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22. PROJECT-WIDE CULTURAL HERITAGE IMPACTS AND MITIGATION MEASURES

This chapter describes the project-wide potential cultural heritage (archaeological and oral tradition) impacts associated with the construction and operation of the PNG LNG Project pipelines and facilities. Measures that will be implemented to mitigate these impacts and the predicted residual impacts are also described. Potential socio-cultural impacts, including impacts on cultural practices, are described in Chapter 23, Project-wide Socio-economic Impacts and Mitigation Measures. Project-wide impacts are summarised in Chapter 28, Environmental Impact Summary Table, and mitigation measures are summarised in Chapter 29, Summary of Mitigation and Management Commitments.

22.1 Impact Assessment Approach

The assessment of potential impacts on cultural heritage sites builds on and extends the work of previous petroleum industry environmental impact assessment surveys. The goal of the surveys has been to determine the location, extent and nature of cultural heritage sites within and near the footprints of project facilities and infrastructure, to assess their significance, to predict (given available knowledge) the scope for impact on each site in the event of the project proceeding, and to devise appropriate mitigation measures to manage potential impacts.

Cultural heritage includes sites with discrete locations (e.g., caves, burials, sacred stone sites, settlement sites and sacrifice sites) and sites comprising broader landscape features (e.g., sacred lakes, swamps and creeks; spirit sites; limestone outcrops; sacred groves; and plant harvest and hunting areas).

22.1.1 Assessment of Significance

Assessments of significance reflect different perspectives on the importance of individual sites, including:

- The 'internal' perspective of local communities, for whom recent burials and other oral tradition sites, together with sites that directly relate to their own immediate community history, are likely to be of greater significance than other sites.
- Several forms of 'external' perspective, reflecting the views and interests of the broader region, the State of Papua New Guinea, and international points of reference (the latter two, for example, likely to attribute greater significance to very early archaeological sites than the former).

Both views have been considered in significance assessments and their attributions of significance are cumulative; i.e., the low significance accorded to an important early archaeological site by the local community does not necessarily negate the high significance attached to the site by external perspectives. This becomes relevant where, for example, local landowners might consent to the destruction of an archaeological site, but where national interests might seek its preservation. Equally, a relatively recent ritual site identified as highly significant by the local community is treated as such, despite the fact that it may not be highly

significant in a national context; that is, local, regional, national and international levels of site significance do not form a hierarchy of value.

Cultural heritage significance is the value of cultural heritage sites to society (Appendix 26, Social Impact Assessment) and is assessed by assigning a relative value ranging from low to very high at the local, provincial or national level under five major criteria:

- Social and political significance – whether sites are important in maintaining a community's integrity and sense of belonging to a particular area as a cultural group.
- Scientific significance – a site's ability to provide data and insight to the history of cultural activities and/or environmental conditions.
- Historical significance – a site's level of association with important persons, events or themes.
- Educational and economic significance – whether sites can provide opportunities for people to visit, examine and gain an appreciation for the nature of these sites.
- Aesthetic significance – the visual appeal of the site.

22.1.2 Impact Matrix

The cultural heritage assessments conducted have predicted impacts via a matrix of valence (positive or negative), nature of impact (direct, indirect or cumulative), duration, extent, magnitude and likelihood as described in Chapter 28, Environmental Impact Summary Table. This chapter provides a discursive summary of these results for the PNG LNG Project while detailed site and site group impacts are presented in Chapter 28, Environmental Impact Summary Table.

22.2 Issues to be Addressed

22.2.1 Damage to or Destruction of Cultural Heritage Sites

Project development will potentially impact cultural heritage sites through direct ground disturbance during construction and where indirect disturbance occurs outside the project area from increased access by people and vehicles. Direct disturbance will occur in the areas within:

- The onshore and offshore pipeline footprint (as described in Section 3.4, Constructing the Onshore Pipelines).
- The footprint of the upstream temporary and permanent facilities (as described in Chapter 2, Producing the Gas, and Chapter 3, Transporting the Gas, and Chapter 5, Project Logistics).
- The footprint of the marine facilities (including the LNG Jetty and the Material Offloading Facility as described in Chapter 4, Producing and Exporting the LNG).
- The footprint of the onshore LNG Facilities site within the security fence boundary and the sections of the Lae Lae Road to be diverted around the facilities site (as described in Chapter 4, Producing and Exporting the LNG).

There is also potential for disturbance to sites located along project roads and access tracks as well as sections of public roads that will be upgraded by the proponent (as described in Chapter 5, Project Logistics).

Sites have the potential to be damaged or destroyed, as follows:

- Within the direct disturbance areas due to on-ground works (e.g., levelling ground, excavating trenches, etc.) and construction of marine facilities in Caution Bay.
- Within the direct disturbance areas due to movements of people and vehicles (e.g., erosion, removal of artefacts, etc.).
- Outside the direct disturbance areas due to the associated increase in person and vehicle traffic.

22.2.2 Disconnection of Communities from Cultural Heritage Sites and Loss of Sites from Oral Tradition

There is potential for the loss of story sites to disconnect communities from a part of their oral tradition. Such activities include:

- Direct disturbance where sites are damaged or destroyed, which has the potential to result in the permanent loss of the cultural heritage, and social or religious practices associated with the site.
- Restriction of access to sites (including the marine exclusion zone of approximately 180 ha).
- Visual modification to the land such that some sites may disappear from living memory and, hence, from the oral tradition.
- Disturbance to ecosystems through impacts on landform and soils, water resources and hydrology, and biodiversity, which have the potential to affect the utility of cultural heritage sites (particularly economic sites, which can be directly affected by impacts on ecosystems and indirectly affected by impacts on spirit sites believed to be connected to success in hunting). Potential ecosystem impacts are described in Chapter 18, Environmental Impacts and Mitigation Measures: Upstream Facilities and Onshore Pipelines.

22.3 Mitigation and Management Measures

Mitigation and management measures are derived from the recommendations made in the cultural heritage specialist reports, which are compiled in Chapter 4 of Appendix 26, Social Impact Assessment. The project-wide cultural heritage management plan will be developed as part of the project construction environmental management plan (see Chapter 30, Environmental Management, Monitoring and Reporting). The cultural heritage management plan will meet all applicable environmental laws and regulations and apply appropriate standards where laws or regulations do not exist.

The main elements in the cultural heritage management plan, to protect or salvage the hundreds of known cultural heritage sites and to identify and develop appropriate mitigation and management measures for the sites yet to be discovered, are presented below. All the cultural heritage mitigation and management measures, including those for individual or groups of sites are provided in Chapter 29, Summary of Mitigation and Management Commitments. The construction environmental management plans will include these measures and tactical routing to avoid cultural heritage sites will be conducted as part of the preconstruction surveys.

22.3.1 Damage to or Loss of Cultural Heritage Sites

22.3.1.1 Site Recording and Mapping

Systematic documentation and mapping of sites within the areas of disturbance will be conducted as part of preconstruction surveys (see Section 2.4, Common Construction Activities) where:

- Infill surveys are required to clarify recorded site locations or to complete surveys in areas where access was previously hindered (for example by unexploded ordnance or tribal disputes).
- The definition of the locations of some minor permanent facilities and temporary facilities (e.g., campsites, helipads, rig sites and well heads, access roads, equipment and materials storage sites) are confirmed as the project advances through FEED and detailed design.
- Further research of appropriate archives (e.g., PNG National Museum and Art Gallery, Australian War Memorial, National Library (Canberra), Office of Australian War Graves) is required to ascertain the existence or location of historic sites.

22.3.1.2 Management Programs

The cultural heritage management plan will make provision for:

- Management of cultural heritage sites within the area of disturbance of the project, and the documentation and storage of salvaged materials.
- Management of sites in the vicinity of, but outside, the area of disturbance of the project that may be indirectly impacted by project activities or by the activities of others.

Measures will include procedures to increase cultural awareness and set standards of behaviour for project personnel to prevent illegal acquisition, misuse and export of cultural heritage materials.

22.3.1.3 Stakeholder Consultation

The consultation activities to be set out in the plan will include the following:

- Cultural heritage specialists will involve local communities in the protection and salvage of sites. Consideration will also be given to the cultural heritage recommendations to involve communities in the cultural awareness activities.
- Consultation with the PNG National Museum and Art Gallery and cultural heritage specialists (including archaeologists).

22.3.1.4 Salvage of Cultural Heritage Materials

The project aims to avoid cultural heritage sites (and, through appropriate planning and design, has largely been able to avoid what appear to be the more important sites), but the disturbance to some sites within the project footprint will be unavoidable (and new sites may be discovered during preconstruction surveys). These will be selectively salvaged and recorded, which could involve the following:

- Engagement of cultural heritage specialists (including archaeologists) with appropriate qualifications or suitable training to coordinate survey and salvage activities in consultation with the PNG National Museum and Art Gallery as required.
- Relocation of burials and other locally important materials, according to local customs, using a method that is agreed to by local communities, with the communities undertaking the relocation work where appropriate.
- Development of a protocol describing the method for relocating and/or salvaging materials from burials that are discovered during construction, which will be developed in consultation with and approved by the PNG National Museum and Art Gallery and the consent of affected communities.

Protocols and methods for salvage will be set out in the cultural heritage management plan.

22.3.1.5 Avoidance of Highly Significant Sites

A number of sites have been identified as highly significant and will be avoided during construction of pipelines and project facilities (see Section 22.3.3, Site Specific Mitigation and Management Measures). The details of sites to be avoided will be documented in the cultural heritage management plan for implementation during final design and construction.

22.3.1.6 Monitoring of Early Works and Construction Activities

A cultural heritage monitoring program will be developed during FEED and detailed design and implemented during construction activities that will include:

- Engagement of cultural heritage specialists (including archaeologists) to monitor construction activities, to oversee appropriate treatment of any sites not yet identified that are discovered during construction works.
- Periodic monitoring of cultural sites during construction within the vicinity of pipelines and facilities to ensure sites outside the area of disturbance are not being indirectly disturbed by project personnel.
- Monitoring during offshore dredging for the presence of submerged prehistoric and post-colonial artefacts.
- Consultation with the PNG National Museum and Art Gallery on the implementation of the agreed protocols during construction activities.

22.3.2 Disconnection of Communities from Cultural Heritage Sites and Loss of Sites from Oral Tradition

The mitigation and management measures described above, particularly the involvement of local communities and the documentation and salvage of cultural heritage materials, will assist in recording stories for the future reference of the communities concerned.

22.3.3 Site Specific Mitigation and Management Measures

The mitigation and management measures for cultural heritage sites identified to date (and for those that may yet be identified) have been classed under the main management methods

described in Sections 22.3.1, Damage to or Loss of Cultural Heritage Sites, and 22.3.2, Disconnection of Communities from Cultural Heritage sites and Loss of Sites from Oral Tradition, and are listed in Table 22.1 (for the upstream area of disturbance) and Table 22.2 (for sites within the LNG Facilities site and marine facilities areas of disturbance). All sites listed in the table are detailed in Appendix 26, Social Impact Assessment and are also captured in the project geographic information system that will be used to develop site-specific management measures in the cultural heritage management plan. Tables 22.1 and 22.2 also present the mitigation management measures numbers for the corresponding mitigation and management measures detailed in Chapter 29, Summary of Mitigation and Management Commitments.

Table 22.1 Upstream mitigation measures for cultural heritage sites

Mitigation Measures	Relevant Sites*				Corresponding Chapter 29 Commitment
	Juha to Hides	Hides to Kutubu	Kutubu to Kaiam	Kaiam to Goaribari Island	
Site recording and mapping	All indicative sites and all sites discovered during preconstruction surveys in the Juha–Hides pipelines corridor.	All indicative sites and all sites discovered during preconstruction surveys at Hides Ridge, Hides Gas Conditioning Plant (including sites adjacent to the Hides access road), Angore ROW, Angore gas field and Benaria River valley (including ridge top, western slopes and east bank), and all cave and rock shelter sites. Sites HK10, HK11, HK18, HK28, HK34, HK41, HK43, HK44, HK50, HK56, HK72, HK76, HK87, HK88, HK97, HK109, HK112, HK121, HK128, HK132, HK166, HK167, HK168, HK170, HK180, HK209, HK215, HK233 [†] .	All sites discovered during preconstruction surveys (with interviews and site surveys to be conducted between Moro and Manu villages, and from there through Tamadigi to Kantobo and across Mubi River into Gobe plains).	All indicative sites, all limestone outcrops, all sites in the vicinity of the Kopi Shore Base, all sites discovered during preconstruction surveys of the Kopi Bypass survey corridor (including sites KG7, KG9, KG160, KG161, KG162, KG163, KG164, KG165, KG166, KG167, KG168, KG169, KG170, KG171, KG173, KG174, KG175, KG176, KG177, KG178 and KG179).	M224, M225, M229, M240 and M262.
Management programs	All sites within the area of disturbance of the pipelines and facilities, and sites in the vicinity of the disturbance area that are associated with impacted sites or have the potential to be impacted due to their proximity to project activities.				M227, M230, M232, M234, M235, M241 and M260.
Stakeholder consultation	All sites that will be damaged or destroyed by development of pipelines and facilities, particularly burial sites.				M226, M228, M234 and M237.
Salvage of cultural heritage materials	All significant sites that will not be avoided and may be damaged or destroyed by development of pipelines and facilities.				M231 and M232.

Table 22.1 Upstream mitigation measures for cultural heritage sites (cont'd)

Mitigation Measures	Relevant Sites*				Corresponding Chapter 29 Commitment
	Juha to Hides	Hides to Kutubu	Kutubu to Kaiam	Kaiam to Goaribari Island	
Avoidance of highly significant sites	No specific sites.	Sites HD009, HD010, HD011, HD012, HD016, HD017, HD018, HD037, HD109, HD117, HD209, HD211 and HD225. The site complex in the vicinity of Hides Wellpad A and sites HK6, HK37, HK41, HK159, HK177, HK205, HK236 [†] (these sites to be documented and avoided where possible). All sites in the area of the Honeanda site complex. Sites in the area of the Benaria River valley.	Sites LK041, LK042 and LK043.	Sites KG1, KG2, KG3, KG4, KG5, KG6, KG7, KG10, KG11, KG13, KG14, KG15, KG19, KG20, KG21, KG22, KG23, KG24, KG26, KG27, KG29, KG30, KG33, KG37, KG42, KG77, KG93, KG94, KG95, KG96, KG110, KG113, KG114, KG115, KG122, KG125, KG134, KG135, KG139, KG140, KG141, KG142 and KG143. All sites in the area of the Mount Ru site complex at Kopi. All highly significant sites requiring avoidance that are recorded in the Kopi bypass survey corridor during preconstruction surveys (including KG162).	M233 and M261.
Monitoring of early works and construction activities	All sites that will be damaged or destroyed by development of pipelines and facilities, and all sites that may be impacted due to their proximity to pipelines and facilities.				M236, M238 and M239.

*Sites are recorded in the PNG National Museum and Art Gallery's site register with short, abbreviated acronyms. The co-ordinates and a brief description of the relevant sites in the table can be found in Chapter 4 of Appendix 26, Social Impact Assessment.

† Sites with the prefix 'HK' that have been recommended for site recording/mapping and avoidance have been listed based on preliminary recommendations from a draft Komo survey report.

Table 22.2 LNG and marine facilities mitigation measures for cultural heritage sites

Mitigation Measures	Relevant Sites*		Corresponding Chapter 29 Commitment
	Marine Facilities	LNG Facilities site	
Site recording and mapping [†]	Sites CB3, CB4, CB23, CB24 CB16, CB17, CB18, ID10 (CB6, CB8, CB9, CB13, CB14, CB15, CB16, CB20, CB21) [§]	Sites CB30, B10, CB11, CB12, ARD, ARG, ARH, ARI, ARJ, ARM, AAIP, AAIO	M242, M243, M246, M247 and M256.
Management programs	All sites within and in the vicinity of the area of disturbance of pipelines and facilities.		M244, M257, M258 and M259.
Stakeholder consultation	All sites that will be damaged or destroyed by development of pipelines and facilities.		M242, M243, M246, M254 and M255.
Salvage of cultural heritage materials	No sites were discovered in the area of disturbance. (See 'Monitoring of Construction activities' below.)	Sites CB1, JD1, JD2, JD3, JD5, ML3, SC3, SC1, ARD, ARG, ARH, ARI, ARJ, ARM, AAHM, AAHN, AAHO, AAHP, AAHR, AAHS, AAHU, AAHV, AAHX, AAIB, AAIC, AAIG, AAIJ, AAIM, AAIO, AAIR, AAIT, AAIU, ML4, ML5, ML6, ML7, ML9, ML15, ML16, JD6, JD17	M252 and M254.
Avoidance of highly significant sites	Sites SC4, CB16, CB17, CB18	Sites CB1, JD1, JD2, JD3, JD5, ML3, AFA, AMG, AMH, AMI, ANA, ANU, CB21, CB30, B10, CB11, CB12, CB6, CB7, CB8, ASM	M245, M248, M249, M250, M251, M253 and M258.
Monitoring of construction activities	Review of marine survey engineering (side scan) data and monitoring of dredging and construction works will be undertaken. Any credible anomalies will be reviewed, investigated and managed as appropriate.	Sites SC1, SC3, SC4, SC5	M243.

* Sites are recorded in the PNG National Museum and Art Gallery's site register with short, abbreviated acronyms. The co-ordinates of the relevant sites in the table can be found in Chapter 4 of Appendix 26, Social Impact Assessment.

† Many sites were recorded through interviews with locals without the exact location being obtained, therefore recording and mapping is required to confirm site locations prior to commencement of project activities in those areas.

§ These sites are located outside the area of disturbance along the coast of Caution Bay and within Caution Bay itself. Section 21.2, Physical Coastal Processes and Sediment Transport describes the effect of hydrodynamic processes resulting from the construction of the LNG Jetty and Materials Offloading Facility as being primarily sediment deposition.

22.4 Residual Impacts

The avoidance of sites of high past and contemporary significance has been planned by an iterative exchange of project planning and engineering information and the cultural heritage results from all the field surveys and interviews conducted between 2005 and 2008. This has enabled project engineers to take timely account of cultural heritage constraints when routing pipelines and determining facility locations. This process of iteration between the social, cultural, environmental and engineering design disciplines of the project will continue through FEED and into detailed design with a focus on the avoidance of sites where practicable.

The main actions arising from this process to date have been as follows:

- The 2005 archaeological surveys between Hides and Kutubu yielded the recommendation that the ROW be re-routed to avoid the largely intact and significant Honeanda site complex between Homa and Paua (see Figure 14.4). In consideration of these and engineering and environmental factors, the alignment has since been re-routed to pass 1 km south of the complex (see also Figure 6.6 and Section 6.4.3.1, Segment 5: Hides Gas Conditioning Plant to Benaria River).
- Targeted salvage of archaeological sites was undertaken following cultural heritage surveys between Kaiam and Goaribari Island in 2006. Cultural constraints have also been identified for the project as shown by the 'sacred site area' on Figure 5.3 (see also 'Modifications to Kopi Shore Base' in Section 5.2.1.2, Kopi Shore Base), which will be avoided during construction.
- At Caution Bay, the landfall of the LNG Project Gas Pipeline was influenced by the requirement to avoid the Aemakara site located south of the LNG Facilities site (see Figure 16.1). In consideration of the site and other engineering and environmental factors, the landfall is currently located approximately 3 km north of Aemakara.

Despite avoiding the known highly significant sites, some other sites will be unavoidably damaged or destroyed. These sites will be identified before construction and managed in accordance with the relevant laws and guidelines. In these instances, disturbance will be limited to sites that cannot be avoided and disturbance will be considered in consultation with all stakeholders.

Avoidance of sites and implementation of the mitigation measures of the cultural heritage management plan are expected to lower the scale and magnitude of the residual impacts to the following:

- Destruction of sites with low significance (with consent from landowners following documentation and salvage).
- Modification of some sites with high significance (following documentation and salvage).
- Potential for increased risk of disturbance to sites with high significance that have been flagged for avoidance (due to improved access for locals and non-project personnel to the sites).

Residual cultural heritage impacts will be both positive (as documentation and salvage of sites will preserve information that may otherwise have been lost over time) and negative (through damage or loss of sites).

In circumstances where salvage is required, the conversion of sites from in situ-physical features, sometimes associated with oral traditions, into records and artefacts, may disconnect people from some of their oral traditions and change how local culture develops in the future.

The project will also examine other initiatives to support cultural heritage through broader community benefits that will be implemented via the project's National Content Plan (see Section 23.6.4.3, Other Benefits). Additional discussion of cumulative impacts on cultural heritage values is given in Section 24.4.2, Habitat and Biodiversity Impacts of Squatting.

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