APPENDIX 19

ARROW LNG PLANT

Non-Indigenous Cultural Heritage Impact Assessment

arrow energy
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Non-Indigenous Cultural Heritage Impact Assessment

by

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Executive Summary

1. Introduction

Arrow CSG (Australia) Pty Ltd (Arrow Energy) proposes to develop a liquefied natural gas (LNG) facility on Curtis Island off the central Queensland coast near Gladstone. The project, known as the Arrow LNG Plant, is a component of the larger Arrow LNG Project.

This study focuses on the identification and management of the non-Indigenous cultural heritage at the proposed Curtis Island processing facility, and on the adjacent mainland, where associated facilities are proposed. These include temporary workers accommodation facilities, launch sites, tunnel entrance and tunnel spoil disposal area.

2. Study Area

The study area for this investigation is primarily centred on the LNG plant site located in an area of approximately 150 hectares of woodland on the south-western edge of Curtis Island. Curtis Island is one of the group of offshore islands in the World Heritage listed Great Barrier Reef Marine Park and is the largest of the islands enclosing Gladstone Harbour.

3. Objectives

This study investigates the non-Indigenous heritage and post-contact land use history of Curtis Island and the adjacent coast. It documents registered heritage places, heritage places identified during local and regional heritage studies, and heritage places recorded during field studies undertaken as part the project. It assesses potential impacts to heritage sites and locations from construction of the proposed Arrow LNG Plant and proposes measures to mitigate these impacts.

The objective of this study is to address the three main issues raised by the Office of the Coordinator-General of the State of Queensland in the Terms of Reference for the project's Environmental Impact Assessment, in providing a description of the known and potential historical cultural heritage values of the project development area; an assessment of potential impacts during construction, operation, rehabilitation and decommissioning phases of the project and; advice on the measures by which these impacts can be managed to ensure the retention of the region's cultural heritage values.

4. Method

A multi-staged investigation has been undertaken to document known non-Indigenous sites and places and assess the potential for others to occur in the Arrow LNG Plant study area. The initial assessment entailed detailed historical research, the examination of documentary sources and consultation with local groups

and individuals. The site distribution patterns and historical accounts have been used to identify areas with a high potential to contain further traces of heritage sites. Following this site modeling, targeted field investigations took place, leading to the recording and documentation of additional historical places and sites.

5. Heritage sites in the Arrow LNG Plant study area

Sites and places recorded in national, state and local heritage registers are known from the region surrounding the study area. These places help document the development of the region from its pastoral beginnings to the industrial centre of today. In addition to the heritage registers, further sites and places have been identified during previous heritage studies and cultural heritage site clearances.

6. Registered cultural heritage sites of World or National significance

No registered non-Indigenous heritage sites of national or international significance occur in the Arrow LNG Plant study area.

7. National shipwrecks database

No historic shipwrecks on the National Shipwrecks Database have been recorded in the study area.

8. Registered sites of State heritage significance

No sites listed on the Queensland Heritage Register are found in the study area.

9. Sites on the Gladstone Regional Council Heritage List

No sites listed on the Gladstone Regional Council Heritage List are found in the study area.

10. Sites recorded during local heritage studies

Twenty two sites identified in local histories and heritage studies are found in and around the study area. Where possible, reported sites in the Arrow LNG study area were inspected to check the accuracy of previous recordings, and to assess the potential for project impacts.

11. Sites identified during fieldwork

Through a systematic program of field survey and consultation with local historians and members of the public, eight new sites were identified and a previously known site were re-examined and their significance re-assessed. These sites have been recorded in detail and their significance assessed using the criteria specified in the Queensland Heritage Act, the Burra Charter, themes in Queensland history, and Threshold Indicators.

12. Potential impacts

No site listed on any national, state or local council heritage register or heritage list, is at risk from the Arrow LNG Plant. There are however sites with a local heritage significance or local historical interest, that will be

affected by the project. Heritage sites that may be impacted are highlighted.

Impacts to heritage sites within the Arrow LNG Plant study area

Site Name	Location	Site significance	Potential impacts
Targinnie Gold Field (LMcD3)	To the east and west of Targinie settlement	Local Heritage Significance	While the known mining sites are distant from planned facilities, previously undetected mining sites found to the north of Targinie may impacted by construction of a Temporary Workers Accommodation Facility (TWAF) in the area, TWAF8.
Various fence alignments (HI-5)	North of Landing Road	Local Historical Interest	Historic fence lines may be destroyed by construction of TWAF 8.
Wharf remains (CINICH03)	Northern side of China Bay	Local Historical Interest	Construction of the Arrow LNG Plant along the shoreline 250m to the south are unlikely to result in any impacts to this site.
China Bay Yards (CINICH05)	Southern side of China Bay	Local Historical Interest	Site will be destroyed during construction of wharf facilities to the west of the Arrow LNG plant.
Former Dairy Site (HAS-32, CINICH07)	Located on hilltop to east of China Bay	Local Historical Interest	This site will be destroyed during construction of train 2 and train 3 at the Arrow LNG plant.
Birkenhead outstation site ALNG-H2	Boatshed Point	Local Heritage Significance	This site will be destroyed during construction of train 2 and train 3at the Arrow LNG plant.
Grave at Birkenhead outstation ALNG-H3	Boatshed Point	Local Heritage Significance	Although the exact location of the grave is unknown, planned plant facilities (train 2 and train 3) to be located on the ridge, in the area where this site is most likely situated, will result in its destruction.
Old yards ALNG-H5	In clearing to the east of rise with Birkenhead outstation site	Local Historical Interest	This site will be destroyed during construction at the Arrow LNG Plant.
Stock enclosure ALNG-H6	Boatshed Point	Local Historical Interest	The site will is located beside the access road to Boatshed Point and may be damaged or destroyed during construction.
Historic fence line, Hamilton Point ALNG-H7	Hamilton Point	Local Historical Interest	Portions of this fence line will be lost through construction of the Arrow LNG plant.
Pre-1870 track alignment ALNG-H8	Boatshed Point	Local Heritage Significance	The majority of this track will be destroyed by building of a construction camp and access road to the southern end of Boatshed Point.
Ruins of rendered brick building ALNG-H9	Boatshed Point	Local Heritage Significance	This building will be impacted by construction of facilities associated with the construction camp and wharf facilities on the southern end of Boatshed Point.

13. Potential impacts to undetected sites

It is likely that other sites, particularly buried archaeological sites, remain undetected in the study area. If these sites do exist, they are most likely to occur in those areas identified as having high archaeological

sensitivity.

14. Impacts from operation and decommissioning of the Arrow LNG Plant

Most impacts to non-Indigenous heritage sites in the study area will result from vegetation clearing and earthworks during construction. These impacts will be widespread and will remove all traces of cultural heritage sites from impacted areas. Once the plant has been built, further disturbance would only occur in previously impacted areas. Decommissioning of the plant would also be confined to previously disturbed areas and there would be no impacts to additional cultural heritage items.

15. Mitigation

The preferred approach to site protection for this project is complete site avoidance. Where sites cannot be avoided, comprehensive mitigation measures will be necessary to ensure that sites are fully investigated and documented. The nature of the investigation will be appropriate to the type of site and its level of significance. In areas deemed to be of high non-Indigenous heritage sensitivity, sub-surface testing, remote sensing or construction impact monitoring and recording may be warranted. Impacts can be minimised by the implementation of a heritage management plan to ensure appropriate protection of items of heritage significance identified during construction and operations.

16. Protecting known sites

Five measures are typically available for the management of development impacts on heritage sites. These encompass: avoidance, relocation, salvage, archival recording and interpretation. In most cases a combination of these measures will minimise the loss of site heritage values.

1. Avoidance

By mapping known sites and identifying locations with a high potential to contain further sites, it may be possible to develop engineering and design solutions to avoid impacts to some sites. The simplest means of protecting sites from development impacts entails relocation of facilities so the sites are avoided. Where the sites remain near construction, it may be necessary to erect physical barriers to protect the site from accidental damage.

2. Relocation

In some instances where impacts are unavoidable, it may be possible to relocate the heritage items, either to a nearby area that is not threatened by construction impacts, or to a museum.

3. Salvage

Controlled archaeological excavation may be an option for recovery of information and relics from sites threatened by construction impacts. Once the site has been investigated and the information or relics recovered, development may proceed in the site area.

4. Archival recording

Detailed archival recording of heritage items that are to be impacted by development is a minimum requirement. DERM has guidelines for archival photographic recording and plan drawings for heritage sites to ensure that these records accurately document threatened sites.

5. Interpretation

Either as part of a salvage and recovery program, or in isolation, the pubic interpretation of a site to be impacted by development can inform the community of the heritage values of sites that are lost or damaged. In some instances, it is possible to incorporate elements of the archaeological features in public displays as part of the development. The Gladstone Maritime Museum or Calliope River Historical Village may be appropriate venues for such a display.

17. Heritage Management Plans

It is recommended that a heritage management plan be formulated, to specify how known heritage sites are to be protected during construction and to outline procedures to be followed in the event that further historic heritage sites or features are found. This protocol will be prepared in consultation with the Queensland Heritage Office, to ensure that no uncontrolled impacts occur that would diminish the heritage values of significant sites and places, including the curtilage of those places.

Consultation should also be undertaken with local historical societies and/or local historians (as appropriate) to help identify management options for threatened sites and places deemed to be of only historical interest.

18. Construction Management

Before commencement of construction, site recording and protection measures as outlined in the Heritage Management Plan must be implemented. These protection measures will depend on the nature and significance of the site, these may include physical barriers, and/or exclusion and buffer zones. The extent of buffer zones will be dependent on the nature and significance of the site and may be 20-50m.

If, during construction, previously unidentified historical heritage items are uncovered, it will be necessary to employ site assessment and management procedures specified in the Heritage Management Plan. This will require: an immediate stop work within a 50m radius of the discovered heritage items; reporting of the heritage items to the Queensland Heritage Office; assessment of the item or place's significance by a qualified heritage practitioner; and the implementation of necessary recording or salvage measures. Only once the heritage traces have been reported and managed, will work be permitted to continue in these locations.

All project personnel, including management and on-site workers should be instructed in the importance of non-Indigenous heritage, its recognition, and the proper and lawful procedures to be followed on its

discovery.

19. Site-specific management

Site-specific recommendations have been formulated for the management of impacts at sites in the Arrow LNG Plant study area which should be considered in the development of a Heritage Management Plan.

List of management recommendations for sites that may suffer construction impacts in the Arrow LNG Plant study area

Site Name	Potential impacts	Site significance	Recommendations
Fishermans Landing			
Targinnie Gold Field (LMcD3)	While the known mining sites are distant from planned facilities, previously undetected mining sites found to the north of Targinie may impacted by construction of a Temporary Workers Accommodation Facility (TWAF) in the area, TWAF8.	Local Heritage Significance	A detailed site survey of the site of a proposed Temporary Workers Accommodation Facility (TWAF 8), located to the north of known mine sites in the Targinnie Gold Field may reveal further associated heritage sites. These would be recorded and appropriate impact mitigation measures formulated in consultation with the Queensland Heritage Office.
Various fence alignments (HI-5)	Historic fence lines may be destroyed by construction of TWAF 8.	Local Historical Interest	If fence lines are in development areas these alignments should be recorded. The fences can then be removed.
Curtis Island sites			
Wharf remains (CINICH03)	Construction of the Arrow LNG Plant may result in impacts along the shoreline 250m to the south.	Local Historical Interest	Confine construction activities to the southern shores of China Bay to protect this site.
China Bay Yards (CINICH05)	Site will be destroyed during construction of wharf facilities to the west of the Arrow LNG plant	Local Historical Interest	Further site recording and mapping should occur prior to site destruction.
Former Dairy Site (HAS-32, CINICH07)	This site will be destroyed during construction of train 2 and train 3 at the Arrow LNG plant.	Local Historical Interest	Site should be recorded in detail before it is destroyed.
Birkenhead outstation site ALNG-H2	This site will be destroyed during construction of train 2 and train 3at the Arrow LNG plant.	Local Heritage Significance	Traces of this site may survive and further, detailed site investigations should occur prior to site destruction. These should entail remote sensing and excavation.
Grave at Birkenhead outstation ALNG-H3	Although the exact location of the grave is unknown, planned plant facilities (train 2 and train 3) to be located on the ridge, in	Local Heritage Significance	This grave may still survive and attempts should be made to relocate it using remote sensing techniques. Construction monitoring

Site Name	Potential impacts	Site significance	Recommendations
	the area where this site is most likely situated, will result in its destruction.		would be warranted in this area. Should the grave be found it should be relocated to protect it from construction activities.
Post cutting site ALNG-H4	Site will be removed during construction of fencing around the perimeter of the plant site.	Local Historical Interest	No further recording of this minor site is warranted.
Old yards ALNG-H5	This site will be destroyed during construction at the Arrow LNG Plant.	Local Historical Interest	Site should be recorded in detail before it is destroyed.
Stock enclosure ALNG-H6	The site will is located beside the access road to Boatshed Point and may be damaged or destroyed during construction.	Local Historical Interest	Site should be recorded in detail before it is destroyed.
Historic fence line, Hamilton Point ALNG-H7	Portions of this fence line will be lost through construction of the LNG plant.	Local Historical Interest	Site should be recorded in detail before it is destroyed
Pre-1870 track alignment ALNG-H8	The majority of this track will be destroyed by building of a construction camp and access road to the southern end of Boatshed Point.	Local Heritage Significance	The road should be fully mapped prior to destruction.
Ruins of rendered brick building ALNG-H9	This building will be impacted by construction of facilities associated with the construction camp and wharf facilities on the southern end of Boatshed Point.	Local Heritage Significance	The building and its curtilage should be investigated and recorded in detail prior to the commencement of construction in this location.

20. Conclusions

A small number of non-Indigenous heritage sites are found in the south western corner of Curtis Island and near Fishermans Landing on the adjacent mainland. Some of these sites are located in areas that will be impacted by the Arrow LNG Plant. None of these sites are listed as having heritage significance under any national, state or local council register. There are however sites of local heritage significance or of historical interest. Mitigation measures will need to be implemented to ensure that heritage values are protected. These have been highlighted in this document.

Construction impacts to previously undetected non-Indigenous heritage items will be controlled through the implementation of a comprehensive heritage management plan prepared prior to construction, and rigorously applied work procedures. This will ensure that newly discovered heritage items are assessed, reported and managed in a manner recognising the significance of those items.

If these mitigation measures are implemented, there will be localised impacts to non-Indigenous cultural heritage sites in the study area. Overall, however, most impacts will only occur to sites of historical interest or local heritage significance, and will result in minimal effects to the non-Indigenous heritage values of the

region.

1. Introduction

1.1 Proponent

Arrow CSG (Australia) Pty Ltd (Arrow Energy) proposes to develop a liquefied natural gas (LNG) facility on Curtis Island off the central Queensland coast near Gladstone. The project, known as the Arrow LNG Plant, is a component of the larger Arrow LNG Project.

The proponent is a subsidiary of Arrow Energy Holdings Pty Ltd, which is wholly owned by a joint venture between subsidiaries of Royal Dutch Shell plc and PetroChina Company Limited.

1.2 Arrow LNG Plant

Arrow Energy proposes to construct the Arrow LNG Plant in the Curtis Island Industry Precinct at the southwestern end of Curtis Island, approximately 6km north of Gladstone and 85km southeast of Rockhampton, off Queensland's central coast. In 2008, approximately 10% of the southern part of the island was added to the Gladstone State Development Area to be administered by the Queensland Department of Local Government and Planning. Of that area, approximately 1,500 ha (25%) has been designated as the Curtis Island Industry Precinct and is set aside for LNG development. The balance of the Gladstone State Development Area on Curtis Island has been allocated to the Curtis Island Environmental Management Precinct, a flora and fauna conservation area.

The Arrow LNG Plant will be supplied with coal seam gas from gas fields in the Surat and Bowen basins via high-pressure gas pipelines to Gladstone, from which a feed gas pipeline will provide gas to the LNG plant on Curtis Island. A tunnel is proposed for the feed gas pipeline crossing of Port Curtis.

The project is described below in terms of key infrastructure components: LNG plant, feed gas pipeline and dredging.

1.2.1 LNG Plant

Overview

The LNG plant will have a base-case capacity of 16 Mtpa, with a total plant capacity of up to 18 Mtpa. The plant will consist of four LNG trains, each with a nominal capacity of 4 Mtpa. The project will be undertaken in two phases of two trains (nominally 8 Mtpa), with a financial investment decision undertaken for each phase.

Operations infrastructure associated with the LNG plant includes the LNG trains (where liquefaction occurs; see 'Liquefaction Process' below), LNG storage tanks, cryogenic pipelines, seawater inlet for desalination and stormwater outlet pipelines, water and wastewater treatment, a 110 m high flare stack, power generators (see 'LNG Plant Power' below), administrative buildings and workshops.

Construction infrastructure associated with the LNG plant includes construction camps (see 'Workforce

Accommodation' below), a concrete batching plant and laydown areas.

The plant will also require marine infrastructure for the transport of materials, personnel and product (LNG) during construction and operations (see 'Marine Infrastructure' below).

Construction Schedule

The plant will be constructed in two phases. Phase 1 will involve the construction of LNG trains 1 and 2, two LNG storage tanks (each with a capacity of between 120,000 m3 and 180,000 m3), Curtis Island construction camp and, if additional capacity is required, a mainland workforce accommodation camp. Associated marine infrastructure will also be required as part of Phase 1. Phase 2 will involve the construction of LNG trains 3 and 4 and potentially a third LNG storage tank. Construction of Phase 1 is scheduled to commence in 2014 with train 1 producing the first LNG cargo in 2017. Construction of Phase 2 is anticipated to commence approximately five years after the completion of Phase 1 but will be guided by market conditions and a financial investment decision at that time.

Construction Method

The LNG plant will generally be constructed using a modular construction method, with preassembled modules being transported to Curtis Island from an offshore fabrication facility. There will also be a substantial stick-built component of construction for associated infrastructure such as LNG storage tanks, buildings, underground cabling, piping and foundations. Where possible, aggregate for civil works will be sourced from suitable material excavated and crushed on site as part of the bulk earthworks. Aggregate will also be sourced from mainland quarries and transported from the mainland launch site to the plant site by roll-on, roll-off vessels. A concrete batching plant will be established on the plant site. Bulk cement requirements will be sourced outside of the batching plant and will be delivered to the site by roll-on roll-off ferries or barges from the mainland launch site.

LNG Plant Power

Power for the LNG plant and associated site utilities may be supplied from the electricity grid (mains power), gas turbine generators, or a combination of both, leading to four configuration options that will be assessed:.

- Base case (mechanical drive): The mechanical drive configuration uses gas turbines to drive the LNG train refrigerant compressors, which is the traditional powering option for LNG facilities. This configuration would use coal seam gas and end flash gas (produced in the liquefaction process) to fuel the gas turbines that drive the LNG refrigerant compressors and the gas turbine generators that supply electricity to power the site utilities. Construction power for this option would be provided by diesel generators.
- Option 1 (mechanical/electrical – construction and site utilities only): This configuration uses gas turbines to drive the refrigerant compressors in the LNG trains. During construction, mains power would

provide power to the site via a cable (30-MW capacity) from the mainland. The proposed capacity of the cable is equivalent to the output of one gas turbine generator. The mains power cable would be retained to power the site utilities during operations, resulting in one less gas turbine generator being required than the proposed base case.

- Option 2 (mechanical/electrical): This configuration uses gas turbines to drive the refrigerant compressors in the LNG trains and mains power to power site utilities. Under this option, construction power would be supplied by mains power or diesel generators.
- Option 3 (all electrical): Under this configuration mains power would be used to supply electricity for operation of the LNG train refrigerant compressors and the site utilities. A switchyard would be required. High-speed electric motors would be used to drive the LNG train refrigerant compressors. Construction power would be supplied by mains power or diesel generators.

Liquefaction Process

The coal seam gas enters the LNG plant where it is metered and split into two pipe headers which feed the two LNG trains. With the expansion to four trains the gas will be split into four LNG trains.

For each LNG train, the coal seam gas is first treated in the acid gas removal unit where the carbon dioxide and any other acid gases are removed. The gas is then routed to the dehydration unit where any water is removed and then passed through a mercury guard bed to remove mercury. The coal seam gas is then ready for further cooling and liquefaction.

A propane, precooled, mixed refrigerant process will be used by each LNG train to liquefy the predominantly methane coal seam gas. The liquefaction process begins with the propane cycle. The propane cycle involves three pressure stages of chilling to pre-cool the coal seam gas to -33°C and to compress and condense the mixed refrigerant, which is a mixture of nitrogen, methane, ethylene and propane. The condensed mixed refrigerant and precooled coal seam gas are then separately routed to the main cryogenic heat exchanger, where the coal seam gas is further cooled and liquefied by the mixed refrigerant. Expansion of the mixed refrigerant gases within the heat exchanger removes heat from the coal seam gas. This process cools the coal seam gas from minus -33°C to approximately -157°C. At this temperature the coal seam gas is liquefied (LNG) and becomes 1/600th of its original volume. The expanded mixed refrigerant is continually cycled to the propane precooler and reused.

LNG is then routed from the end flash gas system to a nitrogen stripper column which is used to separate nitrogen from the methane, reducing the nitrogen content of the LNG to less than 1 mole per cent (mol%). LNG separated in the nitrogen stripper column is pumped for storage on site in full containment storage tanks where it is maintained at a temperature of - 163°C.

A small amount of off-gas is generated from the LNG during the process. This regasified coal seam gas is routed to an end flash gas compressor where it is prepared for use as fuel gas.

Finally, the LNG is transferred from the storage tanks onto LNG carriers via cryogenic pipelines and loading arms for transportation to export markets. The LNG will be regasified back into sales specification gas on shore at its destination location.

Workforce Accommodation

The LNG plant (Phase 1), tunnel, feed gas pipeline, and dredging components of the project each have their own workforces with peaks occurring at different stages during construction. The following peak workforces are estimated for the project:

- LNG plant Phase 1 peak workforce of 3,500, comprising 3,000 construction workers: 350 engineering, procurement and construction (EPC) management workers and 150 Arrow Energy employees.
- Tunnel peak workforce of up to 100.
- Feed gas pipeline (from the mainland to Curtis Island) peak workforce of up to 75.
- A dredging peak workforce of between 20 and 40.

Two workforce construction camp locations are proposed: the main construction camp at Boatshed Point on Curtis Island, and a possible mainland overflow construction camp, referred to as a temporary workers accommodation facility (TWAF). Two potential locations are currently being considered for the mainland TWAF; in the vicinity of Gladstone city on the former Gladstone Power Station ash pond No.7 (TWAF7) or in the vicinity of Targinnie on a primarily cleared pastoral grazing lot (TWAF8). Both potential TWAF sites include sufficient space to accommodate camp infrastructure and construction laydown areas. The TWAF and its associated construction laydown areas will be decommissioned on completion of the Phase 1 works.

Of the 3,000 construction workers for the LNG plant, it is estimated that between 5% and 20% will be from the local community (and thus will not require accommodation) and that the remaining fly-in, fly-out workers will be accommodated in construction camps. The 350 EPC management and 150 Arrow Energy employees are expected to relocate to Gladstone with the majority housed in company facilitated accommodation.

The tunnel workforce of 100 people and gas pipeline workforce of 75 people are anticipated to be accommodated in the mainland in company facilitated accommodation. The dredging workforce of 20 to 40 workers will be housed onboard the dredge vessel.

Up to 2,500 people will be housed at Boatshed Point construction camp. Its establishment will be preceded by a pioneer camp at the same locality which will evolve into the completed construction camp.

Marine Infrastructure

Marine facilities include the LNG jetty, materials offloading facility (MOF), personnel jetty and mainland launch site.

LNG Jetty

LNG will be transferred from the storage tanks on the site to the LNG jetty via above ground cryogenic pipelines. Loading arms on the LNG jetty will deliver the product to an LNG carrier. The LNG jetty will be located in North China Bay, adjacent to the northwest corner of Hamilton Point.

MOF

Delivery of materials to the site on Curtis Island during the construction and operations phases will be facilitated by a MOF where roll-on, roll-off or lift-on, lift-off vessels will dock to unload preassembled modules, equipment, supplies and construction aggregate. The MOF will be connected to the LNG plant site via a heavy-haul road.

Boatshed Point (MOF 1) is the base-case MOF option and would be located at the southern tip of Boatshed Point. The haul road would be routed along the western coastline of Boatshed Point (abutting the construction camp to the east) and enters the LNG Plant site at the southern boundary. A quarantine area will be located south of the LNG plant and will be accessed via the northern end of the haul road.

Two alternative options are being assessed, should the Boatshed Point option be determined to be not technically feasible:

- South Hamilton Point (MOF 2): This MOF option would be located at the southern tip of Hamilton Point. The haul road from this site would traverse the saddle between the hills of Hamilton Point to the southwest boundary of the LNG plant site. The quarantine area for this option will be located southwest of the LNG plant near the LNG storage tanks.
- North Hamilton Point (MOF 3): This option involves shared use of the MOF being constructed for the Santos Gladstone LNG Project (GLNG Project) on the northwest side of Hamilton Point (south of Arrow Energy's proposed LNG jetty). The GLNG Project is also constructing a passenger terminal at this site, but it will not be available to Arrow Energy contractors and staff. The quarantine area for this option would be located to the north of the MOF. The impacts of construction and operation of this MOF option and its associated haul road were assessed as part of the GLNG Project and will not be assessed in this EIS.

Personnel Jetty

During the peak of construction, base case of up to 1,100 people may require transport to Curtis Island from the mainland on a daily basis. A personnel jetty will be constructed at the southern tip of Boatshed Point to enable the transfer of workers from the mainland launch site to Curtis Island by high-speed vehicle catamarans (Fastcats) and vehicle or passenger ferries (ROPAX). This facility will be adjacent to the MOF constructed at Boatshed Point. The haul road will be used to transport workers to and from the personnel jetty to the construction camp and LNG plant site. A secondary access for pedestrians will be provided between the personnel jetty and the construction camp.

Mainland Launch Site

Materials and workers will be transported to Curtis Island via the mainland launch site. The mainland launch site will contain both a passenger terminal and a roll-on, roll-off facility. The passenger terminal will include a jetty and transit infrastructure, such as amenities, waiting areas and car parking. The barge or roll-on ,roll-off facility will have a jetty, associated laydown areas, workshops and storage sheds.

The two location options for the mainland launch site are:

- Launch site 1: This site is located north of Gladstone city near the mouth of the Calliope River, adjacent to the existing RG Tanna coal export terminal.
- Launch site 4N: This site is located at the northern end of the proposed reclamation area for the Fishermans Landing Northern Expansion Project, which is part of the Port of Gladstone Western Basin Master Plan. The availability of this site will depend on how far progressed the Western Basin Dredging and Disposal Project is at the time of construction.

1.2.2 Feed Gas Pipeline

An approximately 8km long feed gas pipeline will supply gas to the LNG plant from its connection to the Arrow Surat Pipeline (formerly the Surat Gladstone Pipeline) on the mainland adjacent to Rio Tinto's Yarwun alumina refinery. The feed gas pipeline will be constructed in three sections:

- A short length of feed gas pipeline will run from the proposed Arrow Surat Pipeline to the tunnel launch shaft, which will be located on a mudflat south of Fishermans Landing, just south of Boat Creek. This section of pipeline will be constructed using conventional open-cut trenching methods within a 40-m wide construction right of way.
- The next section of the feed gas pipeline will traverse Port Curtis harbour in a tunnel to be bored under the harbour from the mainland tunnel launch shaft to a receival shaft on Hamilton Point. The tunnel under Port Curtis will have an excavated diameter of up to approximately 6m and will be constructed by a tunnel boring machine that will begin work at the mainland launch shaft. Tunnel spoil material will be processed through a de-sanding plant to remove the bentonite and water and will comprise mainly a finely graded fill material, which will be deposited in a spoil placement area established within bund walls constructed adjacent to the launch shaft. Based on the excavated diameter, approximately 223,000m3 of spoil will be treated as required for acid sulfate soil and disposed of at this location.
- From the tunnel receival shaft on Hamilton Point, the remaining section of the feed gas pipeline will run underground to the LNG plant, parallel to the above ground cryogenic pipelines. This section will be constructed using conventional open-cut trenching methods within a 30m wide construction right of way. A permanent easement up to 30-m wide will be negotiated with the relevant land manager or owner.

Should one of the electrical plant power options be chosen, it is intended that a power connection will be provided by a third party to the tunnel launch shaft, whereby Arrow Energy would construct a power cable within the tunnel to the LNG plant.

Other infrastructure, such as communication cables, water and wastewater pipelines, may also be accommodated within the tunnel.

1.2.3 Dredging

Dredging required for LNG shipping access and swing basins has been assessed under the Gladstone Ports Corporation's Port of Gladstone Western Basin Dredging and Disposal Project. Additional dredging within the marine environment of Port Curtis may be required to accommodate the construction and operation of the marine facilities. Up to five sites may require dredging:

- Dredge site 1 (dredge footprint for launch site 1): The dredging of this site would facilitate the construction and operation of launch site 1. This dredge site is located in the Calliope River and extends from the intertidal area abutting launch site 1, past Mud Island to the main shipping channel. The worst-case dredge volume estimated at this site is approximately 900,000m3.
- Dredge site 2 (dredge footprint for launch site 4N): The dredging of this site would facilitate the construction and operation of launch site 4N. This dredge site would abut launch site 4N and extend east from the launch site to the shipping channel. The worst-case dredge volume identified at this site is approximately 2,500m3.
- Dredge site 3 (dredge footprint for Boatshed Point MOF 1): The dredging of this site would facilitate the construction and operation of the personnel jetty and MOF at Boatshed Point. This dredge site would encompass the area around the marine facilities, providing adequate depth for docking and navigation. The worst-case dredge volume identified at this site is approximately 50,000m3.
- Dredge site 4 (dredge footprint for Hamilton Point South MOF 2): The dredging of this site would facilitate the construction and operation of the MOF at Hamilton Point South. This dredge site would encompass the area around the marine facilities, providing adequate depth for docking and navigation. The worst-case dredge volume identified at this site is approximately 50,000m3.
- Dredge site 5 (dredge footprint for LNG jetty): The dredging of this site will facilitate the construction of the LNG jetty at Hamilton Point. This dredge site extends from the berth pocket to be dredged as part of the Western Basin Strategic Dredging and Disposal Project to the shoreline and is required to enable a work barge to assist with construction of the jetty. The worst-case dredge volume identified is approximately 120,000m3.

The spoil generated by dredging activities will be placed and treated for acid sulfate soils (as required) in the Port of Gladstone Western Basin Dredging and Disposal Project reclamation area.

This study focuses on the identification and management of the non-Indigenous cultural heritage at the proposed Curtis Island processing facility, and on the adjacent mainland, where associated facilities are proposed. These include temporary workers accommodation facilities, launch sites, tunnel entrance and tunnel spoil disposal area.

2. Study Area

The study area for this investigation is primarily centred on the LNG plant site located in an area of approximately 150 hectares of woodland on the south-western edge of Curtis Island. Curtis Island is one of the group of offshore islands in the World Heritage listed Great Barrier Reef Marine Park and is the largest of the islands enclosing Gladstone Harbour. It is approximately 40km long and 10-20km wide. This study area is shown in Figure 1.

There is no road connection between the mainland and Curtis Island, a factor that has resulted in only limited development. The main activities to occur on the island since the mid-19th Century have been the establishment of a pastoral station (Monte Christo) and gazettal of small areas for National Park and State Forest at the northern end of the island; the construction of lighthouses, also at the northern end of the island; and development of a small settlement at South End in the southeast corner, consisting mainly of holiday cottages. The proposed LNG plant site is located 8km to the west of South End and is separated by forested hills and mangroves.

In the south western portion of Curtis Island, adjacent to the proposed LNG plant site, land use has been restricted to pastoral activities and limited, low impact forestry. The entire island has, because of its location and history of isolation, remained relatively wooded, in stark contrast to the heavily industrialised landscape on the mainland.

Mainland facilities comprise of a Temporary Workers Accommodation Facilities (TWAF),mainland launch site and feed gas pipeline. The TWAF will be sited in one of two alternative locations. The first (TWAF 8) is north of Targinie settlement on the eastern side of the Gladstone – Targinie Road, and includes a small portion of Targinie Creek. It is located in an area of regrowth woodland. Most of the historical developments in the district occurred to the south and west of this area. The second alternative (TWAF 7) site is located in a bend of Auckland Creek. Much of the site has already been cleared of native vegetation and was the site of a former Gladstone Power Station ash pond.

The site of the mainland tunnel launch shaft for the feed gas pipeline, access and bunded spoil storage area would be situated to the east of the Gladstone – Mount Larcom Road in an area of sparse, regrowth eucalypt woodland. Launch Site 1, is situated on disturbed land abutting coal handling facilities near the mouth of the Calliope River.

3. Objectives

This study investigates the non-Indigenous heritage and post-contact land use history of Curtis Island and the adjacent coast. It documents registered heritage places, heritage places identified during local and regional heritage studies, and heritage places recorded during field studies undertaken as part the project. It assesses potential impacts to heritage sites and locations from construction of the proposed Arrow LNG Plant and proposes measures to mitigate these impacts.

The objective of this study is to address the three main issues raised by the Office of the Coordinator-General of the State of Queensland in the Terms of Reference for the project's Environmental Impact Assessment, in providing a description of the known and potential historical cultural heritage values of the project development area; an assessment of potential impacts during construction, operation, rehabilitation and decommissioning phases of the project and; advice on the measures by which these impacts can be managed to ensure the retention of the region's cultural heritage values.

Specifically, the Coordinator General's terms of reference requires a description of existing environmental values for non-indigenous cultural heritage that may be affected by the project activities. The non-Indigenous cultural heritage survey should:

Refer to:

- the Australian Heritage Places Inventory
- the DERM Queensland Heritage Register and other information regarding places of potential non-indigenous cultural heritage significance
- local government heritage register
- any existing literature relating to the affected areas.

Refer to:

- consultations and negotiations with the local community and historical societies about:
- places of non-indigenous cultural heritage significance
- the significance of any non-indigenous cultural heritage places located or identified.

Include:

- include locations of culturally significant sites likely to be impacted by the project.

Provide:

- a constraints' analysis of the proposed development area to identify and record non-indigenous cultural heritage places
- the location of any mining areas with historical significance
- a report of work done which includes background research, relevant environmental data and methodology, as well as results of field surveys, significance assessment and conclusions and management recommendations (having due regard for any confidentiality requirements specified by community representatives).

The Coordinator General's terms of reference require provision of an assessment of any likely effects on sites of non-Indigenous cultural heritage values, including but not limited to the following:

- description of the significance of items or places of conservation or non-indigenous cultural heritage value likely to be affected by the project and their values at a local, regional and national

level

- recommended means of mitigating any negative impacts on non-indigenous cultural heritage values and enhancing any positive impacts
- where relevant, negotiations with Queensland Heritage Council and DERM regarding management of places of historic heritage significance, taking account also of community interests and concerns
- documented management strategies in accordance with the outcomes of negotiations with Queensland Heritage Council, DERM and the community.

The sections of this report addressing specific requirements of the Coordinator General's Terms of Reference are contained in Table 1.

Table 1. Coordinator General's terms of reference with section in report where these conditions are addressed.

Terms of Reference Condition	Section (s) in which condition addressed
Reference to The Australian Heritage Places Inventory	7.2
Reference to DERM Queensland Heritage Register and other information regarding places of potential non-indigenous cultural heritage significance	7.2.3
Reference to the local government heritage register	7.2.4
Reference to any existing literature relating to the affected areas	7.1
Reference to consultations and negotiations with the local community and historical societies about places of non-indigenous cultural heritage significance and the significance of any non-indigenous cultural heritage places located or identified	6.3 7.2.2
Identify locations of culturally significant sites likely to be impacted by the project	7.4
Provide a constraints' analysis of the proposed development area to identify and record non-indigenous cultural heritage places	10.
Provide the location of any mining areas with historical significance	7.3
Provide a report of work done which includes background research, relevant environmental data and methodology, as well as results of field surveys, significance assessment and conclusions and management recommendations	7.3
Provide a description of the significance of items or places of conservation or non-indigenous cultural heritage value likely to be affected by the project and their values at a local, regional and national level	10. Appendix 1
Provide recommended means of mitigating any negative impacts on non-indigenous cultural heritage values and enhancing any positive impacts	12.
Where relevant, negotiations with Queensland Heritage Council and DERM regarding management of places of historic heritage significance, taking account also of community interests and concerns	11.4
Documented management strategies in accordance with the outcomes of negotiations with Queensland Heritage Council, DERM and the community.	11.4

These investigations, consultation, impact assessment, management and protection strategies are

conducted in a manner to satisfy statutory responsibilities and duties of care, including those under the EPBC Act and *Queensland Heritage Act 1992*.

4. Legislative context and standards

In Queensland, both Commonwealth and State legislation protects non-Indigenous heritage sites. This legislation mainly considers sites of National or State significance. State legislation also provides protection for sites of local significance, placing obligations on Local and Regional Councils to consider these sites in their planning schemes.

4.1 Commonwealth legislation

Three pieces of Commonwealth legislation address the protection of Australia's historical cultural heritage, specifically the protection of those sites deemed to be of National, Commonwealth or international importance. These are the *Environment Protection and Biodiversity Conservation Act,* 1999 (EPBC Act)*,* the *Australian Heritage Council Act,* 2003, and the *Historic Shipwrecks Act*, 1976. The Commonwealth authority responsible for the administration of this legislation is the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC).

4.1.1 *Environment Protection and Biodiversity Conservation Act, 1999*

This is the primary piece of Commonwealth legislation concerning the environment, providing a legal framework for the protection and management of National, Commonwealth and World heritage sites. It includes the protection of recognised flora, fauna and ecological communities as well as registered cultural heritage items and places. Cultural heritage protected under this Act includes both Indigenous and non-Indigenous sites.

Both nominated and listed cultural heritage sites are protected under the Act, which allows for immediate, temporary protection of threatened sites. Permanent recognition of significant sites comes in their inclusion on the National Heritage List or, if on Commonwealth land or of World importance, on the Commonwealth or World Heritage Lists. The criteria for inclusion of cultural heritage sites on these lists include:

- importance in the course of Australia's cultural history
- possession of uncommon or endangered aspects of Australia's cultural history
- potential to contribute to an understanding of Australia's cultural history
- importance in demonstrating the key characteristics of a class of cultural places
- importance in exhibiting aesthetic characteristics valued by a community or cultural group
- importance in demonstrating creative or technical achievement at a particular period
- special association with a particular community for social, cultural or spiritual reasons
- special association with the life or works of persons of importance in Australia's history, and
- importance as part of Indigenous tradition.

Any development that could impact on a nominated or listed heritage place of national or international significance requires ministerial approval before it can proceed.

In 2003, under the *Australian Heritage Council Act*, *2003* the Australian Heritage Council was created, to administer the new National and Commonwealth Heritage Lists.

4.1.2 *Australian Heritage Council Act, 2003*

The *Australian Heritage Council Act, 2003* established the Australian Heritage Council as the principle advisory body to the Commonwealth Government on heritage matters, particularly in relation to the lists created under the *Environment Protection and Biodiversity Conservation Act,* 1999 (EPBC Act). The Australian Heritage Council replaced the Australian Heritage Commission, the authority previously responsible for assisting in the administration of Commonwealth heritage legislation (*Australian Heritage Commission Act, 1975*).

The role of the Australian Heritage Council is to:

- assess nominated cultural heritage items and places for inclusion in the National or Commonwealth Heritage Lists
- advise the Minister on matters relating to the condition of places included in the National and Commonwealth Heritage Lists
- promote the identification, assessment, conservation and monitoring of heritage, and
- maintain the existing Register of the National Estate.

From 1975, the Australian Heritage Commission had maintained a list of significant heritage locations on the *Register of the National Estate*. More than 13,000 items were listed, including non-Indigenous heritage sites. With the introduction of the *Australian Heritage Council Act,* 2003, the Register of the National Estate was closed to new entries from February 2007. The register remains a statutory instrument until February 2012, with the Minister required to consider it, along with the newly created lists, when making decisions under the *EPBC Act*. In the transition period, entries on the Register of the National Estate are being transferred to Local, State and National heritage registers. From February 2012, all reference to the Register of the National Estate will be removed from the *EPBC Act* though it will remain a publicly accessible archive.

The Australian Heritage Places Inventory is an on-line database maintained by DSEWPC, containing summary information about places listed on all of the States' and Territories' Lists as well as Commonwealth Heritage Lists and the Register of the National Estate.

4.1.3 *Historic Shipwrecks Act, 1976*

The *Historic Shipwrecks Act, 1976* protects shipwrecks and associated relics more than 75 years old in

Commonwealth waters. All wrecks are recorded in the Australian National Shipwrecks Database with details of their location, if this is known. Each of the States and the Northern Territory has complementary legislation for State waters including bays, harbours and rivers. The Minister for DSEWPC can also make a determination to protect historically significant wrecks or relics less than 75 years old.

4.2 State legislation

Queensland's State heritage legislation, the *Queensland Heritage Act*, 1992, addresses the protection of non-Indigenous heritage sites, significant for their place in Queensland's history. Indigenous cultural heritage, significant for its association with Aboriginal tradition and custom or scientific values, is protected under separate State legislation.

The Queensland authority responsible for non-Indigenous heritage protection is the Queensland Heritage Council, an independent advisory body, assisted by the resources of the Department of Environment and Resource Management (DERM). The Queensland Heritage Council manages a register of significant heritage sites and places: the *Queensland Heritage Register*, and with DERM, administers the *Queensland Heritage Act*, 1992.

4.2.1 *Queensland Heritage Act, 1992*

The aim of the *Queensland Heritage Act, 1992* is 'to provide for the conservation of Queensland's cultural heritage for the benefit of the community and future generations' (Section 2.1). The Act (Section 2) enabled:

- the establishment of the Queensland Heritage Council
- the creation of the Queensland Heritage Register
- the regulation, in conjunction with other legislation, of development affecting the cultural heritage significance of registered places
- the provision for heritage agreements to encourage appropriate management of registered places, and
- the provision for appropriate enforcement powers.

Criteria for entry of a cultural heritage site to the Queensland Heritage Register are similar to those for inclusion of cultural heritage sites on the National Heritage Register, except that they relate particularly to the history of Queensland. The specific criteria for inclusion of cultural heritage places on these lists are specified in Section 35 of the *Queensland Heritage Act*, 1992. To be considered of state heritage significance, a place must possess attributes that show:

- evidence of the evolution or pattern of Queensland's history
- rare, uncommon, or endangered aspects of Queensland's cultural heritage
- potential to yield information that will contribute to the understanding of Queensland's history
- demonstrate the principal characteristics of particular classes of places

- aesthetic significance
- a high degree of creative achievement at a particular period
- a strong association with a particular community or cultural group for social, cultural or spiritual reasons.

The Queensland Heritage Register, established under Section 31 of the Act, is a record of State heritage places and protected areas. Since amendments in 2008, it also includes archaeological sites (those sites that contain only buried heritage features). In general, entries to the register include details of the boundaries of the area or place, its history, a description of its fabric and whether it is the subject of a heritage agreement (a legally binding agreement between the Minister and the owner of a registered heritage place, designed to promote the conservation of that place). For State heritage places, a statement of significance is required, addressing cultural heritage criteria defined by the Act. For protected areas (an area believed to contain protected relics under Part 7 of the Act), a statement of significance, relevant to its declaration as a protected area, is required. For archaeological places, a statement of significance, relating to recorded attributes which meet established archaeological criteria, is required. The Register is a public document. The attributes used to assess archaeological significance are discussed further in Section 3.5.

The Act specifically addresses the obligations and rights of owners and developers. The main requirement is that, under Section 68 of the Act, development of a place listed on the Queensland Heritage Register can only proceed with the approval of the Chief Executive of DERM. Any damage to a site or place listed or provisionally listed on the Queensland Heritage Register, attracts a penalty. Any member of the public can make an application for listing of a place of heritage significance on the register. Provisional listing occurs after departmental officers review the application.

In the event that heritage sites are discovered, it is a requirement under Section 89 of the Act for the Chief Executive of DERM to be advised. This advice must be given in a timely manner and include information on where it was discovered in addition to photographs and a description. Once heritage items have been reported, it is an offence under Section 90 of the Act to interfere with these items within 20 business days of informing the Chief Executive of their discovery. Within this period departmental officers will assess it to establish whether it meets the criteria for inclusion on the Queensland Heritage Register.

As soon as a heritage place is nominated for inclusion on the Queensland Heritage Register, the Minister may issue a stop order to protect it from damage (whether entered on the Register or not). A stop order will operate for up to 40 business days until the place has been assessed and further decisions have been made about its fate (Section 154).

Sites and places with local heritage values were formally recognised in a 2008 amendment to the *Queensland Heritage Act*. This required local government agencies to establish their own registers of significant heritage places, or maintain lists of heritage places as part of existing planning instruments (Sections 112,113).

4.3 Local legislation

The 2008 amendment to the *Queensland Heritage Act, 1992* allowed local governments the choice of developing an approved list of locally significant sites or to ensure the protection of these sites through existing planning measures. Planning measures typically take the form of a heritage overlay; one of several maps checked as part of the planning approval process. The Arrow LNG Plant is located exclusively in the Gladstone Regional Council heritage overlay area.

A further (2008) amendment provided for the integration of State and Local government assessment and approval processes. This was effected under the Integrated Development Assessment System of the *Integrated Planning Act,* 1997 (Section 121), which was aimed at aligning State and Local government planning procedures. The Integrated Planning Act was administered by the Queensland Department of Infrastructure and Planning. This Act has since been replaced by the *Sustainable Planning Act* 2009, which came into effect on 18 December 2009. This Act aims to overcome the inconsistencies between local planning schemes, and to co-ordinate Local, Regional and State planning. The instrument used under this Act is a set of standard planning provisions named the Queensland Planning Provisions.

5. Cultural heritage significance and assessment

Significant cultural heritage places provide a sense of the connection between the community and landscape, between the past and the present, and are the tangible evidence of national identity and experience. Some cultural heritage sites in Queensland have importance to all Australians, others have importance to Queenslanders alone, while some have importance within the local community.

In addition to locations deemed to be of National, State or Local significance, are other sites that may not meet register listing criteria, but that still provide a setting in which to understand the region's historical land-use. These locations can be described as having historical interest (HI). Sites assessed as being historically interesting, do not necessarily warrant the level of protection suited to sites with National, State or Local heritage significance. To fully assess these sites, the involvement of the local community is required (Australia ICOMOS 1999).

5.1 Cultural heritage assessment framework

The Burra Charter is a document developed by Australian heritage professionals formalising principles for the conservation and management of places of cultural heritage significance. These principles have been enshrined in procedures employed by heritage agencies and heritage practitioners. The Burra Charter was developed from European heritage guidelines and adapted to Australian conditions. The final version of the Charter was ratified by Australia ICOMOS (International Council on Monuments and Sites) in 1999 and is the accepted standard for cultural heritage assessment in Australia. The Charter spells out the process of establishing cultural significance and 'defines the principles, processes, and practices accepted as proper for professionals working in Australia' (Bickford 1991:39).

In the Burra Charter, cultural significance means the 'aesthetic, historic, scientific, social or spiritual value for past, present or future generations' (Australia ICOMOS 1999). These values have been identified in the criteria used to assess historic places for inclusion in State and National heritage registers, and have been used in site assessment undertaken in this study.

5.2 Cultural heritage significance

Not all heritage sites are of equal value and the level of site significance can be ascertained through the use of significance criteria. The level of heritage significance ranges from *local significance*, for places with only local heritage values that contribute to an understanding of the development of local or regional history and heritage, through places with s*tate, national and international significance,* where their heritage values respectively contribute to an understanding of Queensland, Australian and world history and heritage. To be considered for World Heritage Listing, a place would also have to be of *outstanding value to humanity* (Heritage Council of Queensland 2006:5,6). Some heritage sites and places meet none of the criteria to qualify as significant at a local, state or national level, but nevertheless help us to better understand the historical use of a region. In this document and following the convention of others working in this field (e.g. Converge 2009) these are classified as being of ***local historical interest***.

The Burra Charter provides the framework for the evaluation of the significance of heritage places and underpins the eligibility criteria for listing on the Queensland Heritage Register defined in Section 35 of the *Queensland Heritage Act,* 1992 (Queensland Heritage Council 2006:2). Each of these broadly defined eligibility criteria is considered in turn, in conjunction with the *attributes* that these places must possess to be considered for heritage listing (Significance Indicators), and the *degree* to which these criteria are met to establish whether they are of local or state significance (Threshold Indicators). Threshold indicators are detailed below in Section 5.2.2 and include the following site attributes: integrity, representativeness, antiquity, importance of settlement patterns or setting, cumulative importance, innovation, associations or their discovery through systematic regional studies. If a site or place meets the criteria, it will be eligible for listing on the Queensland Heritage Register, or listed in a local planning scheme or on a local heritage register, depending on its significance. This review of eligibility criteria is drawn from the *Illustrated Guide to Entering Houses in the Queensland Heritage Register* (Queensland Heritage Council 2005) and *Using the Criteria: A Methodology* (Queensland Heritage Council 2006).

5.2.1 Heritage significance indicators

Each of the following eight significance indicators, outlined in Section 35 of the *Queensland Heritage Act, 1992*, highlights an attribute that may justify a site's listing on the Queensland Heritage Register.

a. Evolution or pattern of Queensland's history

Places eligible for listing in this category document historic figures, events, phases, movements, processes, activities or ways of life that illustrate the evolution or pattern of Queensland history. The level of

significance is greatest where the place has remained largely intact, where the setting remains largely unaltered and where the evidence of the event or association remains *in situ*. In this category historical places can be assessed in terms of their historical or scientific values (Queensland Heritage Council 2006:9). In the Guidelines to the Burra Charter it is argued that historical values can also be seen in the related aesthetic, architectural and societal values, thereby encompassing most types of heritage significance. It could be argued that any site or place had some role, in either the form or pattern of Queensland development. Whether these meet the conditions for heritage listing depends on an assessment of their regional importance, age, representativeness or rarity (Threshold Indicators).

b. Rare, uncommon or endangered aspects of Queensland's cultural heritage

Sites and places that document customs, processes, functions, land uses, designs, activities and life ways that are no longer common or were never common are recognised in this category. These places may be considered significant in any of the other heritage significance categories. The Threshold Indicators used to assess the level of significance include the condition of the site or place, its distinctiveness or its uniqueness.

c. Understanding of Queensland's history

Places that can contribute to a better understanding of Queensland history include those with historical or scientific heritage values. These places can provide information on aspects of Queensland history that had not previously been investigated, on particular aspects of Queensland history that need further investigation, or can be used to further understand existing sites and places. The Threshold Indicators used to assess the level of significance for these sites and places include their antiquity, rarity and condition.

d. Demonstrating characteristics of a particular class of cultural places

Places with architectural or historical significance may qualify for inclusion on the Queensland Heritage Register on the basis of their exemplifying architectural styles or construction techniques that are important in documenting Queensland's history. Significant attributes embodied in the fabric of a site or place that address this criterion include: places that illustrate a way of life, ideology, custom, land use, function, work of a particular designer, architect or architectural style or form, use of construction techniques or materials; which contribute to an understanding of the evolution or pattern of Queensland history. The degree to which these places meet the criterion is reflected in the following Threshold Indicators: integrity, antiquity, rarity and uniqueness.

e. Aesthetic significance

Heritage places with widely regarded qualities of elegance and beauty, visual merit or interest are recognised in this listing criterion. These places possess aesthetic and architectural significance. Qualities that might be considered in the assessment of the aesthetic qualities of a building or monument may include its form, scale, interrelationship of components, unity, contrast, colour, texture and fabric (Queensland Heritage Council 2006:13). The Significance Indicators for these sites include the possession

of attributes of beauty, evocative qualities, landmark qualities, expressive qualities or symbolic meaning. To gauge the level of significance the following Threshold Indicators are relevant: the degree of preservation, integrity, setting and location, and the degree of representativeness.

f. Degree of creative or technical achievement at a particular period

Sites and places with artistic, technological or architectural values are recognised in this listing criterion. These places may have artistic or architectural values, may display innovation, or new technology, may represent new construction techniques or designs or may be evidence of the creative adaptation of existing technologies. The level of significance can be assessed using the Threshold Indicators of site integrity and public or peer recognition for architecture.

g. Associations with a particular community or cultural group for social, cultural or spiritual reasons

The importance given to buildings and places through their community connections is also recognised in Queensland Heritage Register listings. This criterion addresses the social significance of heritage places. Places can be listed due to their significance as a landmark or a meeting or gathering place, through a connection with events that have had a profound effect on a particular community or ethnic group, their importance in connection with ceremonial or ritual activities, or through their place in meeting an essential community need. The Threshold Indicators that test the level of significance are associated with a place's length of association, a demonstrable connection with a particular community or evidence of former connection.

h. Association with a person, group or organisation important in Queensland history

Places with connections to notable people and organisations are eligible for listing on the Queensland Heritage Register. These places with historical significance have demonstrable connections with people, groups or organisations that have contributed to the evolution or development of Queensland's society or physical environment. The Threshold Indicators include the level of importance of the person, group or organisation to Queensland history; and the duration, extent and impacts of the connection with Queensland.

5.2.2 Threshold indicators

To assess whether a site meets the conditions for listing on a Local, State or National scale, and to bring a greater level of objectivity to that assessment, a number of threshold indicators have been proposed. These threshold indicators have been adapted from the *Illustrated Guide to Entering Houses in the Queensland Heritage Register* (Heritage Council 2005). These indicators apply mainly to standing structures (buildings in particular), and to a lesser degree to archaeological sites and localities, and enable some quantification of the degree to which a site meets the criteria identified in s.23(1) of the *Queensland Heritage Act 1992* (listed above in Section 2.1.1). The indicators are:

- Integrity
- Representativeness
- Antiquity
- Pattern of settlement/ regional importance
- Importance of the sum of the parts
- Innovation
- Importance of association
- Identification in a study or survey.

The two initial indicators: *integrity* and *representativeness* are most relevant to the evaluation of heritage significance in a rural setting, as the significance of the sites must be determined without the overt benefit of the impressive public buildings that typify the city or large country centre. These conditions apply equally to archaeological sites.

Integrity

The integrity of a site refers to how much or little disturbance has occurred. The spatial arrangement of artefacts and features left by a site's occupants provides vital clues to the nature of the occupation of that site. Sites and structures that preserve features dating from the earliest period of construction or occupation are more significant than sites disturbed by subsequent phases of building or occupation. The greater the amount of removal of earlier occupation evidence, the less information can come from a site, resulting in a lowered research potential and heritage value.

Representativeness

Site significance can be assessed without reference to other sites in the region. While every site is unique in some respects, much of the information that can come from one site could equally be obtained from others. The criterion of representativeness (how well a particular type of site is represented), allows sites to be evaluated with reference to an area's total known archaeological record. Rare sites are of greater significance than common sites, as they often contain unique information.

In areas where few sites have been listed on heritage registers, any new site of a particular type is more likely to be considered important than if numerous sites of that type had previously been found, recorded and assessed.

5.3 Significance and setting

The significance of any cultural heritage site, at whatever level of significance, is enhanced by remaining in its original setting. This is a notion well understood by archaeologists and Indigenous people who know the value of provenance and place. It is one of the principles outlined in the Burra Charter (Australia ICOMOS 1999). It is, however, a notion at odds with local heritage practices that sanction the removal of items, large and small, for storage in museums. While this can sometimes be justified on the grounds of protection, the

significance of objects is lost or diminished when removed from their original context. An opposing argument, in favour of relocation, is that heritage items are more accessible to the public when brought to central locations, such as open-air museums (e.g., the Gladstone Maritime Museum or the Calliope River Historical Village) where they can be preserved and serve as educational tools.

5.4 Significance assessment of archaeological sites

Before 2008, non-Indigenous archaeological sites (those containing historical artefacts on or beneath the surface, rather than structures) were excluded from the Queensland Heritage Register. Archaeological sites can be entered on the Queensland Heritage Register if they contain or may contain items that are an important source of information about Queensland history (*Queensland Heritage Act*, *1992*, Section 60), meeting the significance criteria listed above.

Archaeological sites may have social or historic values but most commonly possess scientific values, usually synonymous with research potential. There are a number of specific criteria used to assess exclusively archaeological (scientific) site significance. These include the site's integrity, structure, and contents: properties that permit the assessment of a site's value for research purposes.

Site integrity refers to the degree to which a site has been disturbed, or how well it has been preserved. The spatial distribution of artefacts and features at a site can provide important clues about the nature of a site's use, and therefore, sites that are least disturbed, have a greater research potential.

Site structure refers to the physical properties of a site, including its stratigraphy, size, the patterning of archaeological material and presence or absence of built structures. A site with undisturbed sub-surface features has greater research potential than a site modified by later land-use or by illegal scavenging. A site's structure is sometimes indicated by surface features, but in other cases can only be established by remote sensing techniques or by sub-surface examination.

Site contents include the range of artefacts and structures found in a site. Some sites contain a diverse range of cultural items, allowing various aspects of site's history to be examined.

5.5 Historical themes

A number of themes in Queensland's historical development have been identified by historian Thom Blake (1996) and are used by the Queensland Heritage Council in the classification of sites on the Queensland Heritage Register. Based on a model originally used by the Australian Heritage Commission, these themes categorise the range of activities that occurred in the State's development from earliest times to the present. These broad themes, listed below, and the sub-themes derived from them are used to ensure that the full range of site types is represented on the Queensland Heritage Register:

- Peopling the land

- Exploiting and/or utilising the land
- Developing secondary/tertiary industries
- Movement of people, goods and information
- Building settlements and dwellings
- Maintaining order
- Creating social and cultural institutions
- Educating Queenslanders
- Providing health and welfare services.

These themes have been used to categorise sites identified during the present study. More than one theme may apply to some sites.

6. Method

A multi-staged investigation has been undertaken to document known non-Indigenous sites and places and assess the potential for others to occur in the Arrow LNG Plant study area. The initial assessment entailed detailed historical research, the examination of documentary sources and consultation with local groups and individuals. The site distribution patterns and historical accounts have been used to identify areas with a high potential to contain further traces of heritage sites. Following this site modeling, targeted field investigations took place, leading to the recording and documentation of additional historical places and sites.

6.1 Background studies

The first task of this assessment was to identify known and potential non-Indigenous cultural heritage values in the proposed Arrow LNG Plant study area. This included a review of documented sites and places. The sources of information included on-line resources for details of previously listed heritage sites: the Cultural Heritage Management System of DERM for sites on the Queensland Heritage Register found in Gladstone Regional Council area, the Australian Heritage Database of DSEWPC for Queensland sites of National and International significance; and the National Shipwreck database for maritime sites. The National Trust of Queensland was also contacted for information on properties listed in their database of heritage places and found in and around the study area.

Historical research using publicly available books and histories was then undertaken to identify themes of settlement and land use. Local history archives, museum resources and the local history sections of public libraries in the region were searched. Local and regional heritage studies were reviewed, both in and around the study area. These revealed additional sites, but more importantly, historical accounts identifying significant heritage precincts and sensitive zones within the study area.

Discussions took place with local historians, members of local historical societies and local residents with knowledge of the history and historical sites in the region. This consultation commenced in February 2010

and continued throughout the year. These local historians provided information on several important sites and freely gave advice, in the hope that their advice would ensure these sites would be protected.

Identified sites were mapped as layers on a Geographic Information System (GIS) database, and in combination with historical cadastral maps, patterns of historical land use and site distribution were identified.

6.2 Field Investigations

A program of systematic field investigation was undertaken through the study area, examining areas that had been highlighted in the background studies. Initial field reconnaissance and consultation with historical societies commenced in February 2010 and continued with intensive field studies from March to June 2010 and in September 2010. A watercraft was used to examine the coastline around the western edge of Curtis Island and for partially submerged heritage sites and an aerial inspection permitted previously undetected sites to be identified.

Historic sites and places located during field investigations were mapped and their significance assessed using principles outlined in the Burra Charter and in accordance with accepted heritage practice. The field surveys and mapping of sites assisted with the identification of zones of heritage sensitivity. The sensitive zones were identified around previously documented settlements, communication routes, stock routes and homesteads.

6.3 Consultation

Information on non-Indigenous heritage sites in the study area came from a wide range of sources, particularly members of historical societies and local historians. Additionally, representatives of organisations charged with protecting heritage sites, including Regional Council officers provided valuable insights. The people contacted as part of this investigation are listed in Table 2.

Table 2. List of heritage contacts in the study area.

Contact	Organisation or location	Region
J.W. Harris	Gladstone	Curtis Island, Gladstone, Calliope region
Information Officer	Calliope River Historical Village	Port Curtis
Information Officer	Gladstone Regional Council	Gladstone and district
Neville Robertson-Hughes	Gladstone Maritime Museum	Gladstone and district
Danny Aischlemann	Gladstone Maritime Museum	Gladstone and district
Dr Val Dennis Heritage Information Officer	National Trust of Queensland	Entire study area and surrounds
Ross Graving	Resident pastoral leaseholder	Curtis Island

7. Existing environment

A brief history of the study area has been prepared to provide the context in which to evaluate identified

historical sites. This history investigates chronologically arranged themes to provide a context in which to interpret known and potential heritage sites and places. A detailed description of the historical setting of each site has been presented in Appendix 1.

7.1 Historical context

Maritime exploration and mapping

Lieutenant James Cook observed Curtis Island in 1770 when he passed by in HM Bark Endeavour. The next recording of the area took place in 1802, when Matthew Flinders spent four days mapping the harbour and adjacent shores (Flinders 1814). He named Port Curtis and Mount Larcom. In 1823 John Oxley explored the coastline and in 1848 Owen Stanley again surveyed the entrance to the port, recording depths along the southern shore of Curtis Island, on the edge of the study area.

The non-Indigenous heritage legacy of this maritime mapping includes the diaries and maps, recording the landscape prior to the arrival of settlers on the island and adjacent mainland. There are unlikely to be recognisable traces of explorer visitation in the landscape.

Contact with Indigenous people

Much early Queensland history describes contact between Europeans, Chinese and Aboriginal people. This initially involved cooperation between the Indigenous inhabitants and the early explorers and, as land was taken, the friendly relations were replaced by fierce conflict (murder and retaliation and with the discovery of gold, conflict with the large number of miners who flocked to the district).

In 1802 there was an encounter between members of Matthew Flinders' party and the Aboriginal people on the southern shore of Curtis Island:

> *A number of blacks gathered on the shore and protested against the landing of the white men by volleys of stones, but they disappeared when two or three muscats [sic] were fired over their heads. Seven bark canoes were found lying on the shore, and near them, hanging upon a tree, were some parts of a turtle and some scoop nets. [Hogan 1898:10]*

When Colonel Barney sailed along the nearby coast in 1846 on his way to conduct a preliminary survey of Port Curtis for a penal settlement, he met with a large number of Aboriginal people asking for flour and speaking English. He assumed they had contact with whalers in the area (Hogan 1898:37). He was received well and helped to find water to fill the ships casks (McDonald 1988:10).

Renowned Australian novelist Rosa (Campbell) Praed, who lived on Curtis Island for three years from 1872 provided another description of early contact:

> *[Curtis] Island is divided from the mainland by a straight called the Narrows, four miles wide thereabouts at its northern and southern ends, and differing at the middle, according to tidal changes,*

from two miles to less than a mile. At this narrowest portion [they] are able to swim their cattle across to the mainland. At the opening of this story the greatest part of the island was merged in a large cattle station called [Monte Christo], upon which grazed the herds of [Mr Campbell]… [his] predecessor at [Monte Christo] had been, fourteen years previously, the first pioneer of civilisation upon this northern shore. He had, by the terror of his firearms, driven the aborigines onto the mainland … [R. Campbell Praed 1890:11].

A late 19th Century reference to the region reveals the dramatic effects of settlement on Indigenous people:

The country of the Byellee tribe stretches from Keppel Bay to the Calliope River, and includes Curtis Island. It was occupied by the Whites in 1855. The tribe at that time numbered about 300 persons, and is now (1882) reduced to 32. [Curr 1887 III:114]

Archaeological traces may include artefacts made from introduced material (glass, iron, ceramic), massacre sites (bullets, disorganised human remains, fortified homesteads), evidence of station camps (such as hearths, horseshoes, stone artefacts adjacent to homesteads) and town camps.

McCabe's survey and the establishment of Gladstone

In 1853, surveyor Francis McCabe was sent to set out a new town at Port Curtis. He named the town Gladstone, in honour of the Colonial Secretary. Two squatting runs had been claimed at the time of his arrival, however, he saw no Europeans in the district. McCabe and his party were hampered by a lack of provisions, but eventually surveyed the town and hinterland.

It was decided to make Gladstone the administrative centre for a new colony of 'North Australia', which was to take in the northern part of New South Wales, the future Queensland and most of the future Northern Territory. It was to be a government residency with Maurice Charles O'Connell appointed government resident in 1854, after being crown land's commissioner in the Burnett district. The following year his office was abolished after criticism in the Legislative Council about the expense and doubts about his suitability for the job. He remained in the district, again serving as crown land's commissioner. He financed a party that discovered gold, which he reported enthusiastically and precipitated a short-lived gold rush. He was again appointed resident to cope with the influx of miners. In 1860 his office was again abolished. He fought unsuccessfully for compensation for this dismissal, although he did become one of the first nominees to the Legislative Council of the newly established State of Queensland (McDonald 1988).

A number of heritage places, including buildings, graves and historical campsites in and around Gladstone date from the early years of settlement. Many were identified in two heritage studies (Allom Lovell & Associates 1999 and McDonald 2001) and these have been included on the Queensland Heritage Register or on the local heritage list.

European settlement on Curtis Island

The first settlement on Curtis Island was the small pilot station at Sea Hill, established in 1858 to aid

navigation to the Fitzroy River. Another lighthouse was set up at Cape Capricorn, on the north eastern tip of the island, in 1875.

The first cattle station registered on Curtis Island was *Monte Christo,* which took up almost the entire island. It was registered in 1862 but indications are that it may have first been stocked in 1858 (Campbell Praed 1890:11). Rosa Praed went there after her marriage in 1872.

> *The greatest part of the island was merged in a large cattle station … and the remainder comprised the pilot station above mentioned, and an extensive tract of land formerly appropriated by the government for a mission station for conversion of aboriginals, but never used for that purpose … at that time, except the huts at the pilot station and the owners residence [at the cattle station] there was not a habitation upon it. [Campbell Praed 1890:11]*

Monte Christo station was offered for sale in 1868, 1870 and 1871. In 1868 it was sold to Mr. W. Stoving Laird for £2587 (*The Queenslander* 13/6/1868). In the newspaper's sale notice, a description of the southern portion of the property (Birkenhead), in the vicinity of the proposed Arrow LNG plant, appeared:

> *The south end of the island has been securely enclosed by a two-railed fence, and forms a heifer station, equal to carry 1,500 head. At this part of the run (which is at present under a lease expiring in August next) there is a capital Weather-board Cottage of four Rooms (shingled), kitchen, small stockyard, and horse paddock of 400 acres.*

After the sale, improvements were made to the main homestead, which increasing from six to ten rooms. There was no reported change to the southern run, although the lease had been extended (*The Sydney Morning Herald* 11/6/1870).

Curtis Island continued as a cattle station after Campbell Praed sold. Later being divided into three smaller runs (Monte Christo, Spadeleigh and Randalls). In the 1890s a meatworks was established in Gladstone. Cattle were swum across The Narrows at low tide and sold at the Gracemere saleyards. Gladstone's main role was as a service centre for the local cattle industry until the early 1960s, when the shipping of Moura coal from Gladstone's deep-water port, began its transformation into the major industrial centre it is today.

McDonald (2001) identified several heritage places, associated with the pastoral phase of settlement on Curtis Island, in her review of the heritage resources of the Curtis Coast. McDonald ascribed State or Local significance to some of the sites, including Monte Christo Station buildings, although these are still to be listed. All these structures are found well outside the study area.

The surviving buildings at Monte Christo station and the archaeological traces of other buildings and features at the settlement on the southern shore of Curtis Island document this early settlement period.

Several historical maps of Port Curtis provided valuable evidence of the timing of settlement in the district.

The 1881 Lands Department Port Curtis District 2 mile map (NLA Rare Map 2019), shows the area near Friend Point and the LNG plant site (Figure 2).

The sketch showing the pre-emptive and conditional purchases of the Monte Christo run on Curtis Island, drawn by Surveyor Arthur F. Wood in 1870, reveals the location of historical tracks and a homestead at the Arrow LNG plant site (NLA Rex Nan Kivell Collection Map NK 2456/150) (Figures 3 and 4). This was corroborated with contemporary newspaper articles.

Pastoralism

Port Curtis was proclaimed a pastoral district in 1854. At that time Boyne Island, to the south of Port Curtis, was already a sheep run, and several runs had already been claimed on the mainland. Two years later, the population of Gladstone had grown to 200. Pastoral leases were registered along Larcom Creek, near Targinie (Spelt Targinnie in historical sources) and on the shoreline near Friend Point. The presence of these pastoral leases can be seen in the distribution of the meagre ruins of early homesteads through the district.

Closer settlement

Closer settlement schemes were introduced by governments from the 1860s, aimed at breaking up the squatter's large land holdings. In the 1860s a Land Act was introduced, aimed at restricting squatters to land that they actually used. Leases were to be stocked and lease size was restricted. In 1868 Crown Lands legislation was enacted that consolidated the leases of individual pastoralists and allowed for a portion of the combined leases to be resumed. Land Acts from 1860 were intended to increase the number of settlers who could use the land for grazing. In 1884 the Dutton Land Act was passed, bringing in the first real round of 'closer settlement'. It allowed for the resumption of half of each consolidated pastoral lease, with that half to be divided into smaller grazing selections.

Closer Settlement Acts in the 1900s were more specifically aimed at increasing agricultural output by expanding beyond beef cattle production, to dairying, wheat, cotton, sugar and fruit growing and market gardening. The 1906 Closer Settlement Act was the first to affect the pastoralists in the Gladstone hinterland, and was aimed specifically at encouraging a diversification of land use. Soils were not suitable for agriculture in this area and various efforts to grow cotton and sugar cane met with little success. However, those living in Yarwun and Targinie (Targinnie), settlements that had briefly thrived on gold, adapted to closer settlement by growing tropical fruits (McDonald 1988). All of the closer settlement schemes led to extensive land clearing.

Timber

The Narrows was used to transport timber and numerous sawmills operated near Gladstone. Curtis Island played a part in this industry, with the northern part of the island being gazetted as a timber reserve. Timber felling was carried out in the early years of the 20th Century, and logs were loaded on barges in Ramsey

Creek, three kilometres from the Narrows (McDonald 2001:42). Evidence of forestry activities can be seen near North China Bay

Mining

The first goldrush in Queensland occurred in 1858 at the Canoona goldfields on the Fitzroy River 50km northwest of Rockhampton.

> *Port Curtis has made a sensation ... It is the topic of all talk, the theme of all discussion … people are madly disposing of their property to be off to Port Curtis [Pearson1858:15]*

Over 15,000 prospectors arrived by ship from Sydney and Melbourne, and travelled overland via the Darling Downs, only to find the claims had been exaggerated and the alluvial leads were soon worked out. Thousands of prospectors were stranded and the Victorian government intervened, sending ships to bring people back.

Gold was discovered on Targinnie Station in 1900. Mining by a syndicate formed by explorer and pioneer grazier Edward Archer commenced the following year. The mine was sold by Archer sometime after 1907 and continued in operation until 1916. At least ten mines operated around Targinie until World War II. These included the Targinnie Scottish Mine, Old Scottish Mine, Commonwealth Mine, Archer Mine, and North and Middle Reef Mine. Targinie, Mount Larcom and Yarwun all began as mining towns. The mines continued operating until World War I, when labour shortages led to their closure (McDonald 1988:49).

Explorer John Oxley discovered traces of copper ore on Curtis Island (Traill 1980:84) and in 1887 five gold prospecting leases were taken out. “Ore brought from the island was said to show free gold throughout but, apart from that one mention, nothing further was ever noted and the exact location of the find is unknown” (de Havelland 1987:238). No traces of the mines or prospecting pits have been found in the study area.

Industrial development

The initial choice of Rockhampton as a railhead over Gladstone, slowed development in Gladstone for many years. When an extension from Rockhampton finally reached Gladstone it opened up the port to coal exports. The event that completely changed Gladstone into a thriving industrial port was construction of a rail link from the Moura coalfields (McDonald 1988). As a result, Gladstone has become Queensland’s second largest industrial city after Brisbane.

7.2 Heritage sites in the Arrow LNG Plant study area

Sites and places recorded in national, state and local heritage registers are known from the region surrounding the study area. These places help document the development of the region from its pastoral beginnings to the industrial centre of today. In addition to the heritage registers, further sites and places have been identified during previous heritage studies and cultural heritage site clearances.

7.2.1 Registered cultural heritage sites of World or National significance

No registered non-Indigenous heritage sites of national or international significance occur in the Arrow LNG Plant study area. There are, however, a number of listed sites elsewhere on Curtis Island. These include sites and places found on the World Heritage List, National Heritage List and the Register of the National Estate.

Additionally, Curtis Island is the largest of the islands included in the World Heritage registered Great Barrier Reef. While cultural heritage values are recognised in this listing, it does not include reference to specific heritage locations. One site listed on the Register of the National Estate is the Garden Island Conservation Park, located one kilometre to the east of the Arrow LNG Plant study area. It has been recognised for environmental, rather than cultural values, although an abandoned homestead with associated areas of cultivation was noted in the Register of the National Estate listing.

One Curtis Island heritage place, the Cape Capricorn Lightstation, was recognised by its inclusion on the Register of the National Estate, and has since been transferred to the Queensland Heritage Register. This lighthouse, located on the Northeast tip of Curtis Island and situated approximately 30km from the Arrow LNG Plant study area, comprises a lighthouse and associated cottages, keeper's quarters, sheds, store, winch-house and powerhouse.

Another site: the Sea Hill Point Lighthouse, located 35km northwest of the Arrow LNG Plant study area, originally enjoyed Indicative status on the Register of the National Estate. This lighthouse was built at Sea Hill Point, on the north western tip of Curtis Island in 1873, on the site of an earlier pilot station (1858). The lighthouse was replaced in the 1920s and the original is now at the Gladstone Maritime Museum. It marked the eastern entrance to Keppel Bay until it was deactivated in 2006 and the replacement lighthouse was demolished in 2009. Sea Hill developed into a small township with a primary school and a quarantine station (McDonald 2001). Although the original lighthouse was removed it is likely that archaeological deposits associated with the earliest occupation of the site survive. As the original lighthouse has been removed to the Gladstone Maritime Museum, it no longer appears on the Register.

Details of the listed sites are shown below in Table 3.

Table 3. Registered and listed heritage sites of World or National significance on Curtis Island

Place	Heritage register	Significance rating
Great Barrier Reef	World Heritage List, WHL ID 105060; Indicative listing on both the National Heritage and Commonwealth Heritage lists, NHL ID 105709 & CHL ID 105573; Register of the National Estate, RNE ID 103284	International, National
Cape Capricorn Lightstation	Register of the National Estate ID100379 (also on the Queensland Heritage Register ID 601723)	State

Sea Hill Point Lighthouse	Formerly listed on the Register of the National Estate, ID101513	State
Garden Island Conservation Park	Register of the National Estate, ID 8820	Natural heritage of State Significance

7.2.2 National shipwrecks database

Thirteen historic shipwrecks on the National Shipwrecks Database have been recorded within 45km of the study area and nine of these lie at the entrance to Gladstone Harbour. The brigantine *Sable Chief* is the nearest of the listed shipwrecks found 16km east of the Arrow LNG plant site. It was wrecked on rocks off Facing Island in 1856.

While none of the listed wrecks occurs in the study area, reports of flotsam from wrecked ships washing into Port Curtis Harbour are found in contemporary newspaper accounts (*The Mercury* 24/1/1913). It is possible that items from early wrecks found their way onto the Curtis Island shore.

Other, more recent wrecks in the Port Curtis district have been recorded by members of the Gladstone Maritime Museum Historical Society. These include the wreckage of a commercial fishing vessel beached on Tide Island just to the south of the study area. This is the *Moorah*, a scallop trawler that burnt to the waterline while berthed in Gladstone Harbour in 1970 (HCA 2009).

7.2.3 Registered sites of State heritage significance

No sites listed on the Queensland Heritage Register are found in the study area.

Ten state registered sites are, however, found in Gladstone, although the nearest of these is 1.1km from the study area and well clear of any potential impacts. The heritage sites and places include public buildings and a historic fig tree, dating from the early 20th Century. Listing details of these registered sites are shown in Table 4 and the location of the sites is shown in Figure 1.

Table 4. List of sites on the Queensland Heritage Register within 10km of the Arrow LNG Plant study area.

Place	Location	Queensland Heritage Register Place ID
Commonwealth Bank Building (former)	114 Goondoon Street, Gladstone	601338
Gladstone Central State School, Block B	94 Auckland Street, Gladstone	602001
Fig Tree	Roseberry Street	602385
Gladstone Court House	16 Yarroon Steet, Gladstone	601332
Gladstone Post Office (former)	33 Goondoon Street, Gladstone	601331
Gladstone Regional Art Gallery and Museum	144 Goondoon Street, Gladstone	601333

Our Lady Star of the Sea Church and School	Goondoon Street, Gladstone	600521
Port Curtis Co-operative Dairy Association Ltd Factory (former)	6 Short Street, Gladstone	601334
Port Curtis Sailing Club Clubhouse	1 Goondoon Street, Gladstone	602711
Kullaroo House	40 Goondoon Street, Gladstone	601330

7.2.4 Sites on the Gladstone Regional Council Heritage List

Twelve sites and places in the wider Gladstone region are included on the Gladstone Regional Council local heritage list. These are the listed sites and places on the Queensland Heritage Register, with the addition of Gladstone Civic Theatre and Friend Park and graves at Barney Point. All of these sites are found outside the study area and none would be affected by development of the Arrow LNG Plant. The local heritage sites listed on the Gladstone Regional Council heritage list, excluding those on the Queensland Heritage Register are listed below in Table 5.

Table 5. List of local heritage sites on the Gladstone Regional Council Heritage List

Place	Location	Cadastral information
Friend Park and graves	Friend Street, Barney Point	Lot 77, G147
Civic Theatre	165 Goondoon Street, Gladstone	Lot 2, RP608130

7.3 Sites recorded during local heritage studies

Twenty two sites identified in local histories and heritage studies are found in and around the study area. In some cases the exact location or extent of those sites is unknown. Where possible, reported sites in the Arrow LNG study area were inspected to check the accuracy of previous recordings, and to assess the potential for project impacts. A summary of these sources is provided below and recorded sites are listed in Table 6 and shown on Figures 1 to 5.

Allom Lovell & Associates 1999 Gladstone Cultural Heritage Study

This comprehensive study of heritage sites and locally significant community places in the Gladstone City region was undertaken in 1999. Many of the heritage places were identified by residents at public meetings. As part of this study 111 heritage sites, landmarks and public amenities were recorded, all of which are found outside the study area. The study highlights places ranging in significance from those already entered on the Queensland Heritage Register to recent structures and prominent local landmarks.

McDonald, L. 2001 An overview of the historical cultural heritage resources of the Curtis Coast

A detailed study of the wider Curtis Coast region's non-Indigenous heritage was undertaken by McDonald who documented the local history including oral history. McDonald recorded 65 additional sites to those documented in the Allom Lovell & Associates (1999) study. The heritage locations found in the Arrow LNG Plant study area are at Targinie (Targinne). These are: the Targinnie Gold Field, which includes three historic mine sites; the site of Targinnie Station; and Targinie Landing, a slipway cut through the mangroves

to bring goods to the station. Kerosene Creek and Boat Creek are also located in the study area, although are distant from any proposed facilities. Targinie School and Targinie cemetery are located outside the Arrow Energy LNG study area, the remaining sites are within the study area, but distant from any proposed development impacts.

Converge 2009 Gladstone Western Basin dredging and disposal project- historical cultural heritage investigation

This project investigated the potential impacts of construction on historic heritage sites along the shoreline from Fishermans Landing to Friend Point, on the mainland directly adjacent to Curtis Island. Seven locations of historical interest were identified in the survey area. These included fences, boat ramps and artefact scatters. These locations were all found within 50m of the mangrove-covered mud flats and within 2km of the Fishermans Landing reclamation area (Converge 2009). While partially contained with the Arrow LNG Plant study area, none of these sites is near any proposed facilities.

HCA Pty Ltd 2009 Australia Pacific LNG Downstream Non-Indigenous heritage study

This study investigated non-Indigenous cultural heritage in the Australia Pacific LNG gas processing plant site near Laird Point, to the north of the Arrow LNG Plant site. Relying principally on existing site records, consultation with local historians and systematic fieldwork, this study documented numerous, previously unrecorded historical heritage sites, including historic fence lines built with split ironbark posts dating from the early 20th Century. Although distant from the Arrow LNG study area by approximately 2.5km, a similar range of sites was encountered. None of the sites recorded during this investigation occur in the Arrow Energy LNG study area.

Archaeo Cultural Heritage Services 2009 Non-Indigenous Heritage Investigation for the Gladstone LNG Project

This study formed part of the assessment of environmental impacts for the Gladstone LNG Project, located to the north of the Arrow LNG Plant Site. Localised field studies were carried out during this investigation and five sites were identified in and around the proposed Arrow LNG Plant site. These included: the Chinaman's Bay loading facilities (HAS-29); Curtis Island industrial working area (HAS-30) which continues into the Arrow LNG Plant site, a Fisherman's Hut (HAS-33) re-examined as part of the Arrow LNG Plant heritage assessment, a historical stockyard and dam (HI-09) and Stockyards near the Fisherman's Hut (HI-10). Four sites: HAS-29, HAS-30, HAS-33 and HI-10 are located in the Arrow LNG Plant site.

ERM 2009 Cultural Heritage report for the Queensland Curtis LNG Project

This study investigates the Queensland Curtis LNG project area, situated to the north of the Arrow LNG Plant site on Curtis Island. Seven sites were recorded on Curtis Island as part of this investigation, of which, two (Sites CINICH06 and CINICH07) had previously been investigated by Archaeo Cultural Heritage

Servies (2009). Of the recorded sites, five are found outside the Arrow LNG Plant study area. These are: stockyards (CINICH01) and a structure comprising two timber uprights (CINICH02) found 1km to the north of the Arrow LNG Plant study area; and a wharf and timber jetty (CINICH03), a sawmill site (CINICH04) and new yards (CINCH06) found around the edge of China Bay, just beyond the edge of the Arrow LNG Plant study area. Two sites: a loading facility (CINICH05) and the former dairy site (CINICH07) are found in the study area. These sites were also examined during the field survey of the Arrow LNG Plant study area and their history and significance reinterpreted. Reminiscences about recent life on Curtis Island by Winn (2002) describe the formation of some of these sites.

Table 6. Non-Indigenous heritage sites located in the Arrow LNG Plant study area during earlier studies

Site name	Location	Description	Significance
Kerosene Creek (LMcD1)	Kerosene Creek, located at the Stuart Oil Shale mine	Naturally occurring, hydrocarbon-rich shale reported by Captain Matthew Rundle who surveyed the Narrows in 1858 (McDonald 2001:48).	Local
Boat Creek (LMcD2)	Located to the south of Fishermans Landing	Used as a disembarkation point for those who rowed from Gladstone to climb Mt Larcom (McDonald 2001:48).	Local
Targinnie Gold Field (LMcD3)	To the east and west of Targinie settlement	At least eight mines operated in the hills around Targinie. These included the Archer Mine, Old Scottish Mine, Targinnie Scottish Mine, Commonwealth Mine and North and Middle Reef mine. Gold was discovered in 1900 and mines operated from 1901 until 1938 (McDonald 2001:49, De Havelland 1987:237-8).	Local
Targinie School Site (LMcD4)	Located in Targinie settlement	Established in Targinie Township in 1903 with the opening of the Archer Reef, the school closed in 1918 when mining halted. A new school opened in 1923 and was replaced in 1936. The school continued to operated until 1968 (McDonald 2001:50).	Local
Targinie Cemetery (LMcD5)	Located 1.1km south of the village, on the western side of the Calliope River – Targinie Road	The cemetery was first used in 1875, but was not surveyed until 1925. It was used by Targinie village residents from 1901 (McDonald 2001:50).	Local
Fishermans Landing Hardstand (HI-01)	North of Fishermans Landing	Recent roadway and storage area to the north of Fishermans Landing (Converge 2009:28).	Local Historical Interest
Targinie Landing Ramp (HI-02)	End of Landing Road	Launching ramp built at end of Landing Road. Constructed from gravel and fill. Mangrove regrowth suggests it has not been used for some time (Converge 2009:29).	Local Historical Interest
Turkey Nest Dam overflow (HI-03)	Located to the east of the Stuart Oil Shale facility	Small overflow channel apparently associated with the Stuart Oil Shale Project located nearby (Converge 2009:29).	Local Historical Interest
Historic marker tree (HI-04)	North of the Landing Road	Blazed ironbark tree located beside track. Likely to be property boundary mark (Converge 2009:30).	Local Historical Interest
Various fence alignments (HI-05)	North of Landing Road	Fencelines marked by split timber posts crossing onto mudflats (Converge 2009:31).	Local Historical Interest
Historical artefact	Various locations north	Scattered artefacts, some dating from the late 19th	Local Historical

Site name	Location	Description	Significance
scatter (HI-06)	of Landing Road	Century, spread along coastline (Converge 2009:31-2).	Interest
Campsite and boat ramp (HI-07)	Located 770m north of Landing Road	Camping and fishing area behind mudflats (Converge 2009:32).	Local Historical Interest
Chinaman (North China) Bay Loading Facilities (HAS-29)	Located on the southern shore of North China Bay, in the vicinity of proposed Arrow Energy LNG project loading wharf facilities	Loading areas from island to bay and rubbish dump/ hut likely used by people loading on the wharf and slipway. Includes dump of scattered machinery and household refuse on Hambledon selection (Monte Christo Station). Timber stockyard with loading ramp. Wharf with four tall vertical stumps set into dune sand. Slipway built with logs set into edge of bay (Archaeo Cultural Heritage Services 2009).	Local
Curtis Island Industrial Working Site (HAS-30)	Located on the northern side of North China Bay, 350m north of the study area boundary	Fences, old machinery, wire, windmill, tanks and engine footings, sheds and boardwalk. (Archaeo Cultural Heritage Services (2009)	Local
Fisherman's Hut (HAS-33, Former Dairy Site CINICH07)	Located within the boundaries of the Arrow Energy LNG Plant site	Two huts, steel and fibro and an early construction with adzed timbers and old wire drawn nails. Fenced yard to the west with water tanks and domestic plantings; cattle dip and associated farm infrastructure. (Archaeo Cultural Heritage Services (2009). Former dairy shed with a concrete floor, clad in split timber slabs and a corrugated iron roof. A larger building with rudimentary kitchen and beds is located 4m to the south west, It has been built from corrugated sheeting. Water tanks, concrete slabs, machinery and rubbish are found to the south of these structures. A concrete cattle dip is also present in this area (ERM 2009).	Local (assessed in ERM 2009 as being of only local historical interest)
Stockyards and dam (HI-09, CINICH06)	Northern side of North China Bay, 180m north of the study area boundary	A small dam fenced to exclude stock and a metal loading ramp. (Archaeo Cultural Heritage Services 2009, ERM 2009)	Local Historical Interest
Stockyards near fishing hut (HI-10)	Located within the boundaries of the Arrow Energy LNG Plant site	Large steel stockyards located near Fisherman's hut. (Archaeo Cultural Heritage Services 2009)	Local Historical Interest
Former yards site (CINICH01)	Located north of the proposed Arrow LNG plant site, approximately 600m from the coastline	Industrial site with yards made from notched timber posts, tanks and tank stand, ship's tanks, windmill and concrete trough, ceramic sherds and bottle dump. Artefacts date from the inter-war period (Winn 2002, ERM 2009).	Local Historical Interest
Timber posts (CINICH02)	Located inland from the former yards site	Two-metre long, standing bush timber posts, situated on a low ridge overlooking the coastline facing The Narrows (Winn 2002, ERM 2009)	Local Historical Interest
Wharf remains (CINICH03)	Northern side of North China Bay	Located on the northern side of China Bay, this site comprises a rock causeway, with associated glass and ceramic artefacts, two parallel rows of bush timber uprights extending approximately 50m into the mangroves. The wharf is associated with a sawmill located a short distance inland (CINICH04). The ceramic sherds and glass date from the 1920s (ERM 2009:59-61).	Local Historical Interest
Former sawmill remains (CINICH04)	Northern side of China Bay	The site contains timber posts and a pulley system for hauling logs. Artefacts associated with the site include steel rope, chains and pulleys, and steel ship's tanks (ERM 2009)	Local Historical Interest
China Bay Yards (CINICH05)	Southern side of China Bay	Recent timber loading ramp near landing at China Bay. The ramp was recently built and used for loading cattle. This site is of historical interest, but is not locally significant (ERM 2009)	Local Historical Interest

7.4 Sites identified during fieldwork

Through a systematic program of field survey and consultation with local historians and members of the

public, eight new sites were identified and a previously known site were re-examined and their significance re-assessed. These sites have been recorded in detail and their significance assessed using the criteria specified in the Queensland Heritage Act, the Burra Charter, themes in Queensland history, and Threshold Indicators. These sites are listed in Table 7 and a detailed description and the criteria used for establishing heritage significance are provided in Appendix 1.

Table 7. List of sites identified or reinvestigated during fieldwork in the Arrow LNG Plant study area

Site Name	Location	Description	Significance
Fisherman's Landing			
Concrete building footings ALNG-H1	170m north of Stuart Oil Shale facility	Remnants of buildings located on slope overlooking Curtis Harbour. The concrete footings cover an area of approximately 20x40m. Eight timber uprights of a large tank stand are found 70m to the west, associated with a large mango tree. It is probable that this site contains the remnants of a house site and light industrial complex.	Local historical interest
Curtis Island sites			
Birkenhead outstation site ALNG-H2	Boatshed Point	Although there are recent structures at the site, described above and interpreted as a fisherman's cottage (Archaeo 2009 – HAS-32) or an old dairy (ERM 2009 – Site CINICH07), this is the site of the original *Monte Christo* outstation, described in a 1868 newspaper advertisement as comprising a "capital Weather–board cottage of four Rooms (shingled), kitchen, small stockyard, and horse paddock of 400 acres" (*The Brisbane Courier* 12/5/1868 page 4). The location of the site is shown on the 1870 plan of the Monte Christo leases prepared by Surveyor Wood. Some of the surviving structures clearly pre-date the recent buildings on the site. These include the concrete floor of a machinery shed, yards, and a pit that may mark the location of an outhouse. A domed, brick-lined water tank is found approximately 70m south of the buildings. This tank is mentioned in oral history accounts and is likely to be a relatively early feature. Oral history suggests that more recently the house was occupied by the Price family with their 14 children. They lived in a house on a low rise overlooking Curtis Harbour (Wood 1870, *The Brisbane Courier* 12/5/1868, HCA 2009, Personal communication J.W. Harris).	Local Heritage Significance
Grave at Birkenhead outstation ALNG-H3	Boatshed Point	Although its precise location is unknown, oral history reveals that this is the grave of William Alfred Price, who died aged approximately 15 months on 15/1/1905, during a cyclone. The child had been ill and due to rough seas, the family was unable to transport him across The Narrows to get medical assistance. The child was buried near the house (HCA 2009, Personal communication J.W. Harris).	Local Heritage Significance
Post cutting site ALNG-H4	In forest at the northern end of the plant site, beside fence	Remnants of several felled trees, sawn longitudinally to produce fence posts. Debris covers an area of 20x30m.	Local Historical Interest

Site Name	Location	Description	Significance
Old yards ALNG-H5	In clearing to the east of rise with Birkenhead outstation site	Recent yards with old post and rail elements, suggesting that the modern yards are built on the site of an earlier structure (Survey HCA 2010).	Local Historical Interest
Stock enclosure ALNG-H6	Boatshed Point	This substantial structure forming an enclosure and race has been built from split timber palings. It is located beside the old track leading south from the Birkenhead homestead site. This site predates the recent structures on the hill to the west (Survey HCA 2010, Personal communication Ross Graving).	Local Historical Interest
Historic fence line, Hamilton Point ALNG-H7	Hamilton Point	Historic fence line extending into the bay to the east of Hamilton Point. The fence comprises standing, split ironbark posts, although all traces of the wire that connected them has been lost. The flats across which the fence line has been built are inundated at high water level (Survey HCA 2010).	Local Historical Interest
Pre-1870 track alignment ALNG-H8	Boatshed Point	This overgrown track is the original alignment providing access to a wharf on Boatshed Point. A cutting from the high bank provided access to the wharf, although no traces of the latter remain. The track passes around the western side of the peninsula and can be followed at different points through the bush. The route can be seen on the map prepared by Wood in 1870 (Survey HCA 2010, Wood 1870).	Local Heritage Significance
Ruins of rendered brick building ALNG-H9	Boatshed Point	The ruins of a 6x4m rendered brick building was found on rise overlooking the southern end of Boatshed Point. The walls have been rendered, and the small, rectangular building has a small cooking alcove at one end. Roof timbers have all disappeared, probably as a result of bushfire. The structure has a concrete floor that extends beyond the building, to form a verandah (Survey ALNG 2010).	Local historical interest

8. Site sensitivity mapping

Abundant grass cover throughout the study area may have concealed heritage sites. By examining the distribution of known sites, landscape features and historical accounts, it has been possible to generate a site sensitivity map, highlighting areas where further heritage sites are likely to occur. Sensitive zones surround the recorded sites, along the coastline and on level ground, where structures may have been built. Highly sensitive locations have a high probability of further sites occurring. Moderate sensitivity zones surround those with a forecast high sensitivity, having a lesser likelihood of sites occurring. Sites found in sensitive areas on Curtis Island are likely to be associated with grazing and forestry. The map showing sensitive zones is presented in Figure 6.

9. Study limitations

The historical research and fieldwork program has yielded valuable results, in an area where until recently there had been limited and contradictory site recording. There are limitations in the historical site data for the study area. The data is limited because heritage lists, the first source of information on non-Indigenous

heritage sites, contain a bias in the types of sites recorded. The bias is essentially toward built heritage and away from archaeological traces, which are the most common evidence of prior historical land use. The majority of sites recorded during field investigations are archaeological sites.

As most registered non-Indigenous sites and places in Queensland have been recorded by members of local historical societies, the National Trust and in more recent times by cultural heritage practitioners, recorded sites tend to reflect narrow interests or restricted geographic coverage. There is, therefore, an overwhelming bias in favour of public buildings, homesteads and monuments. Few archaeological sites have been registered, although with the change to the *Queensland Heritage Act* in 2008, this oversight is being redressed. Field surveys carried out as part of this project assessment have gone some way to address these limitations.

One impediment to the detection of heritage sites and places resulted from the extent of ground cover vegetation growth in the study area. While standing structures could be readily detected the surface traces that reveal buried archaeological sites could not. Further archaeological sites may occur in the study area, primarily in the vicinity of existing structures.

10. Potential impacts

By overlaying recorded cultural heritage sites and structures on a plan of the proposed area of disturbance, it has been possible to identify potential impacts. Where heritage places are situated in areas where planned facilities are proposed, it is considered likely that significant direct impacts will result. Where the facilities are located within 50m of a planned facility, it has been predicted that indirect impacts may result.

This heritage study has identified sites and places in the Arrow LNG Plant study area, recorded in earlier investigations and during dedicated field surveys for this project. This site catalogue permits an evaluation of potential impacts and the recommendation of appropriate impact mitigation measures. On the basis of current project plans, potential impacts from the Arrow LNG Plant can be anticipated at several sites of local heritage significance and heritage interest.

No site listed on any national, state or local council heritage register or heritage list, is at risk from the Arrow LNG Plant. There are however sites with a local heritage significance or local historical interest, that will be affected by the project. The potential for project activities to impact upon these sites is described below in Table 8. Heritage sites that may be impacted are highlighted.

Table 8. Impacts to heritage sites within the Arrow LNG Plant study area

Site Name	Location	Site significance	Potential impacts
Fishermans Landing			

Site Name	Location	Site significance	Potential impacts
Kerosene Creek (LMcD1)	Kerosene Creek, located at the Stuart Oil Shale mine	Local Heritage Significance	Nil. Inside study area but more than 50m away from construction activities.
Boat Creek (LMcD2)	Located to the south of Fishermans Landing	Local Heritage Significance	Nil. Inside study area but more than 50m away from construction activities.
Targinnie Gold Field (LMcD3)	To the east and west of Targinie settlement	Local Heritage Significance	While the known mining sites are distant from planned facilities, previously undetected mining sites found to the north of Targinie may impacted by construction of a Temporary Workers Accommodation Facility (TWAF) in the area, TWAF8.
Fishermans Landing Hardstand (HI-1)	North of Fishermans Landing	Local Historical Interest	Nil. Inside study area but more than 50m away from construction activities.
Targinie Landing Ramp (HI-2)	End of Landing Road	Local Historical Interest	Nil. Inside study area but more than 50m away from construction activities.
Turkey Nest Dam overflow (HI-3)	Located to the east of the Stuart Oil Shale facility	Local Historical Interest	Nil. Inside study area but more than 50m away from construction activities.
Historic marker tree (HI-4)	North of the Landing Road	Local Historical Interest	Nil. Inside study area but more than 50m away from construction activities.
Various fence alignments (HI-5)	North of Landing Road	Local Historical Interest	Historic fence lines may be destroyed by construction of TWAF 8.
Historical artefact scatter (HI-6)	Various locations north of Landing Road	Local Historical Interest	Nil. Inside study area but more than 50m away from construction activities.
Campsite and boat ramp (HI-7)	Located 770m north of Landing Road	Local Historical Interest	Nil. Inside study area but more than 50m away from construction activities.
Concrete building footings ALNG-H1	170m north of Stuart Oil Shale facility	Local historical interest	Nil. Inside study area but more than 50m away from construction activities.
Curtis Island sites			
Former yards site (CINICH01)	Located north of the proposed Arrow LNG Plant site, approximately 600m from the coastline	Local Historical Interest	No impact from the Arrow LNG Plant. This site will be impacted by Gladstone GLNG Project.
Timber posts (CINICH02)	Located inland from the former yards site	Local Historical Interest	No impact from the Arrow LNG Plant. This site will be impacted by Gladstone GLNG Project.
Wharf remains (CINICH03)	Northern side of China Bay	Local Historical Interest	Construction of the Arrow LNG Plant is unlikely to result in impacts along the shoreline 250m to the south.
Former sawmill remains (CINICH04)	Northern side of China Bay	Local Historical Interest	Nil. Inside study area but more than 50m away from construction activities.
China Bay Yards (CINICH05)	Southern side of China Bay	Local Historical Interest	Site will be destroyed during construction of wharf facilities to the west of the Arrow LNG plant.
New Yards (HI-09, CINICH06)	South of main track	Local Historical Interest	Nil. Inside study area but more than 50m away from construction activities.
Former Dairy Site (HAS-32, CINICH07)	Located on hilltop to east of China Bay	Local Historical Interest	This site will be destroyed during construction of train 2 and train 3 at the Arrow LNG plant.

Site Name	Location	Site significance	Potential impacts
Birkenhead outstation site ALNG-H2	Boatshed Point	Local Heritage Significance	This site will be destroyed during construction of train 2 and train 3 at the Arrow LNG plant.
Grave at Birkenhead outstation ALNG-H3	Boatshed Point	Local Heritage Significance	Although the exact location of the grave is unknown, planned plant facilities (train 2 and train 3) to be located on the ridge, in the area where this site is most likely situated, will result in its destruction.
Post cutting site ALNG-H4	In forest at the northern end of the plant site, adjacent to fence line	Local Historical Interest	This site may be damaged by fence construction, however, this impact would be negligible.
Old yards ALNG-H5	In clearing to the east of rise with Birkenhead outstation site	Local Historical Interest	This site will be destroyed during construction at the Arrow LNG Plant.
Stock enclosure ALNG-H6	Boatshed Point	Local Historical Interest	The site is located beside the access road to Boatshed Point and may be damaged or destroyed during construction.
Historic fence line, Hamilton Point ALNG-H7	Hamilton Point	Local Historical Interest	Portions of this fence line will be lost through construction of the Arrow LNG plant.
Pre-1870 track alignment ALNG-H8	Boatshed Point	Local Heritage Significance	The majority of this track will be destroyed by building of a construction camp and access road to the southern end of Boatshed Point.
Ruins of rendered brick building ALNG-H9	Boatshed Point	Local Heritage Significance	This building will be impacted by construction of facilities associated with the construction camp and wharf facilities on the southern end of Boatshed Point.

10.1 Potential impacts to undetected sites

Reviews of site registers and existing heritage studies, consultation with knowledgeable local historians, and detailed field studies have revealed the presence of non-Indigenous heritage sites in the Arrow LNG Plant study area. Despite this review, it is likely that other sites, particularly buried archaeological sites, remain undetected. If these sites do exist, they are most likely to occur in those areas identified as having high archaeological sensitivity.

10.2 Impacts from operation and decommissioning of the Arrow LNG Plant

Most impacts to non-Indigenous heritage sites in the study area will result from vegetation clearing and earthworks during construction. These impacts will be widespread and will remove all traces of cultural heritage sites from impacted areas. Once the plant has been built, further disturbance would only occur in previously impacted areas. Decommissioning of the plant would also be confined to previously disturbed areas and there would be no impacts to additional cultural heritage items.

11. Mitigation

The preferred approach to site protection for this project is complete site avoidance. Where sites cannot be avoided, comprehensive mitigation measures will be necessary to ensure that sites are fully investigated

and documented. The nature of the investigation will be appropriate to the type of site and its level of significance. In areas deemed to be of high non-Indigenous heritage sensitivity, sub-surface testing, remote sensing or construction impact monitoring and recording may be warranted. Impacts can be minimised by the implementation of a heritage management plan to ensure appropriate protection of items of heritage significance identified during construction and operations.

11.1 Protecting known sites

Five standard heritage practice measures are typically available for the management of development impacts on heritage sites. These encompass: avoidance, relocation, salvage, archival recording and interpretation. In most cases a combination of these measures will minimise the loss of site heritage values.

1. Avoidance

By mapping known sites and identifying locations with a high potential to contain further sites, it may be possible to develop engineering and design solutions to avoid impacts to some sites. The simplest means of protecting sites from development impacts entails relocation of facilities so the sites are avoided. Where the sites remain near construction, it may be necessary to erect physical barriers to protect the site from accidental damage.

2. Relocation

In some instances where impacts are unavoidable, it may be possible to relocate the heritage items, either to a nearby area that is not threatened by construction impacts, or to a museum.

3. Salvage

Controlled archaeological excavation may be an option for recovery of information and relics from sites threatened by construction impacts. Once the site has been investigated and the information or relics recovered, development may proceed in the site area.

4. Archival recording

Detailed archival recording of heritage items that are to be impacted by development is a minimum requirement. DERM has guidelines for archival photographic recording and plan drawings for heritage sites to ensure that these records accurately document threatened sites.

5. Interpretation

Either as part of a salvage and recovery program, or in isolation, the pubic interpretation of a site to be impacted by development can inform the community of the heritage values of sites that are lost or damaged. In some instances, it is possible to incorporate elements of the archaeological features in public displays as part of the development. The Gladstone Maritime Museum or Calliope River Historical Village may be appropriate venues for such a display.

11.2 Heritage Management Plans

It is recommended that a heritage management plan be formulated, to specify how known heritage sites are to be protected during construction and to outline procedures to be followed in the event that further historic heritage sites or features are found. This protocol will be prepared in consultation with the Queensland Heritage Office, to ensure that no uncontrolled impacts occur that would diminish the heritage values of significant sites and places, including the curtilage of those places.

Consultation should also be undertaken with local historical societies and/or local historians (as appropriate) to help identify management options for threatened sites and places deemed to be of only historical interest.

11.3 Construction management

Before commencement of construction, site recording and protection measures as outlined in the Heritage Management Plan must be implemented. These protection measures will depend on the nature and significance of the site, these may include physical barriers, and/or exclusion and buffer zones. The extent of buffer zones will be dependent on the nature and significance of the site and may be 20-50m.

If, during construction, previously unidentified historical heritage items are uncovered, it will be necessary to employ site assessment and management procedures specified in the Heritage Management Plan. This will require: an immediate stop work within a 50m radius of the discovered heritage items; reporting of the heritage items to the Queensland Heritage Office; assessment of the item or place's significance by a qualified heritage practitioner; and the implementation of necessary recording or salvage measures. Only once the heritage traces have been reported and managed, will work be permitted to continue in these locations.

All project personnel, including management and on-site workers should be instructed in the importance of non-Indigenous heritage, its recognition, and the proper and lawful procedures to be followed on its discovery.

11.4 Site-specific management

Site-specific recommendations have been formulated for the management of impacts at sites in the Arrow LNG Plant study area (Table 9), which should be considered in the development of a Heritage Management Plan, as recommended in Section 11.2. It is noted that no sites identified require negotiations with the Queensland Heritage Council or DERM regarding their management and community consultation with regards to sites of local interest will take place in the detail project planning phase.

Table 9. List of management recommendations for sites that may suffer construction impacts in the Arrow LNG Plant study area

Site Name	Potential impacts	Site significance	Recommendations
Fishermans Landing			
Targinnie Gold Field (LMcD3)	While the known mining sites are distant from planned facilities, previously undetected mining sites found to the north of Targinie may impacted by construction of a Temporary Workers Accommodation Facility (TWAF) in the area, TWAF8.	Local Heritage Significance	A detailed site survey of the site of a proposed Temporary Workers Accommodation Facility (TWAF 8), located to the north of known mine sites in the Targinnie Gold Field may reveal further associated heritage sites. These would be recorded and appropriate impact mitigation measures formulated in consultation with the Queensland Heritage Office.
Various fence alignments (HI-5)	Historic fence lines may be destroyed by construction of TWAF 8.	Local Historical Interest	If fence lines are in development areas these alignments should be recorded. The fences can then be removed.
Curtis Island sites			
China Bay Yards (CINICH05)	Site will be destroyed during construction of wharf facilities to the west of the Arrow LNG plant	Local Historical Interest	Further site recording and mapping should occur prior to site destruction.
Former Dairy Site (HAS-32, CINICH07)	This site will be destroyed during construction of train 2 and train 3 at the Arrow LNG plant.	Local Historical Interest	Site should be recorded in detail before it is destroyed.
Birkenhead outstation site ALNG-H2	This site will be destroyed during construction of train 2 and train 3at the Arrow LNG plant.	Local Heritage Significance	Traces of this site may survive and further, detailed site investigations should occur prior to site destruction. These should entail remote sensing and excavation.
Grave at Birkenhead outstation ALNG-H3	Although the exact location of the grave is unknown, planned plant facilities (train 2 and train 3) to be located on the ridge, in the area where this site is most likely situated, will result in its destruction.	Local Heritage Significance	This grave may still survive and attempts should be made to relocate it using remote sensing techniques. Construction monitoring would be warranted in this area. Should the grave be found it should be relocated to protect it from construction activities.
Post cutting site ALNG-H4	Site will be removed during construction of fencing around the perimeter of the plant site.	Local Historical Interest	No further recording of this minor site is warranted.
Old yards ALNG-H5	This site will be destroyed during construction at the Arrow LNG Plant.	Local Historical Interest	Site should be recorded in detail before it is destroyed.
Stock enclosure ALNG-H6	The site will is located beside the access road to Boatshed	Local Historical Interest	Site should be recorded in detail before it is destroyed.

Site Name	Potential impacts	Site significance	Recommendations
	Point and may be damaged or destroyed during construction.		
Historic fence line, Hamilton Point ALNG-H7	Portions of this fence line will be lost through construction of the LNG plant.	Local Historical Interest	Site should be recorded in detail before it is destroyed.
Pre-1870 track alignment ALNG-H8	The majority of this track will be destroyed by building of a construction camp and access road to the southern end of Boatshed Point.	Local Heritage Significance	The road should be fully mapped prior to destruction.
Ruins of rendered brick building ALNG-H9	This building will be impacted by construction of facilities associated with the construction camp and wharf facilities on the southern end of Boatshed Point.	Local Heritage Significance	The building and its curtilage should be investigated and recorded in detail prior to the commencement of construction in this location.

12. Cumulative impacts

In addition to the potential impacts from construction of the Arrow LNG Plant, there are several other parallel projects being built on the south western shore of Curtis Island. Construction of these gas processing plants, located immediately to the north of the Arrow LNG Plant will also result in impacts to several recorded sites.

The other LNG projects will result in impacts to sites associated with the Curtis Island's pastoral industry. Construction of the Gladstone LNG plant may result in the loss of an extensive scatter of artefacts: the Curtis Island Industrial Working Site (HAS-30). This site has been recorded fully by Gladstone LNG archaeologists prior to construction at the plant site (Archaeo Cultural Heritage Services 2009).

Two pastoral sites will be lost through development of the Queensland Curtis LNG Plant facility: disused cattle yards (Site CINICH01) and two bush-timber posts of uncertain function (CINICH02) (ERM 2009 Volume 78). These have been recorded in detail by the Queensland Curtis LNG archaeologist.

On the Australia Pacific LNG plant site, portions of several fence lines comprising rows of split ironbark posts, will be lost through construction (HCA 2009). These are associated with early to mid-20th Century pastoral activities on the island. These are of local historical interest, and are well represented by other, similar features elsewhere on the western side of the island, in areas where there will be no construction impacts. The fence lines have been recorded in detail prior to construction.

Sites found in and around the study area are also subject to impacts from natural processes. Many of the fence posts marking old paddock boundaries, have been charred or destroyed in bushfires.

13. Conclusions

A small number of non-Indigenous heritage sites are found in the south western corner of Curtis Island and near Fishermans Landing on the adjacent mainland. Some of these sites are located in areas that will be impacted by the Arrow LNG Plant. None of these sites are listed as having heritage significance under any national, state or local council register. There are however sites of local heritage significance or of historical interest. Mitigation measures will need to be implemented to ensure that heritage values are protected. These have been highlighted in this document.

Construction impacts to previously undetected non-Indigenous heritage items will be controlled through the implementation of a comprehensive heritage management plan prepared prior to construction, and rigorously applied work procedures. This will ensure that newly discovered heritage items are assessed, reported and managed in a manner recognising the significance of those items.

If these mitigation measures are implemented, there will be localised impacts to non-Indigenous cultural heritage sites in the study area. Overall, however, most impacts will only occur to sites of historical interest or local heritage significance, and will result in minimal effects to the non-Indigenous heritage values of the region.

14. References

Allom Lovell & Associates 1999 Gladstone Regional Heritage Study. Report prepared for Gladstone Regional Council and the EPA.

Archaeo Cultural Heritage Services 2007 Gladstone – Fitzroy Pipeline Project Environmental Impact Statement. Cultural Heritage. (Chapter 14).

Archaeo Cultural Heritage Services 2009 Non-Indigenous Heritage Investigation for the Gladstone GLNG Project. Report prepared for URS.

Australia ICOMOS 1999 *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance*. Australia ICOMOS.

Bickford A. 1991 The Australian ICOMOS Charter (The Burra Charter) and First Government House. *In* G, Davidson and C.A. McConville (eds) 1991 *A Heritage Handbook*, pp.38-42. Allen and Unwin, NSW.

Blake, T. 1996 Queensland cultural heritage context study. A report to the Queensland Heritage Council.

Blake, T. 2005 Targinnie: History of a Central Queensland Rural Community. Queensland Government, Brisbane.

Brisbane Courier, The 1868 Classified advertisement for Monte Christo Station. The Brisbane Courier 12 May 1868, page 4.

Converge 2009 Historic cultural heritage investigation. Gladstone Western Basin Dredging and Disposal Project. A report to GHD.

Curr, E.M. 1887 *The Australian Race: its origin, languages, customs, place of landing in Australia and the routes by which it spread itself over that continent*. John Ferres: Government Printer.

De Havelland D.W. 1987 Gold and Ghosts. A *prospectors guide to metal detecting and history of the Australian Goldfields Vol 3. Queensland Central and Southern Districts*. Hesperian Press.

ERM 2009 Queensland Curtis LNG Project, Draft Environmental Impact Statement.

Flinders, M. 1814 *A Voyage to Terra Australis*. 2 volumes. London: G. and W. Nichol.

Heritage Consulting Australia (HCA) 2009 Australia Pacific LNG Non-Indigenous Heritage reports prepared for the Environmental Impact assessment.

Hogan, J.F 1898 *The Gladstone Colony*. Fisher Unwin, London

McDonald, L. 1988 Gladstone, City that waited. Boolarong Publications for the Gladstone City Council.

McDonald, L. 2001 An overview of the historical cultural heritage resources of the Curtis Coast. Consultancy report prepared for the Coastal Planning Unit of the Environmental Protection Agency.

The Mercury 24 January 1913 Supposed shipping disaster. Wreckage on Queensland coast. Motor Launch's discovery. Hobart, Tasmania, p.3.

Pearson, L. 1858 *The emigrants guide to Port Curtis and the Canoona Gold Regions on the Fitzroy River*

New South Wales. Printed by Shaw, Harnett and Co.

Praed, Mrs R. Campbell 1890 *An Australia Heroine*. Ward and Downey, London.

Queensland Heritage Council 2005 Illustrated Guide to Entering Houses in the Queensland Heritage Register. Environment Protection Authority and Queensland Heritage Council.

Queensland Heritage Council 2006 *Using the Criteria: a methodology. An interpretation and methodological framework for entering places in the Queensland Heritage Register using the criteria as established by the Queensland Heritage Act 1992.* Queensland Heritage Council, City East, Queensland.

Traill, W.H. 1980 *Historical Sketch of Queensland*. Lansdowne Press, Sydney.

Ward, P. (ed) 2002 Some Early Bush Graves. Gladstone Historical Society and Museum.

Winn, R. 2002 High Tides and Hard Rides: a rollicking account of the last-frontier adventure in the 1990s. Boolarong Press. Moorooka, Qld.

Wood, A.F. 1870 Pre-emptive and conditional purchases of the Monte Christo run on Curtis Island. NLA Rex Nan Kivell Collection Map NK 2456/150.

14.1 Legislation

Environment Protection and Biodiversity Conservation Act, 1999

Australian Heritage Commission Act, 1975

Australian Heritage Council Act, 2003

Historic Shipwrecks Act, 1976

Integrated Planning Act, 1997

Queensland Heritage Act, 1992

Sustainable Planning Act 2009

15. Glossary

Archaeology	The systematic study of past human life and culture through the recovery and examination of surviving material evidence, such as structures, landscapes and occupation deposits.
Artefact	An artefact is any object made or modified by humans. In historical contexts, artefacts include timber, ceramic, glass and metal objects, discarded or lost by their owners.
Burra Charter	The Burra Charter defines the basic principles and procedures for the conservation of heritage places of cultural significance to be followed in the conservation of Australian heritage places. It was adopted by the Australia International Council on Monuments and Sites (ICOMOS). It is based on the philosophy and concepts of the Venice Charter, although adapted to Australian conditions.
Contact history	The period following the arrival of Europeans to Australia and the history of their interaction with Indigenous people.
Cultural heritage	Cultural heritage includes the artefacts and intangible attributes (values, ideas, technologies) of a group inherited from past generations, maintained in the present and passed on to future generations. Physical cultural heritage includes the buildings, historic places, sites and artefacts considered of such value as to be preserved for the future. Heritage also includes cultural landscapes (natural features with cultural values).
Curtilage	The enclosed space immediately surrounding a house or building. It can include the yard or home paddock of a pastoral station.
Fabric	The materials that make up the physical structure of historical sites: timber, masonry, stone, in combination with the ways in which those components have been assembled to construct structures.
Local historical interest	A heritage site or place that meets none of the criteria to qualify as significant at a local, state or national level, but can nevertheless help us to better understand the historical use of a region.
Non-Indigenous heritage	Items of cultural heritage and heritage places associated with cultural groups other than those of the first Australians. These are historical sites, places and artefacts connected with European, Chinese and South East Asian visitors to and inhabitants of Australia. Indigenous heritage is a separate field of investigation although there are common

	sites and themes dating from the contact period.
Significance	The aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects (Burra Charter).
Significance assessment	The evaluation of the importance of sites, buildings and places, following the principles of Burra Charter and accepted heritage practice, and using the criteria outlined in Queensland heritage legislation.
Significance indicators	These are the attributes that a place must possess to be considered for heritage listing on the Queensland Heritage Register. A site may possess one or more significance indicators. The significance indicators are drawn from Section 35 of the *Queensland Heritage Act*, 1992 and include: a. Evolution or pattern of Queensland's history b. Rare, uncommon or endangered aspects of Queensland's cultural heritage c. Understanding of Queensland's history d. Demonstrating characteristics of a particular class of cultural places e. Aesthetic significance f. Degree of creative or technical achievement at a particular period g. Associations with a particular community or cultural group for social, cultural or spiritual reasons h. Association with a person, group or organisation important in Queensland history
Threshold indicators	The levels or thresholds of significance that need to be met for a particular heritage place to qualify as being of Local, State, National or World heritage significance. The Threshold Indicators include factors such as rarity, integrity and representativeness.

Appendix 1 – Site descriptions

Site no. ALNG-H1
Site name Concrete building footings
Location 56J (GDA94) 311120 7368680
Source Discovered during field survey, Survey HCA 2010, Blake (2005).
Site Description Concrete footings for removed buildings. May be associated with an earlier phase of the oil shale mining that continues at the Stuart Oil Shale Mine, to the south.

Photos

Suggested measures Nil. Site is within study area but more than 50m away from construction activities
Site significance Local Historical Interest

Significance type	Criterion for listing on heritage register	Significance Indicators	Threshold Indicators
Scientific Historical	c) place has the potential to yield information that will contribute to an understanding of Queensland history	May contribute information on shale oil mining in the mid-20th Century	**Intactness** – disturbed with most structures removed. Archaeological traces may be present.

Site no. ALNG-H2
Site name Birkenhead outstation site
Location 56J (GDA94) 319232 7368736 Buildings 56J (GDA94) 319241 7368673 (subterranean water tank)
Source Discovered during field survey, Survey ALNG 2010, Wood 1870, *The Brisbane Courier* 12/5/1868, HCA 2009, Personal communication J.W. Harris
Site Description Although there are recent structures at the site, interpreted as a fisherman's cottage (Archaeo 2009) or an old dairy (ERM 2009 – Site CINICH07), this is the site of the original *Monte Christo* outstation, described in a 1868 newspaper advertisement as comprising a "capital Weather–board cottage of four Rooms (shingled), kitchen, small stockyard, and horse paddock of 400 acres" (*The Brisbane Courier* 12/5/1868). The location of the site is shown on the 1870 plan of the *Monte Christo* leases prepared by Surveyor Wood. Some of the surviving structures clearly pre-date the recent buildings on the site. These include the concrete floor of a machinery shed, yards, and a pit that may mark the location of an outhouse.

A domed, brick-lined water tank is found approximately 70m south of the buildings. This tank is mentioned in oral history accounts and is likely to be a relatively early feature.

Oral history suggests that more recently the house was occupied by the Price family with their 14 children. They lived in a house on a low rise overlooking Curtis Harbour (Personal communication J.W. Harris)

Photos

Suggested measures Avoid if possible. If unavoidable, site will need further investigation, archival recording, sub-surface testing to identify any mid 19th Century features.

Site significance Local significance

Significance type	Criterion	Significance Indicators	Threshold Indicators
Historical Scientific	h) association with person of importance to Queensland history (Rosa Campbell Praed)	Special association with a person who made a significant contribution to the development of Australian literature	**Importance of person** – significant 19th Century writer **Degree of association –** peripheral to her life, although she lived at the main *Monte Christo* homestead.

Site no. ALNG-H3
Site name Grave at Birkenhead outstation
Location 56J (GDA94) 319232 7368736 approximate position
Source Survey ALNG 2010, HCA 2009, Ward 2002, Personal communication J.W. Harris
Site Description Although its precise location is unknown, oral history reveals that this is the grave of William Alfred Price, who died aged approximately 15 months on 15/1/1905, during a cyclone. The child had been ill and due to rough seas, the family was unable to transport him across the Narrows to get medical assistance. The child was buried near the house.

Photos

Suggested measures

Site significance Local significance

Significance type	Criterion	Significance Indicators	Threshold Indicators
Social	g) strong association with individual in the local community	Associated with event having effect on particular group	**Significant former association** – significant for family members who remain in the district

Site no. ALNG-H4
Site name Post cutting site
Location 56J (GDA94) 319207 7370047
Source Survey ALNG 2010
Site Description Although Curtis Island was the source of timber for milling, taken from the island by raft from wharves at China Bay and Graham Creek, there are few traces of actual timber felling on the southern part of the island. While termites will have consumed many of the remaining stumps, this was one of the few locations with evidence of timber getting. The logs have been cut with a mechanical saw (not a chainsaw), and the site is unlikely to be of any great antiquity. The timber getting activities are less than 20 years old.

Photos

Suggested measures None. Site has been recorded and is not significant.

Site significance Local historical interest

Significance type	Criterion	Significance Indicators	Threshold Indicators
Scientific	b) demonstrating endangered aspect of Queensland cultural heritage	Timber use in the Curtis Island forests, for which there is only peripheral evidence	**Integrity** – relatively well preserved felled and cut timber

Site no. ALNG-H5
Site name Old yards
Location 56J (GDA94) 319522 7368831
Source Survey ALNG 2010
Site Description These yards are located on the flats to the east of the Birkenhead outstation. Although many of the elements of these yards are modern (steel fences and ramp) and chainsaw cut timber railings, older timber fences are present. These post and rail fences run from the hill on which the Birkenhead Outstation buildings are found, to the flats on which the yards have been built. These are likely to mark the location of an earlier yard built on the same site as the modern yards.

Photos

Suggested measures The site should be recorded in detail and then it can be impacted by construction.

Site significance Local historical interest

Significance type	Criterion	Significance Indicators	Threshold Indicators
Scientific	b) demonstrating endangered aspect of Queensland cultural heritage	Timber use (post and rail fence construction) that is now uncommon	**Integrity** – poorly preserved fenceposts

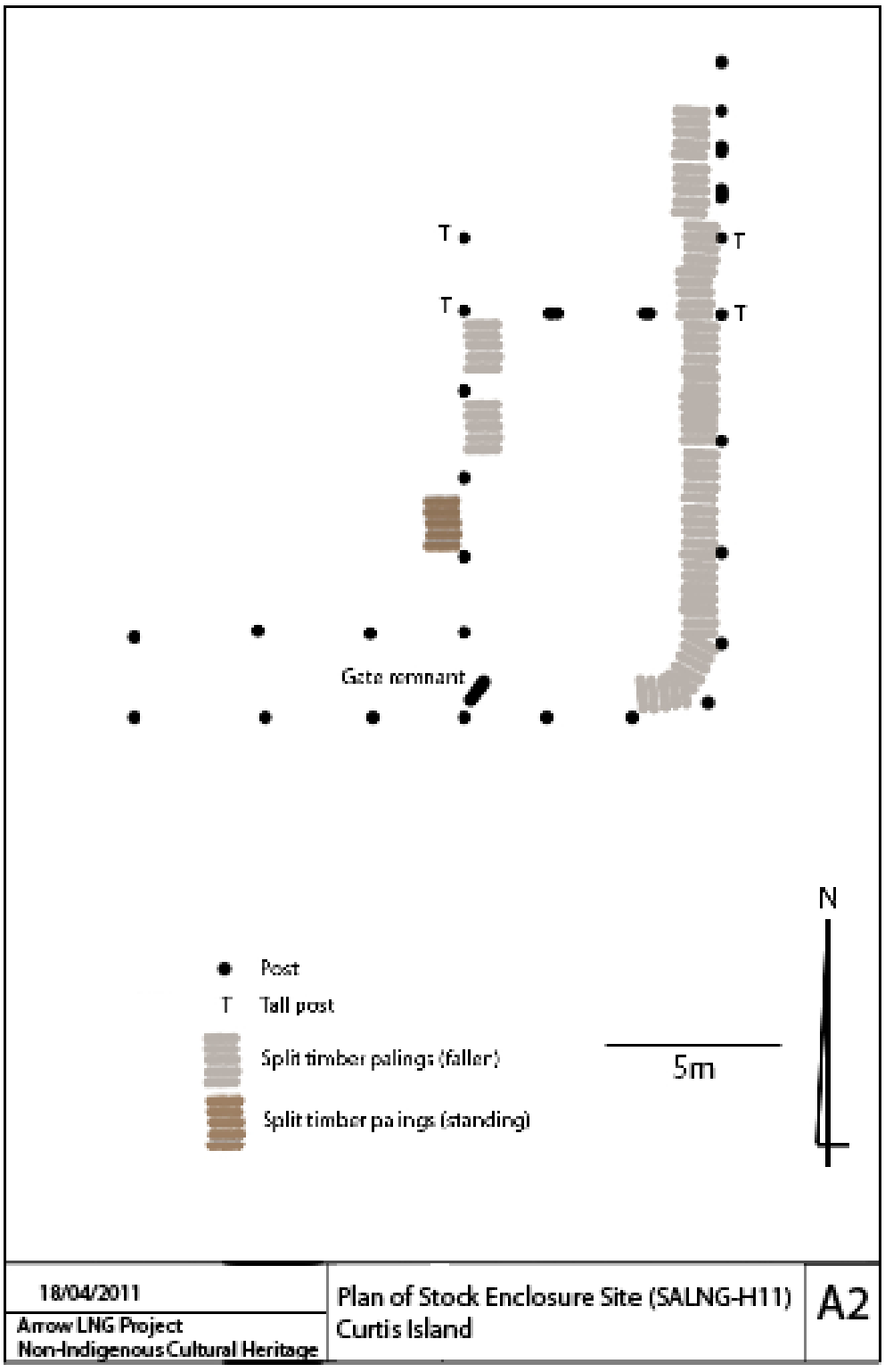
Site no. ALNG-H6
Site name Stock enclosure
Location 56J (GDA94) 319907 7368455
Source Survey ALNG 2010, Personal communication Ross Graving
Site Description This substantial structure forming an enclosure and race has been built from split timber palings. It is located beside the old track leading south from the Birkenhead homestead site. This site predates the recent structures on the hill to the west.
Photos

Suggested measures Site is located inside the Arrow LNG plant site and is likely to suffer direct impacts from

construction activities. It will require detailed recording prior to construction.

Site significance Local significance

Significance type	**Criterion**	**Significance Indicators**	**Threshold Indicators**
Historical	b) demonstrates rare aspects of Queensland's cultural heritage	Form that was once common in rural settings and is no longer practiced	**Distinctiveness** – rare example of such structures **Integrity** - disturbed



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Site no. ALNG-H7
Site name Historic fenceline, Hamilton Point
Location 56J (GDA94) 319788 7368303
Source Survey ALNG 2010
Site Description This historic fenceline extending into the bay to the east of Hamilton Point. The fence comprises standing, split ironbark posts, although all traces of the wire that connected them has been lost. The flats across which the fenceline has been built are inundated at high water level.

Photos

Suggested measures This Site should be recorded in detail, and any impacts on the fence line should be minimised where practicable. The location of the fenceline outside of the direct impact area should be noted on construction plans and protected from accidental impacts.

Site significance Local significance

Significance type	Criterion	Significance Indicators	Threshold Indicators
Scientific	b) demonstrating endangered aspect of Queensland cultural heritage	Timber use (split timber fence construction) that is now uncommon	**Integrity** – well preserved fenceposts, despite period of exposure

Site no. ALNG-H8
Site name Pre-1870 track alignment
Location 56J (GDA94) 319824 7367393
Source Survey ALNG 2010, Wood 1870
Site Description This overgrown track is the original alignment providing access to a wharf on Boatshed Point. A cutting from the high bank provided access to the wharf, although no traces of the latter remain. The track passes around the western side of the peninsula and can be followed at different points through the bush. The route can be seen on the map prepared by Wood in 1870.

Photos

Suggested measures The majority of this track will be destroyed by building of a construction camp and access road to the southern end of Boatshed Point.

Site significance Local significance

Significance type	Criterion	Significance Indicators	Threshold Indicators
Scientific Historical	c) place has the potential to yield information that will contribute to an understanding of Queensland history	May contribute information on road building in the mid-19th Century	**Earliness** – early example of road building dating from before 1870 **Intactness** – relatively undisturbed track, although overgrown

Site no. ALNG-H9
Site name Ruins of rendered brick building
Location 56J (GDA94) 319870 7367489
Source Survey ALNG 2010
Site Description The ruins of a 6x4m rendered brick building was found on rise overlooking the southern end of Boatshed Point. The walls have been rendered, and the small, rectangular building has a small cooking alcove at one end. Roof timbers have all disappeared, probably as a result of bushfire. The structure has a concrete floor that extends beyond the building, to form a verandah (Survey ALNG 2010).

Photos

Suggested measures This building will be impacted by construction of facilities associated with the construction camp and wharf facilities on the southern end of Boatshed Point.

Site significance Local significance

Significance type	Criterion	Significance Indicators	Threshold Indicators
Scientific Historical	c) place has the potential to yield information that will contribute to an understanding of Queensland history	May contribute information on early 20th Century habitation of the southern part of Curtis Island	**Integrity** – apart from the missing roof, the building structure is relatively intact **Innovation** – poured concrete buildings are uncommon in this area.

RUINS FOUND ON ~~WEST~~ SIDE OF BOATSHED POINT - CURTIS ISLAND