

14. CULTURAL HERITAGE ENVIRONMENT: UPSTREAM FACILITIES AND PIPELINES

14.1 Introduction

This chapter summarises the existing cultural heritage environment of the proposed onshore PNG LNG Project pipelines and upstream facilities. It has been based on specialist studies presented in Appendix 26, Social Impact Assessment.

14.2 Investigations

Characterisation of existing cultural heritage (archaeological and oral tradition) sites began in 2005 during investigations for the PNG Gas Project (Enesar, 2005). Figure 14.1 shows the extent to which the areas surveyed at that time cover the proposed PNG LNG Project area and the areas of subsequent infill survey in 2008.

The cultural heritage team reviewed published archaeological, oral tradition, social and anthropological literature, relevant national and international legislation, protocols, and guidelines.

Field surveys were conducted within the framework of PNG legislation and the Equator Principles (EPFI, 2006). Knowledge of cultural practices and historical trends and events for the region has been acquired from oral traditions, early colonial (generally European) and anthropological observations, artefacts held by the PNG National Museum and Art Gallery and other sources, and archaeological evidence (Table 14.1).

Table 14.1 Scope of assessment conducted for the upstream cultural heritage characterisation from 2005 to 2008

Survey Area	Year	Study Methods Used				
		Desktop Review	Predictive Modelling	Interviews	Flyover	Ground Survey
<i>Juha to Hides</i>						
Juha gas field	2008	✓	✓	✓	✓	–
Juha Production Facility	2008	✓	✓	✓	✓	–
Juha–Hides pipelines corridor	2008	✓	✓	✓	✓	–
<i>Hides to Kutubu</i>						
Hides–Baguale pipeline ¹	2005	✓	✓	✓	✓	✓
Hides Ridge pipeline corridor ¹	2008	✓	✓	✓	–	–
Hides Gas Conditioning Plant site ¹ (and alternative site)	2008	✓	✓	✓	–	✓
Hides–Komo access road ²	2008	✓	✓	✓	–	✓
Komo airstrip (and alternative) ²	2008	✓	✓	✓	–	✓
Angore gas field	2008	✓	✓	✓	–	–

Table 14.1 Scope of assessment conducted for the upstream cultural heritage characterisation from 2005 to 2008 (cont'd)

Survey Area	Year	Study Methods Used				
		Desktop Review	Predictive Modelling	Interviews	Flyover	Ground Survey
<i>Hides to Kutubu (cont'd)</i>						
Angore ROW ¹	2008	✓	✓	✓	–	–
Option B Homa–Idauwi pipeline deviation ¹	2008	✓	✓	✓	–	✓
Wage Creek pipeline deviation ¹	2008	✓	✓	✓	–	–
<i>Kutubu to Kaia</i>						
Kutubu–Kaia pipeline	2005	✓	✓	✓	–	✓
<i>Kaia to Goaribari Island</i>						
Kopi–Goaribari Island pipeline	2005	✓	✓	✓	–	✓
Kopi Bypass (and alternative)	2008	✓	✓	✓	–	✓

¹The 2005 study of Hides–Baguale pipeline recorded some sites in the areas of the 2008 studies of Hides Ridge pipeline corridor, Hides Gas Conditioning Plant site, Angore ROW, Option B Homa–Idauwi pipeline deviation and Wage Creek pipeline deviation.

²The 2008 study of the Hides–Komo access road and Komo airstrip (and alternative airstrip) had not been formally reported at the time of publication of the PNG LNG Project EIS (this document). The information provided about the Komo study in this document is sourced from preliminary documentation (Muke, pers. com., 2008).

14.3 Cultural and Historical Context

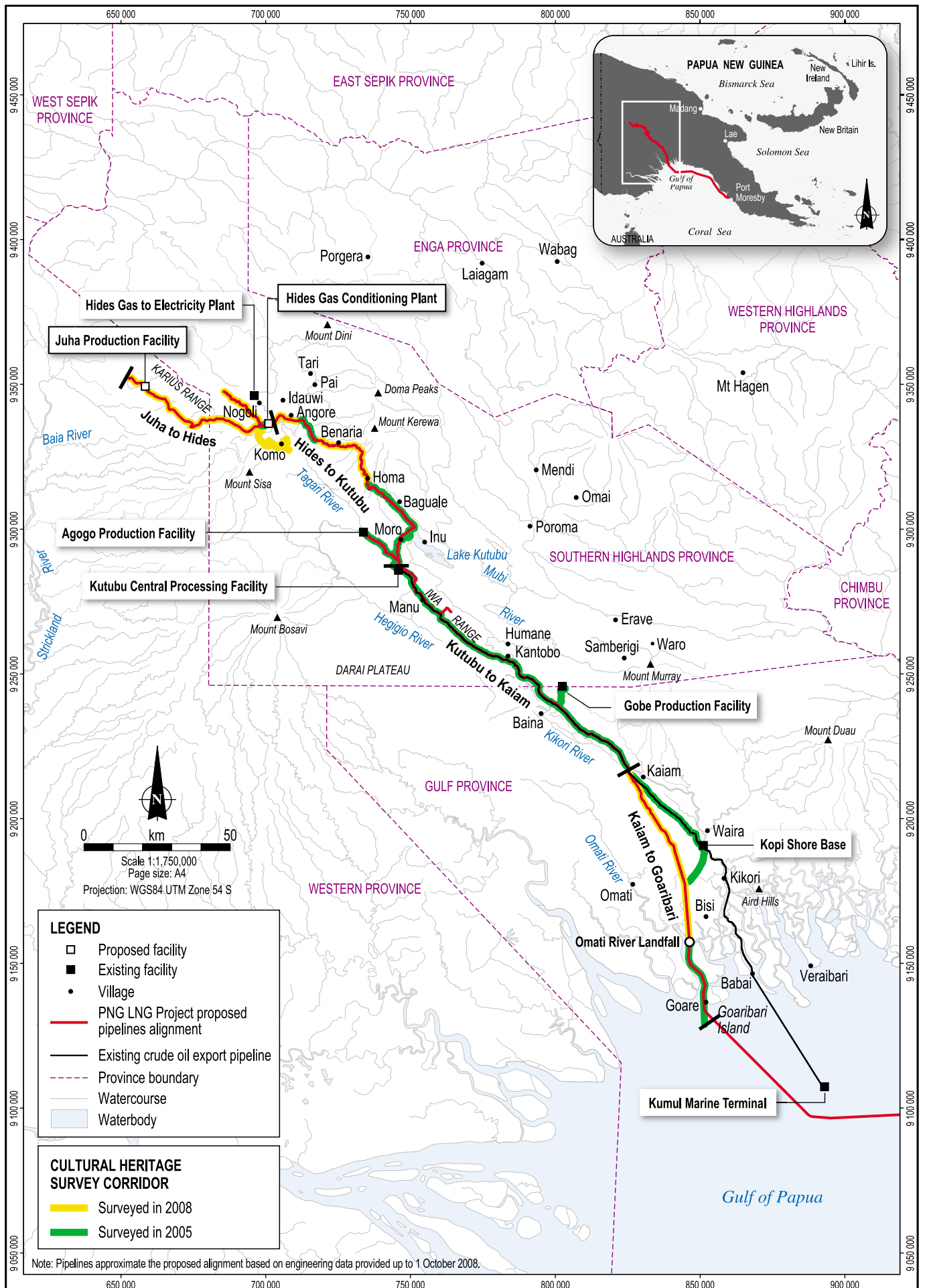
This section briefly describes the cultural and historical context of the upstream area of the project. The site descriptions given in Section 14.4, Important Cultural Heritage Areas, draw on this information to the more important sites in context.

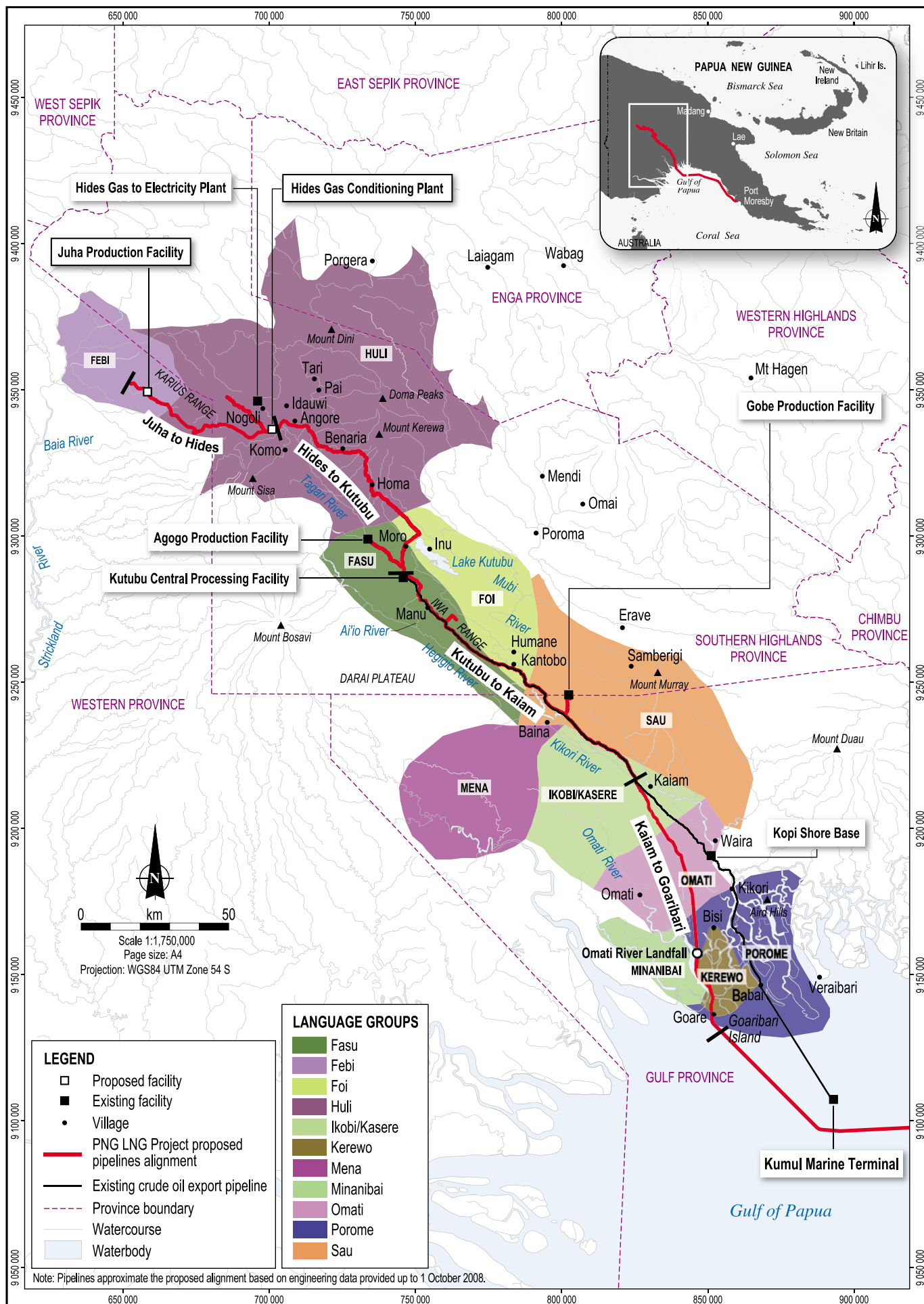
14.3.1 Juha to Hides

A number of clans, collectively known as Febi, occupy relatively exclusive and well-defined territories adjacent to the Baia River (Figure 14.2).

The Febi clan known as Wuoi has mainly settled land below 800 m ASL on the slopes of Gowuo Ridge and along the Mosu River and tributaries. Wuoi ossuaries are generally located relatively close to the main settlements.

The Wuoi landscape is divided into three land-use zones. The upper zone above 800 m ASL is primarily used for hunting, with some gardening; the middle and most important zone is the zone of the village of Siabi and cultivation along the Mosu River; and the zone below 400 m ASL is also used for hunting and gardening.





The Febi clan of Kori historically settled both sides of the Osio River and the settlement is marked by old gardens and banana, bamboo and other useful tree species. All former settlement sites are located south of the proposed LNG Project Gas Pipeline. The main area of old Kori settlement coincides with the location of most of the important *masalai* (spirits) and origin sites. Areas north of the main Osio River valley are used for hunting and gathering. The largest class of oral tradition sites is associated with these *masalai*, which can be split into major spiritual and ritual sites (associated with major figures and events), and minor sites (associated with specific locations within the landscape). Kori clans traditionally used a number of ossuaries within and around the proposed pipelines corridor, which other clans also used.

Huli clans occupy and are the traditional landholding groups along the eastern end of the Juha–Hides pipelines corridor (primarily areas east of the Baia River). However, several Huli clans may have overlapping knowledge of and associations with places along or west of the Baia River.

14.3.2 Hides to Kutubu

The proposed pipelines corridor between Hides and Kutubu covers territories owned mostly by the Huli (see Figure 14.2). The Huli are distinguished from their central highlands cousins in Enga, Hagen, Wahgi and Chimbu by their kinship systems, land tenure systems and leadership structure.

Oral tradition sites of increasing levels of significance are associated with correspondingly larger social units (from families to sub-clans and finally clans) among the Huli. The smaller ritual sites usually service the relationship of individual lineages and sub-clans with their human ancestors. However, the largest ritual centres, at which sacrifices were formerly performed for earth spirits, functioned for all Huli people (who now number approximately 130,000 (Appendix 26, Social Impact Assessment)). It was believed that only regular sacrifice at these sites could guarantee the fertility of the land and of the people. Other oral tradition sites include sacred lakes, initiation centres, ceremonial performance locations, ancestral settlements and agricultural ditches.

Ownership and rights to the resources of Hides Ridge are an extension of the clan territories from the valley floors to the mountain-tops. Ownership is also defined in terms of a wider reference to ancestors and spirits: the modified world is the landscape that has been created by the ancestors, while the rest of the landscape is owned by earth spirits. The areas close to settlement sites are those owned by ancestral spirits associated with human beings, whereas remote areas, such as the high mountains and uninhabited forests, are associated with non-human earth spirits. Regular visits and sacrifices were historically made at both ancestral and earth spirit sites.

The Hides gas field is located 2,000 m ASL in an almost inaccessible mountainous region, characterised by karst landscape with an extensive network of sinkholes. The proposed Hides Ridge Spine ROW will run along Hides Ridge to the Hides Gas Conditioning Plant. Permanent settlement sites are not expected in elevated areas, but ritual sites linked to earth spirits and economic sites associated with seasonal pandanus harvests are likely.

The discovery of a number of large core tools in the Tari region (north of the Angore ROW) and now in the Hides–Komo area suggests late Pleistocene or early Holocene human occupation.

14.3.3 Kutubu to Kaiam

The Kutubu–Kaiam section of the proposed pipeline corridor has been divided into two broadly distinct regions: the Kutubu region, which is settled largely by communities speaking either Foi or Fasu languages; and the Middle Kikori region, which is settled by people speaking the Ikobi or Kasere languages (see Figure 14.2)¹. There are no firm dates for the antiquity of human settlement in the Lake Kutubu area, but a human presence dating back at least 26,000 years (when the central highlands were first occupied) can be assumed from linguistic reconstruction of movements and of relationships between groups.

Information about the culture, history and languages of the Middle Kikori region is ambiguous. However, the Baina people straddle the route between the coast and both the Lower Foi and the Fasu communities and have long been intermediaries in the trade between the Gulf and the central highlands.

This report divides the areas along the pipeline corridor from Kutubu to Kaiam to reflect the different environmental conditions and cultural practices of Lake Kutubu, Foi–Fasu, and Gobe. At the same time, the evidence of many of the sites and artifacts is that the peoples are interrelated.

14.3.3.1 Lake Kutubu

This area consists of the lake, islands and immediate lakeshore environs of Lake Kutubu. Although it appears that most of the lake may originally have been occupied and used by Foi-speaking communities, many of the settlements on the northern and western margins of the lake are now predominantly Fasu-speaking (and Yo'obo elders recall stories of their Fasu ancestors first arriving at the lake and learning to use canoes from the Foi).

The Lake Kutubu area has previously yielded sporadic finds of prehistoric artefacts, such as stone mortars, pestles and clubheads collected in the late 1930s, and caving enthusiasts have produced reports of the rock art and burial sites around the lake. The first archaeological surveys were conducted in the late 1980s and early 1990s, identifying the rock art and burial sites and locating a few caves and surface finds of flaked stone material exposed by road-building. The most common sites in the Lake Kutubu area are secondary or post-decomposition burials of skeletons in caves or niches, or on rock ledges.

14.3.3.2 Foi–Fasu

Fasu settlements are concentrated in three areas of relatively open terrain: the Waro Valley, the Kaipu-Sisibia area, and the northern and western margins of Lake Kutubu. Foi settlements are also focused on three areas: the southern and eastern margins of Lake Kutubu; the upper Mubi River valley around Hegeso; and the lower Mubi River valley around Kantobo.

¹ Figure 14.2 shows part of the Kutubu–Kaiam section of the proposed pipeline corridor as traversing the Sau language group. The cultural heritage reports, based on surveys and interviews, did not identify local groups as belonging to the Sau; however, that is not to say that the locals interviewed do not identify with the Sau language group. They may have not made it clear or it is possible that they identified more strongly with a bordering language group. It is worth noting that the sharpness of the boundary between language groups is not reflected on the ground and many individuals are bilingual.

14.3.3.3 Gobe

The Gobe area consists of low-lying Middle Kikori valley below the Mubi Junction, and its surrounding slopes. Thick forest covers the entire area except for the village of Baina and the airstrip at Gobe. Baina people have historically generated their own items to trade, in the form of flaked chert from nodules in stream beds to the west of Baina village. These items were then traded both down to the coast and up as far as Lake Kutubu.

14.3.4 Kaiam to Goaribari Island

The pipeline corridor from Kaiam to the Omati River and out to sea past Goaribari Island will potentially cross six cultural groups as follows:

- Kikori Kaiam clans (from Kaiam village).
- Omati Kaiam clans (to the west of Kaiam village).
- Kikori Rumu clans (from Kopi village).
- Omati Rumu clans (to the west of Kopi village).
- Kibiri clans (from Kikori Station and villages around Veiru Creek).
- Kerewo clans (small villages from the southern reaches of the Kikori River).
- Oumo-uki and Mehe clans (from Ogomabu village).

Many clans are composed of sub-clans led by recognised landowners, who are able to identify oral tradition sites. There is no consensus about where or when the gulf populations actually arrived, but oral history and village migration patterns suggest a gradual movement from inland north and northwestern communities southwards along the major rivers (the Newberry, Omati and Kikori).

The peoples between Kaiam and Goaribari Island corridor today live in more or less permanent settlements that were generally established along major waterways during the last century.

Sacred sites are located both on the land and in the water. Beliefs about such sites centre on the importance of ancestral spirits to the past and contemporary wellbeing of the gulf people and of the places that house them. Oral tradition sites are created and used in very particular social and cultural contexts that have, at their core, a cosmological interpretation of how the world works. It is believed that places, like human life itself, have been invested with moral charters by ancestral and other spirit forms; and through their purposeful actions, people are conceived as agents of the world's sacred fecundity. Purposeful actions include specific rituals in particular locations that are believed to enable people to communicate with the 'spirit world', maintain the world's order as it is ordained by the sacred charters, and ensure its earthly workings.

Cultural heritage sites within the pipeline corridor may include:

- Historic village sites.
- Hunting campsites and rock shelters.
- Ossuaries.
- Rock art sites.

A number of these sites were recorded in close proximity to the pipeline corridor during the specialist studies for the PNG Gas Project EIS and subsequently during the surveys of the Kopi Bypass.

14.4 Important Cultural Heritage Sites

Cultural heritage sites include 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).

Most cultural heritage sites were able to be geo-referenced by GPS, with exceptions shown as 'indicative'.

Any indicative site locations that may potentially be disturbed during construction will be geo-referenced before construction starts (see Chapter 22, Project-wide Cultural Heritage Impacts and Mitigation Measures) once access to these sites can be safely obtained.

14.4.1 Juha to Hides

The two important cultural heritage site classes between Juha and Hides are oral tradition sites of contemporary cultural importance or knowledge (i.e., places with particular social and cultural importance to people) and archaeological sites of potential national importance, which predate local oral memory.

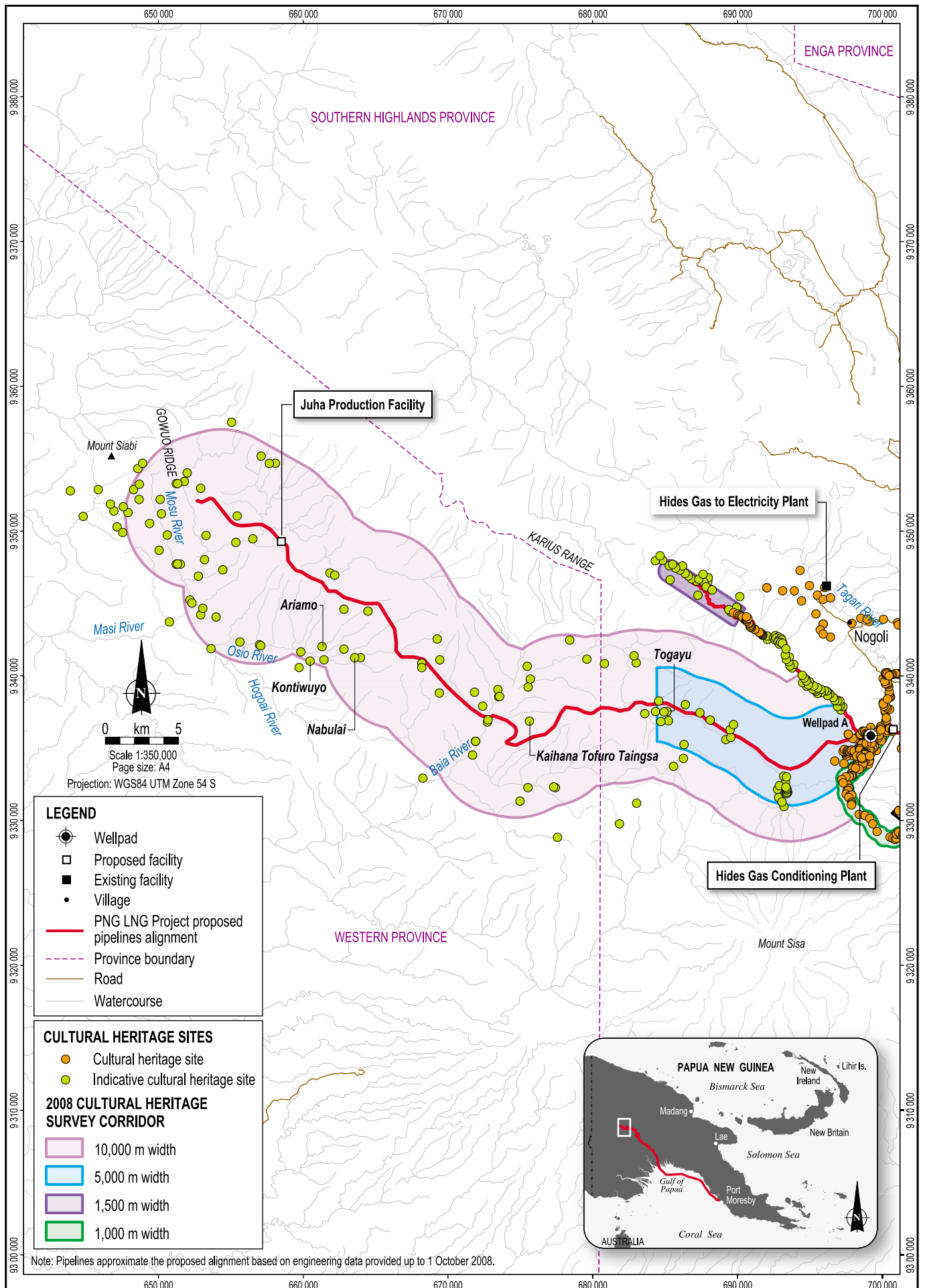
In total, 127 cultural heritage sites of varying importance were identified coincident with the proposed Juha–Hides pipelines survey corridor. The original survey covered a 10-km-wide corridor. However, local clan disputes initially restricted access. Once the situation had calmed down, a subsequent survey was able to be made over a 5-km-wide corridor from Hides Wellpad A to a point 16 km to the west as shown in Figure 14.3. Most cultural heritage sites along this part of the corridor are located in the Osio River valley and include:

- A major Kori origin story site (Kontiwuyo) and associated *masalai* site, approximately 8 km south of the proposed Juha Production Facility.
- A major Bebe-mbele (a Huli sub-clan) ritual site (Be-bepalipuni) and an origin story site (Nabulai, 9.5 km southeast of the Juha Production Facility).
- A major origin site (Ariamo), approximately 8 km southeast of the Juha Production Facility, for the Porali and Pela clans (both sub-clans of the Huli).

14.4.1.1 Febi Clan Sites

The largest class of Febi cultural heritage sites comprises mainly *masalai* (spirit) sites. There are also ossuaries located 3 km and 9 km west of the proposed Juha Production Facility (in relatively inaccessible places at the base and in the middle of cliffs). Ossuaries are not ordinarily used at present for secondary burial as Christian burial practices have been widely adopted.

Cultural heritage sites of ongoing importance to clans who are landowners or claim an association with places within the project area include:



- Two Kori sinkhole sites; one which has a resident *masalai* and the other is used to hunt flying foxes. Both are considered of moderate to high importance by the clan.
- Two Kori caves with associated stories. Neither cave was located during field surveys.
- Two ossuaries of high importance to both the Febi (Kori) and Tsiani clans located in cliff faces less than 1 km from the proposed pipeline alignment.
- A Sabalimatie Tsiani clan cave of high importance to the clan that is both a story site and a hunting shelter.
- A *masalai* site in the Baia River consisting of a natural stone bridge of high importance to the Sabalimatie Tsiani and Kori clans.

14.4.1.2 Tsiani Clan Sites

Although the Tsiani clan is closely aligned with the Kori, the geographical focus of sites is eastward of Kori clan sites and is primarily located along the Baia River and its tributaries. Six classes of cultural heritage sites are present:

- *Masalai* sites.
- Ossuaries.
- Caves used as shelters and temporary encampments.
- Sinkholes or caves with flying fox populations.
- Ponds and lakes.
- Old village sites.

14.4.1.3 Huli Clan Sites

Huli cultural heritage sites are grouped into four main categories:

- Sacred sites.
- Ceremonial sites.
- Settlement sites.
- Economic sites.

Cultural heritage sites of importance to Huli clans exist in the Osio River valley, which is also of major importance to several Febi and Tsiani clans. The major Huli origin and ritual site, Be-bepalipuni, has been located at a 'bridge' over the Baia River.

Parts of the landscape along the proposed pipeline corridor, where sites clustered, were also identified as important to various clans: the upland area opposite Siabi contained Febi sites associated with the clans' origins, a spiritual figure and recently performed rituals; and the middle-upper reaches of the Osio River valley contained cultural heritage sites for several different clans and the Baia River area, including the the Tsiani clan's Kahaina Tofuro Taingsa site east of the Baia River (approximately 1 km from the pipeline).

14.4.2 Hides to Kutubu

14.4.2.1 Hides and Komo Sites

Nearly half of the 110 cultural heritage sites recorded on Hides Ridge by the 2008, 2006 and 2005 surveys (Figure 14.4) were economic sites for pandanus nut harvesting and possum trapping. The second most prevalent were sacred sites, followed by ceremonial and temporary camp sites. Potential archaeological sites reported include a few rock shelters and caves.

The proposed Hides Gas Conditioning Plant is situated on a mid-ridge, forested area, with a single clan, Takuli, claiming ownership. The survey of the Hides Gas Conditioning Plant site (which also covered an alternative location) identified 232 cultural heritage sites (Figure 14.5). A waisted blade stone artefact of the late Pleistocene or early Holocene age was recovered from a fireplace, but its provenance within the area is unknown.

A total of 236 cultural heritage sites were identified along the access road from Hides to Komo and in the vicinity of the proposed Komo airstrip (and alternative airstrip) (see Figure 14.4). Most are modern burials, with most of the others being settlement and ceremonial sites. Also recorded were relatively important sacrificial, sacred stone and sacred lake sites. None of the individual sites recorded during the Komo survey are expected to require avoidance; however, the sites located in the airstrip survey corridors (particularly the corridor of the alternative airstrip) are present in high densities (Muke, pers. com., 2008).

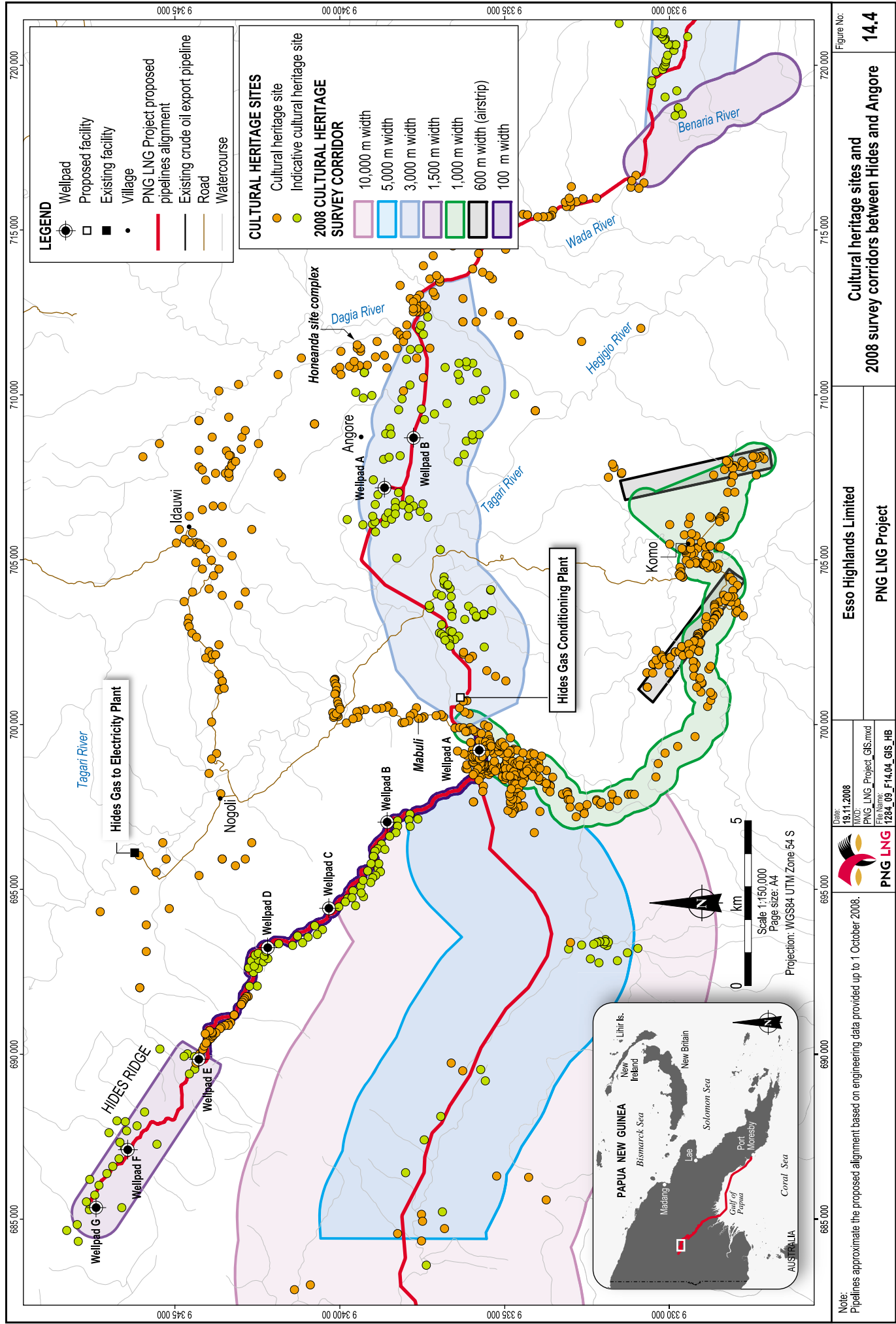
The 2005 survey located a very important sacred lake and sacrificial site, Lake Mabuli, next to the road to Nogoli and just north of the proposed Hides Gas Conditioning Plant (see Figure 14.5).

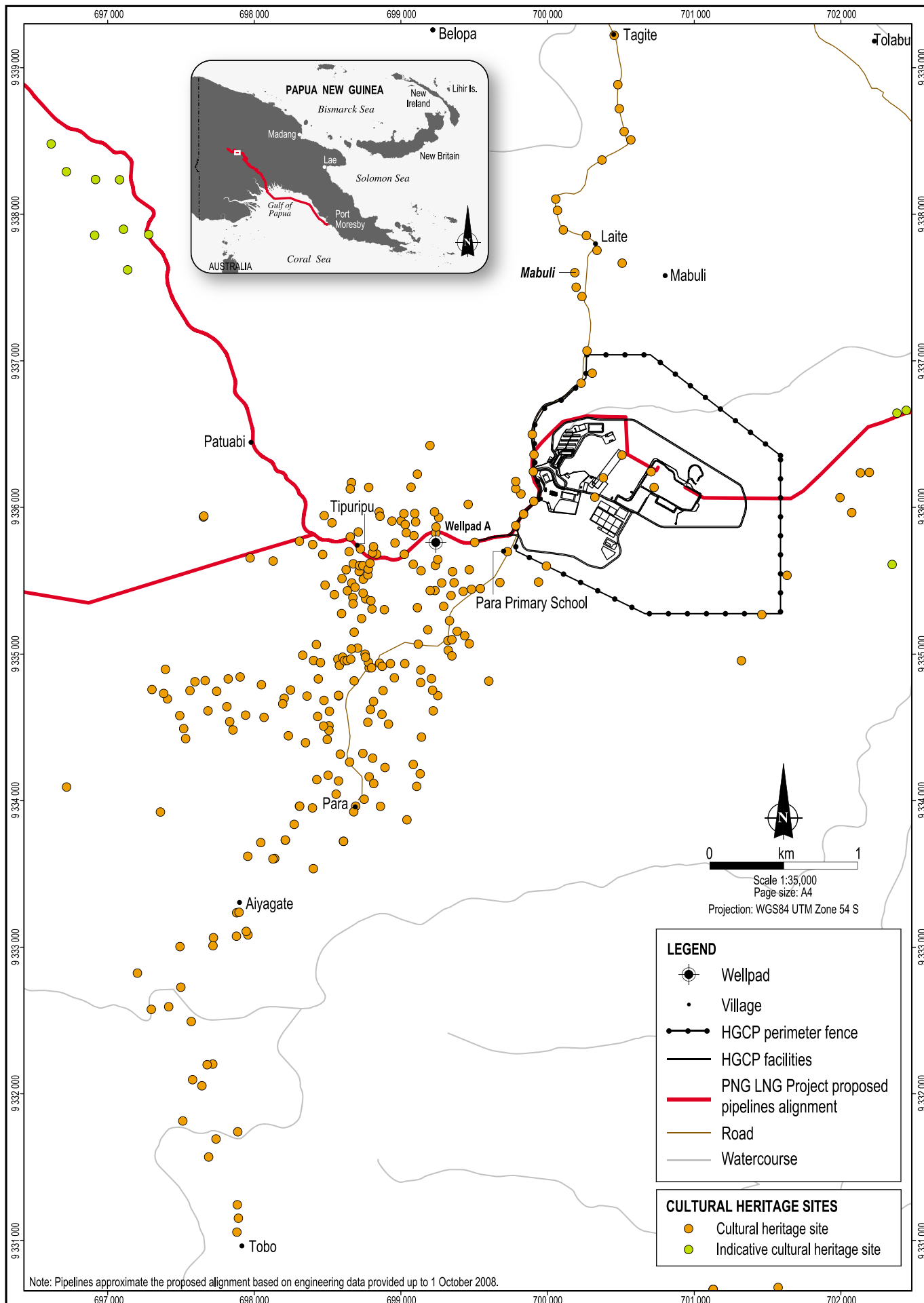
14.4.2.2 Angore Sites

Clan disputes made ground surveys impossible between the proposed Hides Gas Conditioning Plant site and the Tagari River (i.e., part of the proposed Angore ROW). Of the 63 cultural heritage sites recorded from interviews with clan members, most were sacred sites, followed by settlement and ceremonial sites (including sites of cannibalistic rites).

Interviews recorded 73 burial sites, ancestral settlements, sacred stones and bachelor cult houses from the Tagari River to immediately east of the junction between Dagia River and the proposed alignment. Angore is a densely populated area with settlements spread across the entire survey corridor. A single economic site was recorded: a strand of sago plants on the east bank of Tagari River, north of the confluence of Timali and Tagari rivers.

Surveys conducted for the PNG Gas Project had previously recorded the regionally significant Honeanda ritual site complex. The proposed LNG Project Gas Pipeline is located approximately 1 km to south (see Figure 14.4).





14.4.2.3 Benaria to Homa Sites

A ground survey over a 3-km-wide corridor between Benaria and Homa, the Option B Homa–Idauwi alignment shown on Figure 14.6, identified 169 cultural heritage sites, of which most were settlements or burials. Clan disputes precluded questions about the mountains, but cultural heritage sites will be few at such elevations. Interviews at Homa indicated no important oral tradition sites between Homa and the headwaters of the Maruba River; however, 15 sites were recorded during the 2005 surveys in the vicinity of Homa village itself. Any sites that are present in the high mountains are likely to be economic sites (for pandanus nuts and small game hunting).

14.4.2.4 Homa to Kutubu Sites

A total of 88 cultural heritage sites have been identified along the section of the LNG Project Gas Pipeline south from Homa to Moro and the existing Kutubu Central Processing Facility (including the road to the Agogo Production Facility) (see Figure 14.6).

East of the Wage Creek pipeline crossing are two ossuaries:

- Gesai'i, a small but important ossuary site on a low limestone hill 1.5 km from the alignment, where the bones are a mix of remains of former and current landowners.
- Yunabe, 350 m west of Gesai'i, is a major ossuary site, located in the next hill along the same ridgeline (Waiyogore), and consists of a 10-m-high overhanging cliff, about 30 m from the north bank of the Kaimari River and about 15 m above it.

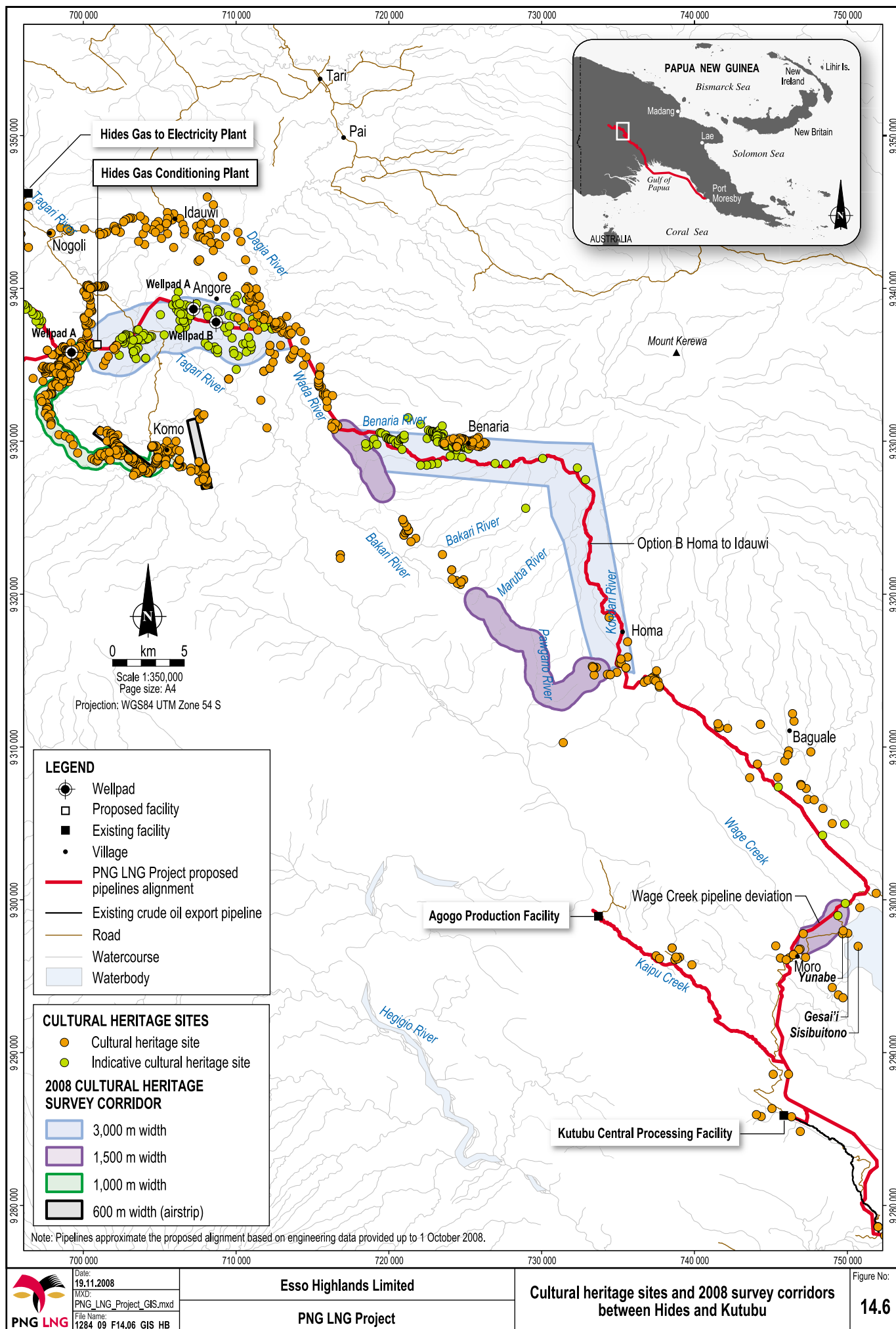
14.4.3 Kutubu to Kaiam

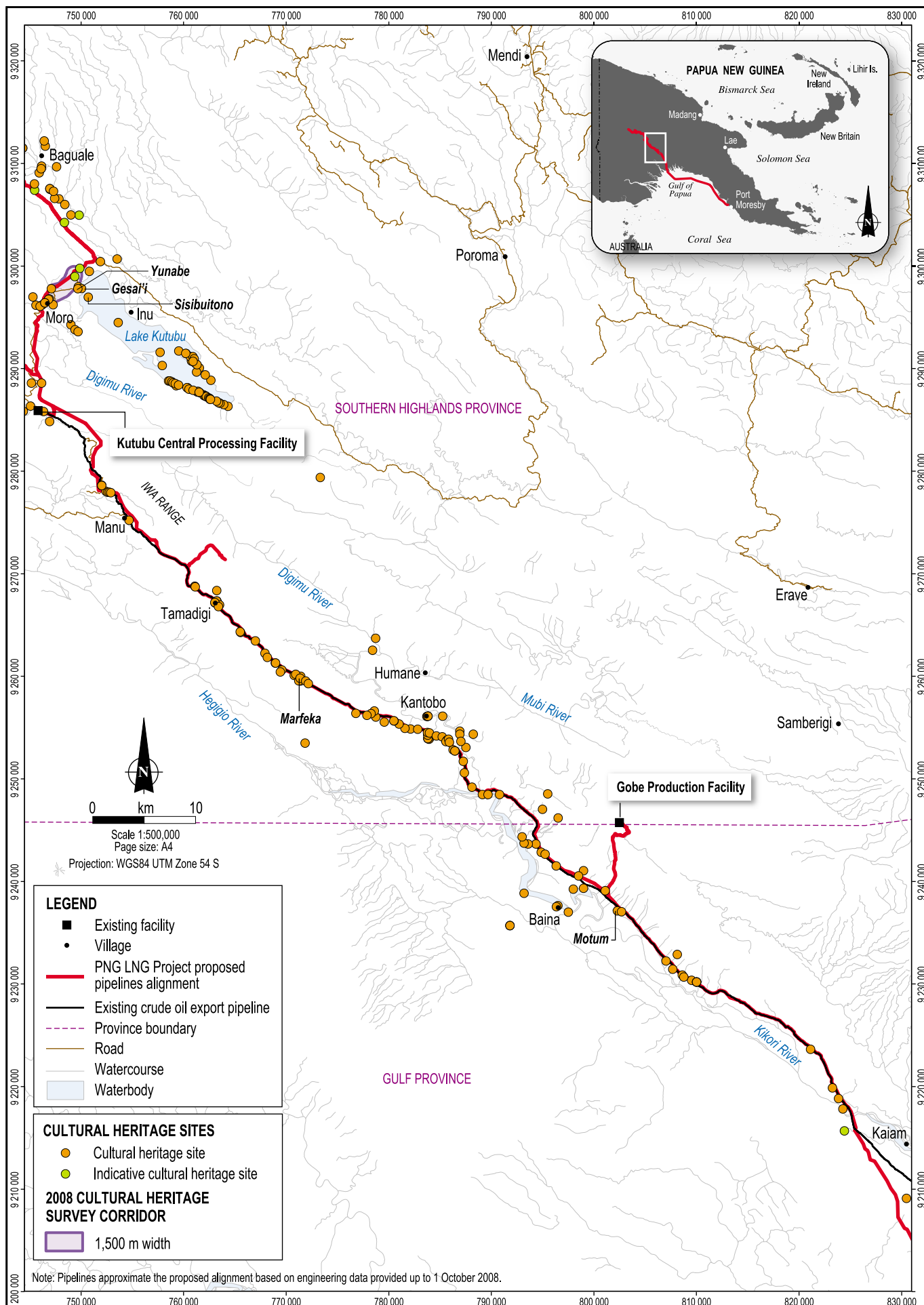
The literature reviews, interviews and fieldwork of the 2005 surveys identified 291 sites between Kutubu and Kaiam: 63 sites in the Lake Kutubu region; 207 sites around Foi–Fasu; and 21 sites around Gobe. Figure 14.7 shows the 173 sites where the exact location of sites could be identified. The proposed LNG Project Gas Pipeline follows the 2005 alignment closely from Kutubu to Kaiam. Investigations in 2008 for two relatively minor deviations to the previous alignment (between Moro and Manu and near Kantobo) identified an additional two sites near Lake Kutubu.

14.4.3.1 Lake Kutubu Sites

The focus of surveys in the vicinity of Lake Kutubu was largely on the internationally significant rock art and burial sites of the southeastern portion of the lake. Thirteen caves or rock shelters were also found in the Lake Kutubu area. An important series of spirit or myth sites was found in the northwestern portion of Lake Kutubu including the tiny grassy island known as Sisibuitono (at a distance of 2 km from the proposed alignment). Two other cultural heritage sites are located on two hills situated 3.5 km and 0.7 km from the proposed pipeline alignment.

Prayer stations are the location for a new form of Christian ritual and periods of fasting, and mostly involve women. They are located on ridge tops or on top of small isolated islands in Lake Kutubu, and are usually indicated by wooden structures with cloth flags. Their preservation is of considerable contemporary importance to the community.





14.4.3.2 Foi–Fasu Sites

The principal site types nominated by communities in the Foi–Fasu area between Moro and Kantobo include caves, rock shelters, spirit sites, burials and settlement sites. A small group of sites belonging to Lower Foi communities at Kantobo are associated with ritual performances. These sites are probably very important because the clans at Kantobo nominated only one each.

Cultural heritage sites become concentrated at points where the proposed pipeline alignment crosses clay ridges interspersed with sago groves or enters relatively level and open areas in limestone karst country. Examples include the Moro area, where many of the sites have already been partially or wholly destroyed. Two such sites include a particularly rich series of sago swamps located in the Kaipu River valley, just east of the Agogo Production Facility access road; and a cluster of burial and settlement sites in the Tamadigi village area (see Figure 14.7).

Two sites are particularly important to local clans. These are Mount Tipureia, which is regarded by Fasu as their point of origin; and Marfeka, a cave located about half-way between Kutubu and Gobe, approximately 180 m, east of the proposed pipeline alignment. The exact location of Mount Tipureia, which lies between Waro and the Kutubu Central Processing Facility, has not been marked with a GPS in the field.

14.4.3.3 Gobe Sites

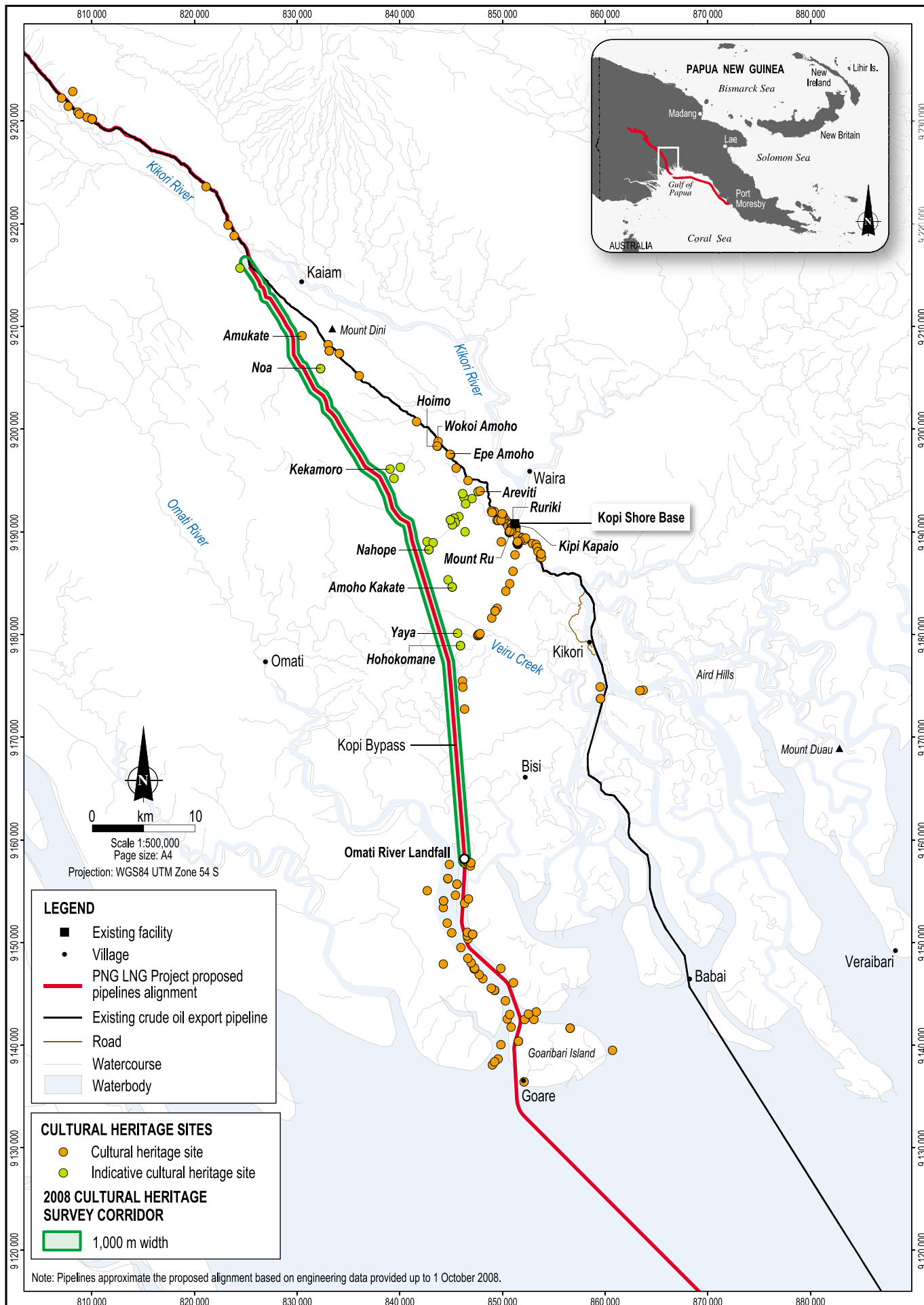
Sites in the southeastern section of the Kutubu–Kaiaam pipeline corridor between the Kikori River and the valley slopes to the northeast fall into three broad categories: old settlements, burials and sites associated with spirits.

Stones in streams to the west of Baina village were the source of raw materials for the abundant flaked stone artefacts and debitage marking old settlement sites around Baina.

The known burial sites occur in limestone caves and niches; in other words, on hill slopes and at some distance from the alignment. The exception is the Motum ossuary just south of the road from the Gobe Production Facility to Gobe Airfield and approximately 350 m from the proposed alignment.

14.4.4 Kaiaam to Goaribari Island

The three previous surveys between Kaiaam and Goaribari Island have covered the two options for the Kopi Bypass of the PNG LNG Gas Pipeline ROW. The 2005 survey along the old PNG Gas Project alignment identified 111 cultural heritage sites, including 29 now-unoccupied villages. The survey of the first alignment option for the Kopi Bypass identified 13 additional cultural heritage sites, while the survey of the second alignment option (the final alignment presented in this document) identified 19 additional cultural heritage sites. A number of the archaeological sites in the vicinity of the Kopi Shore Base that were identified during the 2005 survey—including rock shelters, old villages, shell middens and caves—were excavated for documentation and salvage during 2006. Figure 14.8 shows all the sites identified between 2005 and 2008, which are described below in relation to the proposed PNG LNG Gas Pipeline route.



14.4.4.1 Eastern Sites (Kopi Area)

The 2005 survey identified 32 villages, 18 economic sites (all associated with the procurement of food), 2 sites of isolated stone artefacts exposed on the ground surface and 18 cemeteries.

Five ossuaries and the oldest known evidence of human occupation in the Pacific region (excluding Australia) were also discovered west of Kikori River and some 10 km east of the proposed LNG Project Gas Pipeline alignment. Sacred sites associated with travels of the spirits of the dead are located approximately 10 km east of the pipeline and west of Kopi Shore Base and the Kikori River (see Figure 14.8). Such sites include Ruriki, Mount Ru, Kepero Roati and Kipi Kapaio.

Mount Ru is a limestone peak containing a cultural heritage complex of burial places, camp sites, sacred places, and hunting and fishing zones. Mount Ru and the surrounding raised limestone features contain stream channels, sinkholes, and narrow raised passages that connect the adjoining mountains and habitable caves, representing a network of spirit highways.

The sacred rock art in Pumate Cave (7 km east of the proposed pipeline alignment) is the only known rock art site in Gulf Province and so it is of national archaeological importance. Unknown by local people, the art seems to be of considerable antiquity. Today the cave is used for catching bats.

Other important sites identified during the 2005 survey (located east of the pipeline) include the following:

- Hoimo is a sacred mountain believed to be frequented by the Himaiiu spirit-man Marua and his spirit-dog.
- Wokoi Amoho is a rock shelter and one of the oldest known archaeological sites in the southern PNG lowlands. Radiocarbon dating indicates that people were camping at this rock shelter approximately 8,200 years ago. This site is within the area frequented by the spirit-man Marua and his spirit-dog.
- Epe Amoho is a rock shelter where radiocarbon dating indicates camping in a series of phases dating back 2,800 years. This site is the major hunting camp of the Himaiiu clan and is within the area frequented by the spirit-man Marua and his spirit-dog.
- Areviti is an important ancestral and mythical site of the Himaiiu clan. This site's story relates to a mythical man called Kuiaaru and a mythical woman called Laria.
- Rupo is a very important ossuary for the Himaiiu clan, and a place from which dead people reach the sacred land of the dead. Archaeological excavations have revealed human activity at this site dating back approximately 2,000 years.

Fifteen cultural heritage sites were identified during a survey along the offshore component of the upstream pipeline route. Ten are located on the banks of Are Creek, including five camping grounds and three flying fox caves.

14.4.4.2 Western Sites (Kopi–Omati Area)

During the Kopi Bypass surveys in 2008, the new sites identified in the vicinity of the LNG Project Gas Pipeline included seven villages, eight caves (including one ossuary), one rock shelter, five

camping grounds and nine sacred story places (mostly associated with waterbodies, including sinkholes and creeks). A scatter of chert flakes was also identified (although the observation was opportunistic, as systematic ground survey was not undertaken).

The general Kopi Bypass area contains ancestral sites and other cultural heritage sites important to clans from a number of villages and language groups. However, the proposed pipeline corridor is located to the west of the Kikori River, where the landscape in the past was more densely populated than inland areas; therefore, the Kopi Bypass corridor lies outside of the areas of highest density of cultural heritage (particularly archaeological) sites.

Sites identified during the 2008 surveys within the vicinity of the Kopi Bypass include:

- Kekamoro, which is a large sacred sinkhole said by members of the Hapape clan to be the home of a snake born from a human mother. The sinkhole is probably situated less than 2 km east of the Kopi Bypass survey corridor.
- Noa, which is a large sacred swamp with importance to multiple clans. The headwaters are said to be the most sacred part of the swamp. The swamp is located east of the Kopi Bypass survey corridor, probably a few kilometres away, although the southwestern edge of the swamp has not been precisely recorded.
- Amukate, which is a rock shelter with a 10-m-high ceiling that is said to contain engraved rock art. This site, reported by the Amowi clan, is located near the eastern edge of the Kopi Bypass survey corridor.
- Amoho Kakate ('colorful cave' in Rumuhei), which is said to have (or have had) rock art or engravings on its walls. It is believed that a man named Hupumara lived in the cave and drew designs on the walls. This site is probably located approximately 3 km east of the Kopi Bypass survey corridor.
- Hohokomane, which is a cave said to be within an ancient village called Yurina. It has a story associated with a man named Papupoi who married a flying-fox woman named Huterakewo. The site is located at the headwaters of Veiru Creek and is probably not within the Kopi Bypass survey corridor, although it is likely to be less than 1 km away.
- Nahope, which is a cave and an origin site of the Yoto'uki clan. It is believed that in the cave a bat called Kima transformed into a human who was the ancestral founder of the Yoto'uki clan. The site is located outside of the Kopi Bypass survey corridor.
- Yaya, which is an ancient village site considered to be associated with the Kuhi people. It is thought that a Kuhi boy whose mother was killed and who was adopted by the Wahara clan. Since then, it is said, the Wahara and Kuhi clans have lived together and looked after one another. The site is located approximately 1 km east of the Kopi Bypass survey corridor.

A number of ancestral villages, including Asan, Suare, Yiowin, Sosinoro and Maui Mate, were identified in the Kopi Bypass area. While the precise locations of the villages were not determined (Asan and Suare are thought to be outside the survey corridor), interviews indicated that the villages are relatively small and could be avoided by the pipeline should they occur within the survey corridor.

14.5 Implications for Project Planning, Design and Management

The large number of cultural sites reflects the intimate relationship that people living a mainly subsistence life in dispersed rural settlements have with the landscape and environment. Most sites are at no risk from the future pipeline ROW and it will be an objective of the detailed route design, informed by the results of field preconstruction surveys (see Section 2.4, Common Construction Activities), to avoid the remainder that are in the corridor of the ROW. (Priorities for avoidance are listed in Tables 22.1 and 22.2 in Section 22.3.3, Site-Specific Mitigation and Management Measures). Any that cannot be avoided will need to be managed under statutory procedures and in consultation with the landowners.

Environmental Impact Assessment
PNG LNG Project