully avoid and mitigate impacts.</p>	<p>EIS Attachment 3 and Attachment 5 SREIS Attachment 1, Appendix C and Attachment 2</p>	<p>Arrow has committed to conducting preconstruction clearance surveys prior to ground disturbance works commencing (Commitment C220). An outline of Arrow's management approach is presented SREIS Chapter 11, Terrestrial Ecology, Section 11.5. Field verification of vegetation communities and habitat features will be undertaken prior to preconstruction clearance surveys to determine the level of survey effort required, appropriate to each species (as outlined in species dossiers within SREIS, Attachment 1, Appendix C).</p> <p>Mitigation measures set out in EIS Attachment 3, Matters of National Environmental Significance, and EIS Attachment 5, draft Environmental Management Plan, have been further developed and informed by surveys undertaken for the SREIS. These documents are updated in SREIS Attachment 1, Matters of National Environmental Significance and SREIS Attachment 2, Strategic Environmental Management Plan, which provides an update to EIS Attachment 5, Environmental Management Plan.</p> <p>SREIS Attachment 2 identifies high level management controls for the project. These controls, and any additional site-specific controls, will be set out in the statutory information requirements to support the application for an environmental authority (EA) or an EA amendment, in accordance with EHP Guideline "Application requirements for petroleum activities". This will include site specific measures for management of MNES species and methods for translocation of MNES species, amendments to clearing plans (in terms of methods used and/or timeframes) and offsets. Management measures are dependent on what species or habitat is identified.</p> <p>SREIS Attachment 1, Matters of National Environmental Significance, Appendix C provides updated dossiers for MNES species and communities, and these dossiers contain specific management measures where applicable for each species.</p>
22	<p>Cumulative impacts should be identified and quantified in respect of each MNES. We note that quantification of cumulative impacts on MNES has been provided in previous coal seam gas assessments, and the Minister may consider information on cumulative impacts in making a decision on whether to approve the taking of the action under Part 9 of the EPBC Act.</p>	<p>EIS Attachment 3, Section 11 SREIS Attachment 1, Appendix C</p>	<p>EIS Attachment 3, Matters of National Environmental Significance, Section 11 described the cumulative impacts at a bioregional level and at a species level for MNES.</p> <p>SREIS Attachment 1, Matters of National Environmental Significance, Appendix C provides an estimate of the amount of each EPBC listed threatened ecological community and habitat present within the project development area. This information can be considered in light of the quantitative assessment conducted by other proponents, as a means for determining the potential cumulative impact.</p>

Table 21.2 Response to submissions on MNES by private submitters

Issue No.	Issue	Reference	Response
S145	Managing impacts to Great Barrier Reef and other MNES should be of primary importance to the Qld and Australian Government.	EIS Chapter 16, Section 16.6	<p>Arrow's Coal Seam Gas Water and Salt Management Strategy is provided in SREIS Attachment 5.</p> <p>The Great Barrier Reef Marine Park was described in EIS Appendix I, Surface Water Part B: Water Quality Impact Assessment as receiving water from less than 1% of a catchment within the project development area. Water from this catchment has to flow approximately 700 km before discharging to the sea. Due to the distance separating the Great Barrier Reef Marine Park and the project development area, the potential for impact from the project was discounted and was therefore not assessed in the EIS.</p> <p>EIS Chapter 16, Aquatic Ecology, Section 16.6 identifies a number of mitigation measures that Arrow will implement to protect water quality and prevent contamination entering watercourses. These include commitments to:</p> <ul style="list-style-type: none"> • Develop and implement emergency response and spill response procedures to reduce impacts that could occur as a result of releases of hazardous materials or loss of containment of storage equipment (Commitment C036). • Ensure appropriate spill response equipment, including containment and recovery equipment, is available on site, or can be mobilised to the impacted site within an acceptable response time and that relevant personnel are appropriately trained (Commitment C037). <p>Arrow will develop a strategy for the discharge of coal seam gas water to watercourses in accordance with relevant legislation. The strategy will incorporate a water quality monitoring program with locations upstream and downstream of the discharge point to inform site specific water quality objectives. A detailed environmental flows assessment informed by water quality monitoring data and an aquatic ecology monitoring program will inform the discharge strategy. Periodic inspections of the physical form and hydrology of the watercourse are to be incorporated in the strategy to monitor geomorphic performance (Commitment C498).</p> <p>The specific details of options for coal seam gas water disposal will be developed further through detailed engineering design. Chosen management options will be detailed in the coal seam gas water management plan required for the EA or EA amendment application. The management plan will include detailed coal seam gas water and brine impacts assessments and management strategies in accordance with the EHP Guideline "Application requirements for petroleum activities".</p>

Table 21.2 Response to submissions on MNES by private submitters (cont'd)

Issue No.	Issue	Reference	Response
S145	General concern regarding impacts on Wetlands of National Significance and the Great Barrier Reef Marine Park.	<p>EIS Chapter 16, sections 16.3.7 and 16.6.2</p> <p>SREIS Chapter 11, sections 10.3.2 and 10.4.5</p>	<p>Arrow recognises the need to protect environmentally sensitive areas (ESAs) and to identify and manage impacts on significant values of waterways in the project development areas. EIS Chapter 16, Aquatic Ecology, Section 16.3.7 identified these values, including the location of any relevant ESAs for aquatic ecology in the project development area. Arrow has committed to a range of measures to protect aquatic values, seeking as a first option to avoid impacts occurring.</p> <p>The primary means by which avoidance is achieved is through the design of the project and associated facilities and infrastructure and the selection of sites.</p> <p>The Great Barrier Reef Marine Park was described in EIS Appendix I, Surface Water Part B: Water Quality Impact Assessment as receiving water from less than 1% of a catchment within the project development area. The water which had to flow approximately 700 km before discharging to the sea. Due to the distance separating the Great Barrier Reef Marine Park and the project development area, the potential for impact from the project was discounted and was therefore not assessed in the EIS.</p> <p>As identified in SREIS Chapter 10, Aquatic Ecology, Section 16.6.2, Arrow will manage potential impacts on waterways through the commitment to implement a buffer zone from the high bank of all watercourses to prevent development or clearance occurring within the buffer (other than construction of watercourse crossings for roads and pipelines, discharge infrastructure and associated stream monitoring equipment). The buffer zone distance will be determined in accordance with the legislative requirements at the time of development or through preconstruction clearance surveys (Commitment C157).</p> <p>The SREIS Chapter 10, Aquatic Ecology, Section 10.3.2 describes the site-specific field surveys undertaken at the two proposed discharge locations for treated coal seam gas water, and Section 10.4.5 proposes additional mitigation measures to reduce the potential impacts to the identified waterways.</p>
S145	EIS does not adequately describe and assess impacts to the Great Barrier Reef that may result from the disposal of brine and treated coal seam water via an ocean outfall pipeline.	<p>EIS Chapter 5, Section 5.6.4</p> <p>SREIS Attachment 5</p>	<p>EIS Chapter 5, Project Description, Section 5.6.4 identifies the disposal of coal seam gas water to the sea via an ocean outfall pipeline as a feasible option undergoing evaluation as part of the detailed design of the gas field and production facilities. If the ocean outfall pipeline becomes the preferred option for coal seam gas water disposal, it will be assessed under a separate approval process.</p> <p>Further details of the coal seam gas water management are provided in SREIS Attachment 5, Coal Seam Gas Water and Salt Management Strategy.</p>

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