Hummock Hill Island Net Benefit Assessment

- July 2009
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1. Executive Summary

The Hummock Hill Island (HHI) Development is a master planned integrated tourism and residential community designed to provide a high quality tourism destination for local, national and international visitors. The development will be constructed in a carefully designed tourism and residential setting, with associated recreational facilities.

In January 2006, the proposed development was determined to be a *'controlled action'* which requires Commonwealth approval under Part 9 of the EPBC Act. An Environmental Impact Statement (EIS) was prepared for public comment in November 2007 to describe the environment of the project, and benefits and impacts associated with the development and measures to manage project impacts.

The Queensland Department of Environment and Resource Management (DERM) (previously EPA) submitted a response to the EIA which raised a number of issues in regards to the economic assessment. In addition to specific comments about the methodology applied to the economic assessment, the DERM noted that the coastal sand dunes on the proposed site are considered an 'area of state significance' which triggers Policy 2.8.1 of the State Coastal Management Plan. The Policy requires that '*if a use or activity that has adverse effects is to occur within "areas of state significance", it must have a demonstrated net benefit for the state as a whole'*.

Cost-benefit analysis is used to assess the additional benefits of a specific proposal (above a base case), against the additional costs that are required to achieve those benefits. In some cases the 'Benefit Cost Ratio' is used to report the benefits as a proportion of the costs to provide some measure of rank between proposals. A benefit cost ratio (BCR) divides the present value of estimated benefits by the present value of the costs. BCRs provide decision makers with a tool to compare the 'value for money' from different options of varying investment costs and ultimately assess how many dollars of benefit an option provides for every dollar of cost. A BCR greater than one indicates that the benefits are greater than the costs and that the project provides a net benefit to the state.

In this case, the assessment seeks to understand the overall state impact of the proposed developments and the incremental impact of the development on the island's dunes.

The cost-benefit analysis (CBA) considers three options relative to the base case (i.e. do nothing option):

- **Option A:** the full development as outlined in the Master Plan;
- **Option B**: the full development (i.e. Option A), excluding the development in the 100 Ha of sand dunes; and

- **Option C:** Whilst not a discrete option, Option C is equivalent to the difference between Option A and Option B, and therefore isolates the costs and benefits directly attributable to the development on the dunes.

The costs and benefits considered in the CBA are classified into the following categories:

- Land development and building development costs;
- Environmental costs (which factor in the value of the affected sand dunes);
- Operating expenditure (maintenance and operation);
- Land and building development revenue; and
- Tourism revenue (which includes tourism accommodation expenditure and non-accommodation expenditure).

The summary results from the economic analysis are presented in **Table 1. The results from the CBA conclude that the proposed development delivers a net state benefit returning a value of $541.1 million to the economy assuming a discount rate of six per cent and a 30-year analysis period.** This results in a BCR of 1.6. Further, the results show the development which is proposed to be undertaken on the 100 ha of coastal dunes also delivers positive net benefit with a BCR of 1.6 with a return of $181.1 million to the state economy. **The analysis therefore indicates the development of the sand dunes meets the requirements of the State Coastal Management Plan.**

- **Table 1 Summary of the economic analysis results (2007/08 dollars over 30 years)**

Present Value (2007/08 dollars), discounted over a 30 year period	Option A	Option B	Option C (Option A-Option B)
Land Development costs	$120.8 m	$ 84.2m	$ 36.6 m
Building Development Costs	$804.1 m	$ 553.2 m	$ 250.9 m
Environmental Costs	$1.2 m	$ 0m	$ 1.2 m
Operational Expenditure	$32.6 m	$ 22.8 m	$ 9.8 m
Total Cost	***$958.6m***	***$ 660.2 m***	***$ 298.4 m***
Sale Revenue – Land	$351.2m	$ 241.7m	$ 109.5 m
Sale Revenue - Building	$997.3 m	$ 686.0m	$ 311.2 m
Total Tourism benefits	$151.2 m	$ 92.4m	$ 58.8 m
Total Benefits	***$1,499.7 m***	***$1,020.2 m***	***$ 479.5 m***
Net Present Value (Net Benefits)	$ 541.1m	$360.0 m	$ 181.1 m
BCR	**1.6**	**1.5**	**1.6**

The majority of the cost and benefits associated with the proposed development were identified and quantified in the CBA. However there are also some impacts (both costs and benefits) which are difficult to quantify in dollar terms. For example, the proposed development will improve the availability and access to social infrastructure, leisure and recreation activities for existing residents in the Gladstone region. Further, the proposed development addresses some of the need for regional infrastructure and housing in the region. These issues are considered qualitatively in **Section 11**.

2. Introduction

2.1. Background

The Hummock Hill Island (HHI) project is a master planned integrated tourism community to provide a high quality tourism destination for local, national and international visitors. The development will be constructed in a carefully designed tourism and residential setting, with associated recreational facilities. The project will consist of two resort hotels, a motel, camping grounds, holiday accommodation and residential development, golf course and associated sporting facilities, education precinct, a commercial and retail centre, and small scale commercial marine facilities.

On October 25, 2005, the Coordinator-General declared the project *'a significant project for which an EIS is required'* under Section 26(1) (a) of the *State Development and Public Works Organisation (SDPWO) Act 1971*.

The project was referred to the Commonwealth Government and the Minister for the Department of Environment and Heritage (DEH) under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act). The project was determined to be a *'controlled action'* by the Minister's delegate on 13 January 2006. Controlling provisions under the EPBC Act were identified as World Heritage properties, listed threatened species and communities and listed migratory species. The development therefore requires Commonwealth approval under Part 9 of the EPBC Act.

An EIS was prepared to describe the environment of the project, benefits and impacts associated with the development and measures to manage project impacts. The EIS was released for public comment in November 2007.

The DERM provided a major submission which included a number of issues related to the economic assessment provided in the EIS. In particular it noted that:

- The HHI development triggers Policy 2.8.1 of the State Coastal Management Plan, which requires that development within an 'Area of State Significance (natural resources)' which include significant coastal dunes must demonstrate net benefit to the state; and
- The methodology and data used in the EIS to determine 'net benefit' to the state, and the conclusions drawn in relation to 'net benefit', are not consistent with the assessment of 'net benefit' by the Economic Services Branch of the DERM.

More specifically, the DERM submission noted that while the cost benefit framework used by the proponent is appropriate, the:

- Assessment included insufficient sensitivity analysis;
- Scope of the economic assessment in the EIS may have included costs and benefits that are not pertinent to determining a 'net benefit' and that the assessment should adopt a 'medium' scope that only includes elements of the proposed project that 'trigger' specific net benefit policies;
- Assessment does not provide a meaningful quantification of the environmental costs and benefits of the project; and
- Assessment included economic multipliers and is therefore inconsistent with Queensland Treasury's Cost Benefit Guidelines.

The cost benefit analysis (CBA) has been revised to address all of the DERM's comments.

2.2. Purpose of the report

The purpose of this report is to demonstrate that the proposed development of HHI as proposed will provide a net benefit to the State of Queensland. Further, the focus of the report is to demonstrate that the development within the coastal sand dune area provides a net benefit to the State of Queensland.

The assessment of this net benefit assessment is based on a robust methodology that meets Queensland Treasury's Cost Benefit Guidelines (2006) and addresses the important points raised in the DERM submission.

2.3. Net Benefit Assessment

Based on the cost benefit guidelines, a CBA model has been developed with the objective of determining the net benefit associated with that part of the HHI development that is located in the area mapped as significant coastal dunes by DERM.

To enable this assessment, the following options are considered in the CBA:

- **Base Case** - the do nothing option refers to no development. This includes the current environmental value of the coastal sand dunes, together with the limited net use value as noted in the EIS social assessment (section 16);
- **Option A** – Full development of the HHI tourist community as detailed in the Master Plan; and
- **Option B** – The full development (Option A) excluding any development on the coastal sand dunes.
- **Option C (Difference between Option A and Option B) –** Whilst not a discrete option, the difference between Option A and Option B is referred to as Option C. Option C includes the marginal net benefit only associated with the development located on the

dunes. The benefit cost ratio (BCR) from Option C therefore determines whether the development within the coastal sand dune area (which has been assessed by the DERM as being of state significance) provides a net benefit to the State of Queensland.

Consistent with CBA methodology, the costs and benefits associated with Option A and B (and therefore Option C) refer to the incremental costs and benefits relative to the base case.

2.3.1. Policy 2.8.1 in the State Coastal Management Plan (SCMP)

Policy 2.8.1 of the State Coastal Management Plan states that significant coastal sand dunes are defined as '*areas of state significance*' and that if use or activity that has adverse effects is to occur within these areas, it must have a demonstrated net benefit for the state as a whole.

Given that the coastal sand dunes have been assessed by DERM as triggering Policy 2.8.1, the CBA seeks to isolate the costs and benefits directly attributable to the part of the development located on the coastal dune system and to demonstrate that the benefits outweigh the costs.

Option C – being the difference between Option A and Option B – provides the most robust estimate of the net state benefit associated with the development undertaken on the coastal dunes area. Option C takes into consideration the fact that it is not a feasible, practical or realistic option to only develop the area on the sand dunes given the distance from the sand dunes to the bridge entry to HHI. Rather, the analysis seeks to answer the DERM's key questions of whether the proposed development on the sand dunes is a critical component of the overall project's feasibility, and whether the development on the dunes provides a net benefit to the state.

The methodology used in this net state benefit assessment has been accepted by the DERM. More detail on the methodology is provided in **Section 5**.

3. Project Overview and Context

3.1. Location

HHI is situated at the juncture of the Wide Bay and Capricorn Coasts, 65 km by road south east of Gladstone. The Island provides a combination of warm climate, deep water estuaries, safe beaches, clean air and a landscape that ranges from open cleared areas, re-grown vegetation and natural landscape. The Island is approximately 13 km long, 3 km wide, with a total area of 2,150 ha, of which 518 ha (24 per cent) lies within the development boundary. Around 58 ha of the land within the development area is currently cleared or is regrowth vegetation. The master plan for the development has made use of these cleared areas to the maximum extent possible with the aim of reducing the area of vegetation to be cleared.

The Island is separated from the mainland by Boyne Creek, a shallow tidal channel that flows into the deeper waters of Colosseum Inlet and Seven Mile Creek, east and west of the Island respectively. The Island is situated within the Great Barrier Reef World Heritage Area and Great Barrier Reef Coast Marine Park, and adjoins the Great Barrier Reef Marine Park.

3.2. Development History

HHI has a long history of use; firstly by a small indigenous population and then for pastoral activities. A pastoral lease granted in 1870 saw the Island used for raising beef cattle and as a source of timber for construction of railways in the region. Vegetation clearing on the Island was required as a condition of pastoral lease renewal and large areas of the lease were cleared to comply with this condition.

The pastoral lease was rescinded in 1980 and a lease issued by the DNRW in 1991 for development of the Island for business, industrial commercial, residential, tourist and recreation purposes.

Following preparation of development plans and an EIS by the Tod Group in 1993, Miriam Vale Shire Council issued a development approval for 5,000 lots, a marina, two golf courses and a hotel/convention centre in the mid 1990s. This approval was allowed to lapse by the original lease holder and a further development was proposed in 1999 consisting of a hotel resort, caravan park, two golf courses, low and medium density residential and commercial science/technological precincts to support a satellite launching facility on the southern part of the Island.

An Exploration Permit – Minerals (EPM) has existed over the Island since the early 1980s to investigate identified mineral sand resources in the coastal sand deposits of which approximately 12 per cent occur on the special lease area.

3.3. Master Plan

The master plan for the HHI development incorporates a diverse range of tourist facilities and accommodation including resort hotels, holiday units, camping grounds, holiday housing, boating facilities, golf course and recreational facilities and a town centre based around retail and educational services that will cater for a broad range of people. The community will consist of an estimated 2,300 tourists and 1,600 residents (at 100 per cent capacity) with full development of the Island achieved over a period of 16 years.

Ecologically sustainable development (ESD) principles have been the driver behind the design with HHI supporting a low impact master planned community. The Master Plan for the HHI development is detailed in Section 3 of the EIS.

The master planning process has also included a detailed landscape plan that is based on the development objective of minimising impacts of the proposed development on the Island's environment and the Great Barrier Reef World Heritage Area. Landscape strategies include preserving existing habitat to the maximum extent possible, maintaining and providing linkages between areas of habitat, and developing the remaining land in a least disturbance approach. The landscaping strategy for the development will utilise existing native species present on the Island and will be tailored for each development precinct based on plant communities and species present. This will maintain the inherent character of the Island and provide an attractive holiday and residential environment.

Master planning for the proposed development has incorporated the input from a range of detailed studies including detailed fauna and flora surveys, water supply option studies, water sensitive urban design for stormwater control, geological and geomorphological investigations etc. These detailed reports are provided in the Appendices of the EIS.

3.4. Plan of Development

A Plan of Development has been prepared for the HHI tourist community development, consistent with the Miriam Vale Shire Council Planning Scheme and requirements of planning schemes under the *Integrated Planning Act 1997*. The Plan of Development provides specific direction on how development should occur to achieve environmental protection and a sustainable and vibrant community. It establishes Development Codes that guide any development on HHI within the development lease, and overlays which describe constraints on development.

The Plan of Development will become part of the new Miriam Vale IPA Planning Scheme or the future Gladstone Regional council IPA planning scheme when presented.

The Plan of Development includes six precincts:

- Tourist Precinct;

- Community and Education Precinct;
- Conservation and Natural Areas;
- Open Space Precinct, including:
  - Golf Course Open Space.
- Town and Village Centres Precinct;
- Residential Precincts, including:
  - Low Density Residential;
  - Medium Density Residential; and
  - High Density Residential.

Details of the Plan of Development may be found in Appendix A2 of the EIS.

The approval being sought for this project would establish a framework for all future works and proposed developments requiring assessment against the planning scheme to be assessed against the Plan of Development.

3.5. Construction

The construction of the HHI development is planned to take 17 years. The key activities undertaken for the construction of the development and associated facilities are:

- Upgrade of external road network to the Island;
- Construction of a bridge over Boyne Creek connecting the Island to the mainland;
- Construction of the internal road network;
- Connection of the Island to the mains power network on the mainland and construction of a distribution network on the Island;
- Connection of the Island to the mains gas network on the mainland and construction of the distribution network on the Island;
- Construction of the desalination plant, waste water treatment plant and associated supply water supply and sewage networks; and
- Construction of the resort, tourism facilities and housing including hotels, apartments, houses, community centre, retail and commercial facilities, golf course and sporting facilities.

3.6. Project Need

3.6.1. Future Tourism Need

The HHI development will contribute significantly to tourism within the central Queensland region providing flow on effects to the regional economy. It will also attract and cater to, a wide ranging market of potential visitors with little impact on existing tourist infrastructure.

The development is projected to accommodate approximately 2,300 tourists per night (at full capacity) once fully developed.

The Queensland Tourism Strategy: A 10-year Vision for Sustainable Tourism (2006) has been endorsed by the Queensland Government as the plan to develop the tourism market in Queensland. Four key goals are proposed by Tourism Queensland over the next 10 years, these being:

- Goal 1 - increase visitor expenditure by $1.43 billion above forecasts to $21.6 billion;
- Goal 2 - Increase Queensland's market share from overnight visitors to 29.1 per cent;
- Goal 3 - Increase tourism's economic contribution to Gross State Product (GSP) by $900 million above forecasts to 12.5 billion; and
- Goal 4 - Create an additional 11,000 tourism jobs above forecasts.

The HHI development will contribute significantly to achieving these goals[1].

- By 2016 around $65 million in tourism expenditure will result from the proposed development, and by 2024, around $95 million in tourism expenditure will result from the proposed development;
- By 2016 expenditure from the development is anticipated to contribute 0.5 per cent of the Queensland Tourism Gross State Product (GSP) target; and
- At the Fitzroy region level the proposed development is anticipated to generate around 350 jobs directly related to tourism by 2016 (refer to Section 17 of the EIS).

3.6.2. Future Residential Need

The future residential need associated with the development will be driven by project and tourism generated demand. The project will offer a range of accommodation types and styles to suit a diversity of needs and budgets.

[1] Note: the figures provided above include expenditure from domestic, inter-state and international visitors, and do not exclude expenditure from tourists diverted from other Queensland destinations. These exclusions are factored into the net state benefit assessment (see Section 7.2).

The residential housing component of HHI will accommodate around 5 per cent of future population growth and allotment demand.

3.6.3. Alternative Locations

HHI is a unique location in that it provides ready access to coastline, beaches, waterways, ocean views and bushland areas. The Island is also close to Gladstone for health, transport, education and social services. The Island is also unique from the perspective that other areas of the coastline in the region are committed to development for port, mining, national parks and urban uses.

HHI is the only location in the central Queensland area that provides the diversity of settings in relative proximity to a service centre and is available for development. As a result the HHI is the only viable alternative for the development.

4. Environmental Assessment

Since 1870, when a pastoral lease for the Island was first granted, HHI has been used for beef cattle and as a source of timber for railway construction. The land was largely cleared as part of the pastoral lease and nearly the entire Island was used for grazing activity at some stage since 1870. The grazing lease was rescinded in 1980.

The master planning process was developed with the objective of minimising impacts of the proposed development on the environment of the Island and the Great Barrier Reef World Heritage Area. This strategy has meant existing habitat is preserved as much as possible, linkages between habitats are maintained and the remaining land is developed in a least disturbance approach.

The Island is located within the Great Barrier Reef World Heritage Area (WHA), adjacent to the Great Barrier Reef Marine Park and the GBR Coast Marine Park. Within the WHA, the Island has no formal conservation status; the Island was overlooked when National Parks and Conservation Areas were established in the area due to its lesser environmental or conservation value compared with surrounding areas.

Environmental features of the Island and development are summarised below:

- HHI had no fringing reef or associated major evolutionary geological process; limited geological or biological evolution features; no unique rare or superlative natural phenomena and does not provide habitat to rare or endangered species.
- A small reef is found off the headland at North Beach.
- The surrounding waters contain mangroves and seagrass meadows, the latter are habitat for dugong and turtles, though these are outside the lease area, and are expected to be impacted minimally. Mitigation and management measures have been prepared.
- The relict beach ridges and foredune strandplains likely formed about 6,500 years BC, are ‘not unusual in a regional contest’ with similar occurring in Wild Cattle Island, the eastern side of Rodds Peninsula, Middle Island and Eurimbula National Park. Such beach ridges are not identified as being of ‘high degree of ecological integrity and biodiversity conservation values’ as noted by the State Coastal Management Plan. There is no direct disturbance to beaches, active coastal dunes or other coastal processes. The active dunes of the Island are outside the development footprint and will remain untouched by the project, except for the placement of an above ground walkway through the dunes to provide access to the beach.
- The development occurs only on landscapes of grassy woodland on undulating plain, ridgeline vegetation communities, open eucalypt woodland and cleared headland.
- Of the 518 ha of the development footprint, essential habitat for the Wallum Froglet and the Koala have been identified, though these species have not been located on the Island. There

are no flora species listed as endangered, vulnerable or rare, but there are two such fauna species (Black Breasted Button Quail, Beach Stone Curlew).

- Two endangered regional ecosystems – Queensland Blue Gum on alluvium and Poplar Box on alluvium are known to be on the Island. Impacts on these two communities will be minimised by avoiding sensitive areas through responsive design. To the maximum extent, the development is centred on non-endangered ecosystems, avoiding erosion prone areas, ocean fronts and wetland areas. Native vegetation clearance is minimised, by using as much as possible land already cleared or degraded. Controlled access is maintained to conservation areas, to ensure those on the Island can use, yet not damage these areas.
- The diversity of the species on HHI will not be impacted as a result of the development as wildlife corridors and conservation areas are established with managed controls.
- Marine life such as turtles, dugong, whales and dolphins are known in the area. Marine environment impacts will be limited to the proposed access road and bridge across Boyne Creek and the public boat ramps in Colosseum Inlet and Boyne Creek. No other areas will be directly lost or disturbed.

The features referred to above are discussed in more detail in the EIA.

The DERM has assessed the coastal dunes system on HHI as meeting the necessary criteria, from the *State Coastal Management Plan – Queensland's Coastal Policy*, to render the system significant. The revised economic assessment applies the DERM's assessment of the state of the sand dunes.

5. Quantitative Net State Benefit Assessment Methodology

This section outlines the quantitative cost benefit analysis (CBA) framework and how it is applied to the economic, social and environmental assessment for the HHI Project.

5.1. Introduction to the Cost Benefit Analysis methodology

CBA is an analytical tool to aid decision-makers in the efficient allocation of resources. It identifies (and where possible quantifies) the financial, economic, social and environmental costs and benefits of project options relative to a do nothing option (referred to as the base case).

CBA helps decision makers assess whether a proposed project should be undertaken, and to identify which option provides the best value for money. It is an accepted methodology for assessing the net benefits accruing to society as a whole as a result of a project.

The key outputs from a CBA include:

- Benefit cost ratio (BCR) – a ratio of all the quantified direct benefits and costs associated with each option assessed. A ratio greater than one indicates that the benefits are greater than the costs and that the project provides a net benefit to the state. BCR's provide decision makers with a tool to compare the 'value for money' from different options of varying investment costs – i.e., it provides a tool to assess how many dollars of benefit an option provides for every dollar of cost.
- Net Present Value (NPV) – the present value net benefits associated with a project (i.e. present value benefits less present value costs). Unlike the BCR, a NPV comparison may be biased towards larger projects.

CBA attempts to measure the value of all costs and benefits that are expected to result from the activity in economic terms. It includes estimating costs and benefits of assets which are not subject to market transactions - and hence have no market value, but which nevertheless entail the use of real resources. Such assets are referred to as 'non-market' goods. In such situations, quantification of the effects in money terms is an important part of the evaluation. However, projects frequently involve the assessment of non-market benefits and costs that can be difficult to quantify. Where it is not possible to quantify an identified impact in dollar terms, the impact will be considered in a qualitative assessment framework.

Some key points to note about the general CBA methodology are detailed below:

- Unlike the assessment which was undertaken in the original economic assessment, a CBA only considers the direct costs and benefits and therefore does not allow the use of multipliers. This is consistent with the Queensland Treasury Cost Benefit Guidelines (2006)
- The CBA method considers the effect of real resource costs and benefits, and excludes, for example, taxes and subsidies, which are regarded as transfer payments from one part of the economy to another.
- The sensitivity of key assumptions which may significantly skew the BCR and NPV outcomes should be tested. These may relate to variables such as tourism expenditure and willingness to pay for non-market assets. These issues are explored in more detail in **Section 9**.

It should be noted that a quantitative CBA can only provide accurate information to assist in decision-making where all impacts are appropriately valued on a comparable basis. To ensure an unbiased assessment, this analysis includes a qualitative and quantitative CBA assessment of the HHI Project.

5.2. Options Considered

As detailed in **Section 2.3** the following option are considered in the CBA:

- **Base Case (do nothing option)** – this option assumes that if this development does not take place, then the project site on Hummock Hill Island will remain as it is today – with no further development. The coastal sand dunes identified as being of state significance will remain in the same condition, with no further maintenance or rehabilitation works. There will be no increased access to the site and no development of tourist or residential accommodation. Given that access to the site is currently restricted, it is assumed that tourism numbers to the island will not increase over time as there is no Council or State Government plan to increase access to the site. It is therefore assumed that the island will largely remain uninhabited. Whilst the coastal sand dunes will maintain their current ecological value, their recreational and/or use value will remain practically non-existent.
- **Option A** – Full proposed development as detailed in the Master Plan.
- **Option B** –Identical to Option A, but excludes any development on the coastal sand dunes.
- **Option C** – Whilst not a discreet option, the difference between Option A and Option B is referred to as Option C. Option C includes the marginal net benefit only associated with the development located on the dunes. The BCR from Option C therefore determines whether the development within the coastal sand dune area provides a net benefit to the State of Queensland.

5.3. Net State Benefit Assessment – General Assumptions

Table 2 lists the general economic assumptions used in the CBA model.

- **Table 2: general assumptions**

Assumption	Comment
Consumer Price Index (CPI) – 2.5%. Applied to: ■ Environmental costs ■ Tourism benefits	Whilst CPI fluctuates, and is currently closer to 4 per cent, the long term average target is between 2 and 3 per cent.
Wage Price Index (WPI)– 3.5% Applied to: ■ Operational expenditure (opex)	Operational expenses are generally indexed according to wage increases rather than CPI
Building Price Index (BPI)– 4.5% Applied to: ■ Capital cost indexation ■ Land and building sale revenue	Building costs have escalated at a much higher rate than CPI – particularly in Queensland.
■ **Discount Rate (real): 6%**	Based on DERM discount rate used.
■ **Project time frame:** 30 years	A 30 timeframe is selected as the acceptable point at which future flows of benefits and costs approximate zero due to discounting

6. Net State Benefit Assessment – Costs

The following costs are considered in the quantitative net state benefit assessment:

- Capital Expenditure
- Operating expenditure
- Environmental costs associated with the development on the coastal sand dunes.

These are discussed in more detail below:

6.1. Capital Expenditure (capex)

The CBA includes all capital expenditure over the 30 year assessment period. Detailed costing of all land development has been estimated by the developer. The developer has also estimated building costs based on accepted industry standards.

The land development costs items are provided in **Appendix A**.

The full land development costs are estimated at approximately $120.8 million (present value). Option A which is the full proposed development includes the full land development costs. Estimating the proportion of these costs which apply to Option B is a more complex exercise.

HHI is a tourism based community which includes approximately 2,400 tourist/residential units[2], of which approximately 35 per cent are located on the sand dunes. Therefore, Option A includes 2,400 accommodation units and Option B includes approximately 1,540 accommodation units. Based on a cost sharing methodology, 65 per cent of all roads, utilities, and shared public infrastructure should apply to Option B. The analysis assumes that Option B's share of the costs would be larger due to larger projects benefiting from economies of scale. Therefore, as a conservative estimate, it is assumed that Option B's share of the total land development costs is approximately 70 per cent. A similar split has been applied to any costs (as well as revenue) associated with commercial and retail facilities.

It should be noted that under an Option B scenario, less than 65% of the infrastructure may be required – and thus the share of the infrastructure cost may in fact be less than 65%. Given that Option B has not been fully scoped (i.e. there is not Option B Master Plan available), the assumption is tested in the sensitivity analysis.

Table 3 outlines the allocation of capital expenditure between options.

[2] A unit of accommodation includes hotel/motel rooms, apartments, holiday homes, cottages, townhouses, villas, and camping sites.

- **Table 3: Allocation of shared capital expenditure between options**

Shared Capital Expenditure	Option A	Option B
Internal Roads	100%	70%
Drainage	100%	70%
Water and Wastewater Reticulation	100%	70%
Electricity	100%	70%
Gas	100%	70%
Telecommunications	100%	70%
Land Clearing	100%	70%
Landscaping	100%	70%
Community Infrastructure	100%	70%
Site Preparation for Commercial and Retail Development Land	100%	70%

Option A includes the full building development costs, whilst the costs applicable to Option B are based on the geographical location of the sand dune. **Table 4** indicates which residential and tourist accommodation facilities are included in each option.

The full building development costs (i.e. for Option A) over a 16 year development period equate to approximately $804.1 million (present value). Based on the share of the buildings located off the sand dune, the building development costs for Option B are estimated at $553.2 million (present value).

- **Table 4: Allocation of residential and tourist accommodation**

Accommodation Type	Option A	Option B
Headland resort hotel	100%	50%
Headland resort apartments	100%	100%
Headland Holiday Home	100%	100%
Beachfront Holiday homes	100%	50%
Beachfront Apartments	100%	100%
Seaside cottages	100%	100%
Ridgetop Housing	100%	100%
Hillside Terraces	100%	100%
Lagoon villas	100%	-
Riparian Eco Homesites	100%	-
Bushland residential	100%	-
Resort town apartments	100%	-
Village town house	100%	-
Golf Course resort Homestead	100%	100%
Golf Course resort apartments	100%	100%
Boyne Channel Apartments	100%	100%
Beachfront Tourist Hotel	100%	-
Conference centre and motel	100%	100%

Accommodation Type	Option A	Option B
Tourist Park	100%	-
School Recreational Camping	100%	-
Retail and Commercial Primary facility	100%	70%

6.2. Operational Expenditure

The operational expenditure (opex) costs in the assessment include the full costs of maintaining the infrastructure and buildings on the island at full development – excluding any costs that are transfers from one party to another. For example, any costs directly covered by levies, council rates, or utility rates are excluded from the analysis. This is consistent with CBA methodology.

Operational expenditure considered as part of the net state benefit assessment includes[3]:

- Nature resource maintenance;
- Operation and Maintenance (O&M) of infrastructure services including:
  - Roads and drainage;
  - Parks and gardens;
  - Water Supply (desalination and distribution);
  - Waste water (STP and collection system);
  - Solid waste management; and
  - Operation of an Environmental Office.
- Project management costs;
- Consultant costs; and
- Marketing costs.

These are described in more detail below:

6.2.1. Nature resource maintenance

It is proposed that an Environmental Office will be established on the island to manage and provide maintenance of the undisturbed areas on the island. The cost of this service will be covered by a special area levy (i.e. a transfer), and is therefore not identified as a cost in the net benefit assessment.

[3] Operating expenditure of tourism facilities is not considered as part of the general opex costs. Instead, opex relating to tourism facilities is factored into the net revenue (i.e. profit) from tourism accommodation (outlined in Section 8.2.3)

6.2.2. Operation and Maintenance costs (O&M)

The proponent proposes to enter into an operation and maintenance agreement with the Local Government Authority (LGA) to maintain and operate the service infrastructure for a period of years to be agreed and until such operation and maintenance costs can be covered by income from rates applied to the developed land. Similarly, the proponent proposes to operate the water and wastewater systems (and to receive income from these services) until the Council takes over the responsibility for operation and maintenance of all infrastructure on the island. Given that the revenue from the water and wastewater operations is expected to cover the costs of operation and maintenance[4], both the costs and revenues have been excluded from the CBA.

The potential agreement may also allow the proponent to recover a proportion of the operation and maintenance costs. The proponent will provide a training program for LGA staff before transfer of operation and maintenance responsibilities to the LGA[5].Estimates provided by the proponent suggest that the transfer in O&M responsibility will likely occur 12 years after project commencement. Therefore opex for operation and maintenance of the Island's infrastructure services has been estimated at $650,000 per year (real at 2007/08 dollars) for a period of 12 years. This takes into consideration any costs recovered from the LGA.

No costs or income have been included in the assessment for supply of electricity and gas. It is expected that the costs will be fully covered by fees and charges set by the retailer – Origin Energy. If the cost is not fully covered in the short term, it is expected that the medium to long term fees and charges will be adjusted such that there will be no net impact on the community.

The proposed airstrip will be a private operation for small/light single turbo-prop aircraft only, and the revenue is expected to fully cover the costs of development.

6.2.3. Project management costs

Project management costs for the development of infrastructure have been estimated at $5.2M (present value), or at $486,750 annually (real in 2007/08 dollars) from 2007/08 to 2023/04. Project management costs for building development are equivalent to approximately 3.7 per cent of the total building development costs[6].

[4] Fees and charges will be set by the LGA in agreement with the proponent to cover the costs of operations.
[5] For CBA modelling purposes, it is assumed that the maintenance and operating costs will be recovered through rateable income set by the LGA.
[6] The 3.7 per cent project management/consultant costs have been incorporated into the total building development costs.

6.2.4. Consultant costs and marketing costs

The consultant costs for the proponent have been estimated at $7.7 million (present value) over the life of the project. As mentioned above, an allowance for consultant costs for the building development component of the project have been incorporated into the total building costs.

6.2.5. Marketing costs

Marketing costs have been estimated at $11.4 million (present value) over the life of the project.

6.2.6. Total Opex costs

Total opex costs over the 30 year period for Option A have therefore been estimated at $32.6 million (present value). Consistent with the approach taken for allocation of shared infrastructure costs for Option A and Option B, it is assumed that Option B includes 70 per cent of Options A's opex costs.

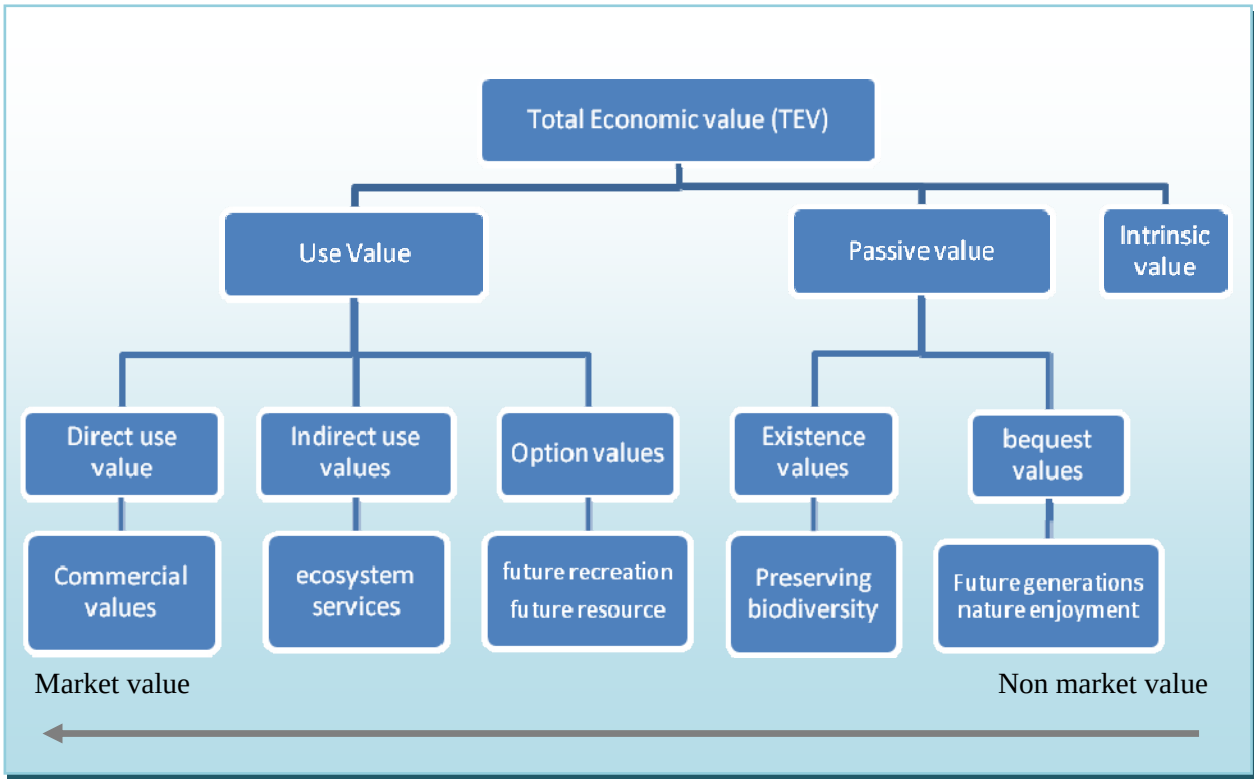
6.3. Environmental costs

As already discussed, the DERM has recommended that the coastal sand dune system affected by the proposed Hummock Hill Project includes an 'Area of State Significance.' To measure the net benefit assessment of the works to be undertaken on the 'Area of State Significance' – as identified by the DERM, it is necessary to estimate the value associated with the affected sand dune system. The valuation approach and principles for the valuing environmental assets is presented in the next section.

6.3.1. Environmental Valuation – Principles and Technique

Environmental assets provide a number of services and benefits – not all of which can be captured by a market price. For example, in the case of sand dune systems, they provide tourism benefits which can be clearly represented by a market or commercial value (by tourists direct and indirect payments to visit them), but may also provide non-market, unpriced benefits such as recreation (assuming that access to the sand dune is free), amenity, and ecosystem services. In addition to the benefits experienced from *using* the environmental asset, there are also non-use values which to be considered. For example, those who do not use an environmental system may still value its conservation for altruistic reasons or purely for the knowledge that it exists. This full classification of natural resource values is provided in the diagram below and is based on the information provided in the Queensland Government's Introductory Guide to Environmental Economic Valuation (2003).

- **Figure 1: Environment Economic Valuation**



In this context, the total economic value of an environmental asset is based on the following equation:

Equation 1

Total economic value = direct-use value + indirect-use value + options value+ existence value + bequest value

Where:

- *Direct Use Values* refer to values arising from the consumptive and non-consumptive uses of the environmental - e.g. for recreation and tourism
- *Indirect Use Values* refers to values arising from the environmental services - e.g. including habitat support, biodiversity value, physical protection and carbon capture;
- *Option Values* refers to the willingness to pay to conserve the option of using the environmental asset at a later date;
- *Existence Value* reflects the willingness to pay for the satisfaction of knowing that something exists even if one has no intention of visiting the site. The Amazon in South America is a common example of an asset that people may be willing to pay for its preservation even if they know that they will never visit it; and
- *Bequest value* reflects the value gained through the ability to endow a natural resource on future generations.

Some economist also include intrinsic value in the above formula which takes into consideration that organisms have a worth of their own, regardless of usefulness to humans.

6.3.1.1. Valuation techniques

Environmental valuation is largely based on the assumption that individuals are willing to pay for the benefits from environmental goods and services, and, conversely to accept compensation for environmental losses. The willingness to pay (WTP) demonstrates a preference or choice – similar to the preference or choice demonstrated when purchasing goods and services in the market.

Economists have developed a number of market and non-market techniques to estimate the WTP for, or the dollar values of, environmental assets. These techniques can be split into market based techniques, revealed preference and stated preferences techniques, and benefit transfer approach[7].

These valuation techniques are discussed below.

Market based techniques

Direct observable market values are generally preferred as a valuation technique. For example, where there is an accredited and liquid offset market for environmental services (e.g. biodiversity or offset markets), this market value can be used to estimate the value of the degraded ecosystem. This approach is not considered acceptable for the purposes of measuring the Total Economic Value of the Hummock Hill sand dune system, as there is no accredited offset market in Queensland that could be used for this purpose.

Market based techniques can also be used to measure part or all of the value of an environmental asset, if the benefit generated can be bought and sold on the market. For example, polluted water can have a direct impact on the fishing industry, and thus the impact can be directly measured based on the impact that increased pollution will have on fish harvest. This approach is not applicable to the sand dunes given that there is no commercial price for any of their environmental services.

Revealed preference techniques

Revealed preference valuation technique is a step removed from the market technique. Rather than depending on direct market price, this technique uses market data to infer a value. Techniques for this approach are discussed below:

[7] It is noted that benefit transfer approach is not a valuation technique per se, but rather an approach used to transfer values from revealed or stated preference studies to other, similar projects and project areas.

- **The preventative cost method** – estimates the value of the environmental asset based on the cost of avoiding damage to it. Alternatively, the preventative cost method can be estimated based on the asset replacement cost. This was the approach that adopted in the original Economic Impact Assessment (EIS) which estimated the Total Economic Value at $10 million (NPV). The DERM has advised that this approach is not acceptable for the purposes of the Hummock Hill project EIA.
- **Hedonic pricing method** – uses changes in market prices (usually houses) in response to a change in the surrounding environment as a proxy for valuing the loss in ecosystem. For example, this method assumes that house prices reflect the value that people place on the surrounding environment – e.g. recreation opportunities such as fishing in the local creek and amenity value of local parks. An essential requirement of this method is that people use the property and are therefore affected either favourably or unfavourably by the surrounding environment. Given that the residents in the surrounding region have very limited access to the sand dune system at HHI, and there are no residents currently living on the island, this approach cannot be used to accurately estimate the value of the sand dune system.
- **Travel cost method** – measures the willingness to pay for a site by using travel costs to the site as a proxy for its value. This approach is most useful for estimating the value of recreational sites, historic sites and wilderness areas. The travel cost method is not directly an appropriate technique for the proposed Hummock Hill project given that access to the island is currently limited. Therefore it would not be possible to link the travel costs to the region to the sand dune system at HHI.

Stated preference approach

The above valuation techniques (market based and revealed preference) can sometimes be used to estimate the use values of an environmental asset. However, these techniques are limited in their ability to reflect the non-use or passive value of the environmental assets. Stated preference techniques have been developed to try and capture people's willingness to pay (WTP) for services offered from environmental assets. This approach is not limited to the market value of the asset, and therefore, should theoretically capture Total Economic Value of the asset (i.e. both the use and passive value). There are two dominant stated preference techniques which have been developed – contingent valuation, and choice modelling. Both techniques involve surveying a sample group of people to assess (either directly or indirectly) their WTP for the improvement or conservation of an environmental asset.

The contingent valuation (CV) approach is most commonly used, but is also the more controversial of the two approaches. The survey questions directly ask for a WTP value for a hypothetical level of conservation or improvement of an environmental asset, and can be prone to bias. Furthermore, critics have claimed that this approach measures what individuals would

like to happen rather than the true valuations. This can lead to overestimation of the Total Economic Value.

The choice modelling (CM) technique does not ask survey respondents to directly state a WTP value in dollars. Instead, this approach, asks respondents to state a preference between a group of environmental services or characteristics at a given cost to the individual, and another group of environmental characteristics at a different price or cost. Because it focuses on trade-offs between scenarios, the CM technique removes some of the bias which can arise with the CV technique. Furthermore, because the CM technique can be used to rank options (as well as or instead of estimating a dollar value), results from studies can be more easily transferred to other sites and situations.

The stated preference technique is expensive and time consuming because of the extensive pre-testing and survey worked required. Therefore, it is not commonly used for project specific valuations.

Benefit Transfer Approach

The benefit transfer method in a not a valuation approach per se. Rather, it involves transferring values from existing revealed or stated preference studies and adapting them to the relevant study area. This is the most commonly used approach due to the high costs associated with undertaking site-specific stated preference studies. However, the accuracy of benefit transfer depends on the degree of similarity between the study and the project area and the accuracy of the initial study.

> *The transfer of the database values to other sites can be misleading unless the values are carefully applied. It is seldom satisfactory to directly transfer aggregate benefit estimates from one site to another. There are various issues that should be considered before transferring values such as the similarity of the environmental good being measured, the magnitude of the change under consideration and the population size and socioeconomic characteristics. If you are considering transferring values from the database to another site, it is important that you refer to the full study evaluation in the database before transferring any estimates.*
>
> *Source: Envalue (NSW EPA)*

** ENVALUE is an environmental valuation database, developed by the NSW EPA and first released in 1995. It includes a systematic collection of environmental valuation studies presented in an on-line database

In transferring benefits form one site to another, it is necessary to consider whether and the extent to which the environmental asset in the survey area and project area are comparable. Examples of factors which may affect the benefit transfer include:

- **Rehabilitation/replacement potential** – once damaged, is there more potential in one study area to rehabilitate or replace the damaged environmental asset relative to the other area?
- **Scarcity of the ecosystem** –if an environmental asset is more common in one area (i.e. has a greater number of substitutes); people are likely to be willing to pay less for its preservation.
- **Quality of the environmental asset** – the relative quality of the environment asset in the study area and the project area need to be compared. For example if the asset in the project area is degraded relative to the study area, then the benefit will need to be adjusted accordingly when transferred.
- **Access** – the Total Economic Value is composed of use and passive values. Therefore, it is necessary to assess whether access to the environmental asset is similar at both sites, as this will impact the use value share of the total value.
- **Dependent ecosystems** – if a loss in one environmental asset may lead to future losses of other ecosystems, survey respondents may be willing to pay more for its preservation.
- **Population size and demographics –** often, the WTP demand curve from a stated preference study is linked to the population demographic surveyed. It is necessary to compare the study population to the population at the project site to assess whether any adjustment of the values is required.
- **Links to economic and social impacts** – the WTP for an ecosystem will vary depending upon whether the ecosystem provides the respondents with direct benefit. For example, a tourist area, which may depend on a healthy ecosystem to attract tourists, has an economic incentive to preserve the ecosystem. Therefore surveys in 'tourist economies' will probably result in higher use value relative to other study areas.

The EPA has indicated that the benefit transfer approach should be used to assess the environmental value of the Hummock Hill Island and dune system, and has referred to two specific CV studies – Pitt (1997), and Posford Duvivier (1997).

6.3.2. DERM valuation

The DERM Economic Services has advised that approximately 100 ha of sand dunes should be quantified in dollar terms for inclusion in the CBA and has recommended the benefit transfer method as an appropriate approach. The DERM recommended that in valuing the dunes, the following studies should be referred to:

- The contingent valuation of maintaining natural vegetation on beach dunes by Pitt (1992); and

- The role of dune management in coastal defence: an environmental, technical and economic valuation by Duvivier Posford (1997).

These reports are discussed in the following sections.

6.3.2.1. Contingent Valuation Studies

The only Australian stated preference study considering the Total Economic Value of coastal sand dunes is the contingent valuation study which was undertaken by Pitt (1992). The study area was the northern coast of NSW, and investigated local residents' WTP for beach and dune maintenance.

Key features of the study include:

- The survey questionnaire suggested that the proper maintenance of natural vegetation and the beach can cost in excess of $5,000 per km per annum (1992 dollars);
- The survey asked respondents to indicate their WTP for beach and dune maintenance through increased Council rates/ rental payments. Respondents were given an option of $0, $3, $5, $10, or >$10 per month;
- Interviews were conducted at 53 locations in greater Taree City Council (Lower Coast), some in Coffs Harbour City council (from Bonville to Moonee, Mid Coast), and the Tweed Shire (Far Coast), National Parks were excluded;
- The sample was taken amongst those people who lived in close proximity to the foreshore area, with residents on beach or sea-front streets given first preferences;
- A total of 525 groups, representing 1,551 individuals (with an average of 2.9 people per household), satisfactorily completed the questionnaire in January 1992; and
- The coastline in question was approximately 455km in length – and based on recent advice by Professor Pitt to the DERM, the average width of the dunes was some 50m for a total area addressed in the survey of 2,272.5 ha.

Based on the study results, the net benefit of the beach and sand dune maintenance was calculated to be $17.28/per resident/year (1992 dollars). When extrapolated to the then population of the North Coast, the contingent value of the dune and beach improvement to residents of the North Coast was calculated to be $7.043 million per annum (1992 dollars). This would equate to $15,496 per km per year.

In the report, Pitt advises that the $7.043 million per annum value should be treated as an upper limit given that the valuation of the sample of resident living close to the shoreline was extended to the whole NSW north coast local governmental areas. As represented by Equation 1, the

Total Economic Value is made up of use and passive values. Therefore, residents living closer to the coast line have a higher WTP value – representing their higher use value.

The survey results suggested a correlation between source of income and WTP – i.e. aged pensioners were less willing to pay than residents on salaries. Those in rented properties were also willing to pay more.

Previous studies by Pitt (1991) estimated the recreation benefits of dune and beach maintenance to tourists. Two studies were conducted, one using the travel cost method, and the other, CV. The CV study estimated benefits to tourists to be 27 cents per individual per day. Given that tourists surveyed stay an average of 16 days, this equates to a CV of $4.32 per annum and extrapolated to estimate $2.75 million per annum for all tourists to the relevant local government areas. **Pitt therefore combines the WTP values from the two surveys of the local residents and the tourists, to estimate that the non-market value of the dunes and beached on the North Coast of NSW to be $10 million per annum.**

A report by James Spurgeon (1998) considers the socio economic costs and benefits of coastal habitat rehabilitation and creation. The report refers to the review by Posford Duvivier (1997) which estimates the value of sand dunes in Tramore, Ireland based on the rehabilitation project. This is a preventative cost approach which, as previously discussed, is not considered appropriate for estimating the Total Economic Value of the HHI sand dune system.

6.3.3. Benefit Transfer Approach

The DERM indicated that based on the Pitt (1992) CV study, the value of the Hummock Hill sand dune system is approximately $30,000 per km or $6,000 per hectare[8] (2008 dollars). This estimate is based on the WTP value of $10 million per annum (1992 dollars) which includes the WTP of residents and tourists in the NSW study area. As highlighted in **Section 6.3**, it is important that the WTP values are adjusted to reflect the differences between the study area and the proposed project site. This estimate is explored in further detail below.

Key differences between the two sites are detailed below and the impact on the transferred WTP value is detailed in **Table 5**.

[8] These estimates were provided by the DERM on 30 June 2008 in response to discussions with Dr Pitt about deriving a per hectare value for the dunes from the study's per kilometre of coastline value. These estimates assume that the dunes are approximately 50m wide.

Table 5: Benefit Transfer components

Issue	Impact on relative WTP value - transferred from the NSW study (Pitt 1992)to the HHI sand dune system
Pitt (1992) considered the benefits of maintaining the sand dunes *and beaches*. The environmental costs associated with the proposed project are associated with the sand dune system only. Access to the beach and the quality of the beaches will be maintained.	***Reduces WTP value*** for our case study relative to Pitt (1992) It is likely that beach users are more willing to pay for the maintenance of the beach than the sand dune system due to its recreational/use value.
Pitt (1992) assessed the WTP for maintenance, while the issue at hand for the proposed development is preservation.	It is difficult to speculate about the difference in maintenance and preservation value. The WTP for the preservation of an environment asset is largely dependent on the quality and scarcity of the asset being preserved. Given that the asset is not scarce; access and use is limited; and there are no alternative plans to enhance the asset - there may not be a difference between the preservation and maintenance WTP values. As a conservative approach, ***it is assumed that the preservation value is higher.***
The Total Economic Value of the Pitt (1992) study includes both use and passive values (refer to Equation 1). The residents in the NSW study area had access to the sand dunes and beaches which were the subject matter of the survey. There is currently limited access to the HHI, and therefore, the use value of the sand dunes will be very low (or non-existent)	***Reduces WTP value*** of maintaining the HHI dunes relative to the Pitt 1992 study. Only part (likely anywhere between 50-70 per cent) of the total Pitt WTP value would be relevant in a benefit transfer to the HHI sand dune system. This is not to say that there aren't instances where the majority of the WTP value is based on the existence value of the asset. The Amazon Forest is a classic example of an environmental asset that people place a high value on its preservation despite most people never having the opportunity (and sometimes the intent) to visit the forest in their lifetime.
Given the current limited access to the HHI site, it is not considered a major a tourist destination. Many tourists visiting the region may not even be aware of the island's coastal sand dune systems, and may therefore not be willing to pay for its preservation. This differs to the situation in Northern NSW where the Pitt (1992) Study was undertaken. In the NSW study area, many of the tourists are there to visit the beaches and dunes which were the subject matter	***Reduces WTP value*** of maintaining the HHI dunes relative to the Pitt 1992 study. It is inappropriate to directly apply the tourist WTP value from the Pitt study to the HHI sand dune system given the lack of tourist access to the site. Whilst a small proportion of tourists to the Gladstone Region will be willing to pay for the dunes' preservation, it is unlikely that 100% of

Issue	Impact on relative WTP value - transferred from the NSW study (Pitt 1992)to the HHI sand dune system
of the questionnaire. Therefore they were more likely to be WTP for their maintenance.	them will be willing to do so. As a conservative approach, it is assumed that only 30% of them will be willing to pay.
The residents surveyed in Pitt (1992) all lived in close proximity to the coast line and therefore had easy access to the beaches and dunes and also had an appreciation for them above what a previously uninformed member of the community may have. WTP is a function of residents' access and use of the beach, as well as familiarity. Therefore, residents living further away from the coastline would usually be willing to pay less for the environmental asset.	***Reduces WTP value*** of maintaining the HHI dunes relative to the Pitt 1992 study. As highlighted by Pitt, the value obtained in the CV study in 1992, should be treated as an upper limit
The Pitt Study was interested in assessing the value of the Northern NSW **foredunes** – i.e. the coastal dune parallel to the shoreline approximately 50m in width. The 50m of sand dunes closest to the shore are likely to be the most valuable to survey respondents as they have the greatest aesthetics and use value. The HHI dunes are much wider than the dunes along the NSW coast – and smaller share is of the dune runs alongside the coast.	***Reduces the WTP value.*** The HHI development proposes to keep the HHI foredunes, at a width of 100m), in pristine condition, the only impact on the foredunes will be the development of elevated walkways for beach access at 2-3 locations.

6.3.4. The WTP applied to the HHI sand dunes

The Pitt WTP value was estimated on a per km of coastline basis for the population (residential and tourist) in the NSW study areas. Using an inflation rate of 2.5 per cent, the Pitt value per km of northern NSW coastline (455 km) in 2007/08 dollars is estimated to equal $24.42/resident/year and $6.10/tourist/year. Based on the average 50m width of the NSW coastal dunes, the Pitt WTP values translate to approximated $0.011/hectare/resident/year and $0.003/hectare/tourist/year (2007/2008 dollars).

Based on the issues listed in **Table 5**, the annual WTP value *per resident* has been adjusted to 70 per cent of the value from the Pitt (1992), and the annual WTP value *per tourist* has been adjusted to 30 per cent of the value in the Pitt (1992). Therefore the WTP values applied for the HHI sand dune valuation is $0.008/hectare/resident/year and $0.001/hectare/tourist/year (2007/2008 dollars).

In March 2008, Gladstone City Council amalgamated with Calliope Shire Council and Miriam Vale Shire Council to form the new Gladstone Regional Council. For the purposes of this analysis, the environmental value (or WTP value) obtained from Pitt (1992) will be transferred to the new Gladstone Region population. In June 2007, the population for the relevant Local Government Areas was approximately 50,755 (Census 2006). The total number of tourists visiting the region in a 2006 was 365,500 (Tourism Queensland 2006). Therefore, the total WTP value of the HHI coastal dunes is estimated at $669/ha/year ($382 and $287/ha/year for residents and tourists respectively). Residents' WTP is assumed to increase with the anticipated 3 per cent population growth for the Gladstone Region population. A summary of the conversation process is provided in the table below.

Table 6 provides a summary of the benefit transfer calculation.

- **Table 6: Benefit Transfer Summary**

	Pitt Value Per person /year (real@1992)	Adjustment Factor (% of original per person/category)	Total Population (New Gladsome City Council Region)	WTP Per person /ha/year (real@ 2007/08)	WTP Per ha/year (2007/08)	WTP/year (for full sand dune)
Resident WTP	$17.28	70%	50,755	$0.008	$382	$38,173
Tourist WTP	$4.32	30%	356,500	$0.001	$287	$28,727
TOTAL	$21.60	N/A	N/A	$0.008	$669	$66,899

Over the 30 year period, the total environmental costs, which only applies to Option A is equivalent to $1.2 million (present value). There is no environmental cost associated with Option B.

The key assumptions on which the environmental assessment is based are tested in the sensitivity analysis in **Section 9**.

7. Net State Benefit Assessment – Benefits

The following benefits are considered in the quantitative net state benefit assessment:

- Financial land building development benefits; and
- New tourism expenditure

These are discussed below:

7.1. Land Development and Building Development Benefits

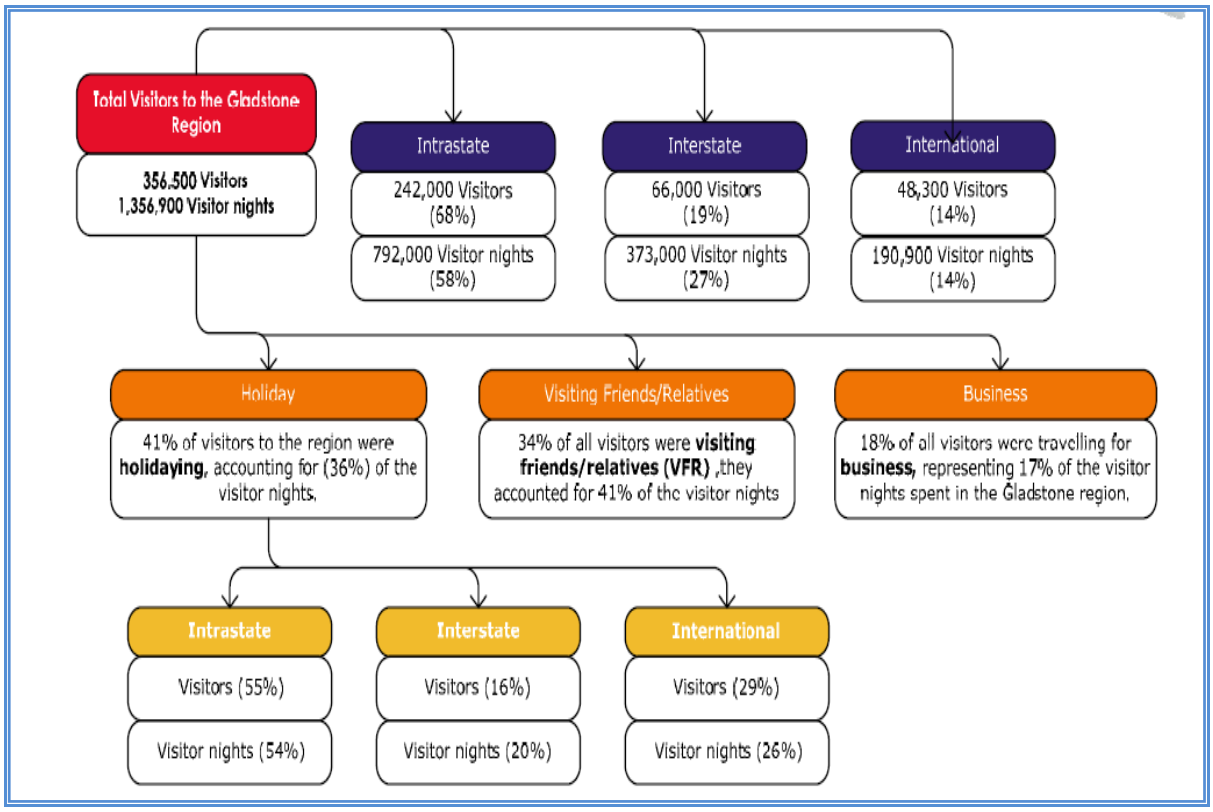
The land development revenue estimates have been based on the Feasibility Analysis undertaken by the proponent's licensed valuer in September 2007. The sale of the land is phased over a 16 year period, and totals approximately $351.2 million (present value) for Option A. Revenue from land sale under Option B is reduced to $241.7 million (present value).

The expected revenue from the building works has been estimated based on a financial return of approximately 25 per cent - which is considered to be an average hurdle rate of return for this type of investment. The total revenue estimated from the building works, over a 16 year development period for Option A is 997.3 million (present value). For Option B, the revenue is reduced to $686 million (present value).

7.2. Tourism benefits

As a tourism centre, the Gladstone region is relatively undeveloped, with opportunities available for sustainable tourist developments that can provide facilities for international, national and regional visitors. Data from the Australian Bureau of Statistics (ABS) and Tourism Queensland show that Central Queensland received 1.1 million visitors in 2006 including approximately 100,000 international visitors. The Gladstone region (including Gladstone, Calliope and Miriam Vale SLAs) received 356,300 visitors including some 48,000 international visitors over the same period representing 32 per cent of the total Central Queensland visitation. Visitors to the Gladstone region consisted primarily of intrastate (within Queensland) visitors (68 per cent) followed by interstate visitors (19 per cent) and international visitors (14 per cent). See **Figure 2** for more detail.

- **Figure 2: Visitation overview Gladstone region**



Source: Tourism Queensland 2006

Whilst there are broader social, economic and environmental benefits associated with providing additional local holiday destinations for Queenslanders, the net benefit assessment only considers the additional revenue to the state, that is additional tourist income (and value added) to the state that is not substituted by offsetting loss of tourism income in other areas of the state. This includes:

1) International tourists, who either chose to visit Queensland, with HHI as their destination of choice; or choose to extend their stay in Queensland to visit HHI;
2) Interstate tourist who either choose to visit Queensland, with HHI as their primary destination of choice; or choose to extend their stay in Queensland to visit HHI; and
3) Domestic tourists who choose to go to HHI for their holiday rather than travelling interstate and/or overseas.

Due to the difficulty in estimating tourist numbers in the third category, only the first two categories have been included in the CBA.

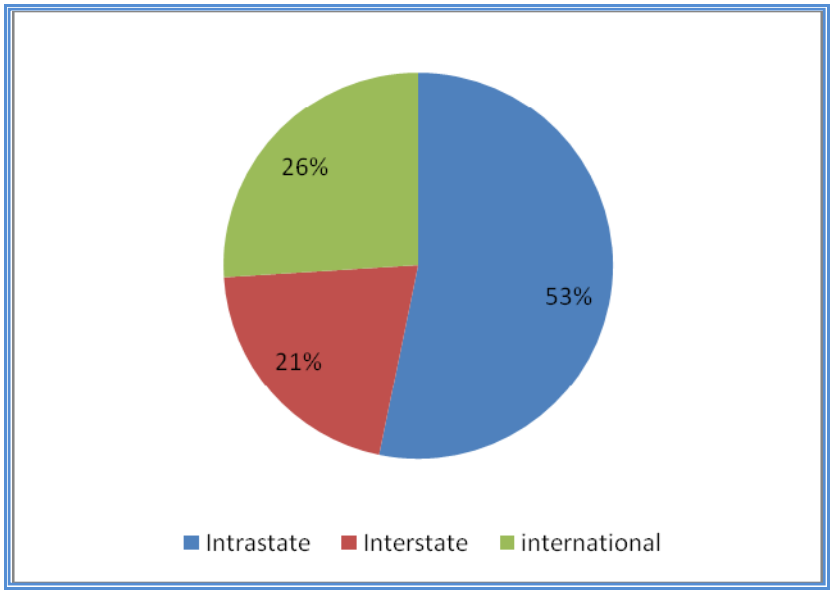
Only some 14 per cent of tourists coming to Gladstone are international visitors spending a similar proportion of visitor nights. This proportion of visitor nights is less than half the rate of international visitor nights to Queensland (31 per cent) and the Gold Coast (32 per cent) and around half the proportion of international visitors to Townsville (28%) and the Fraser Coast

(26%). However, Gladstone does not currently have a resort development which offers the facilities, views, and accommodation options which will be provided by HHI. It is expected that the new development will attract more international tourists and encourage them to stay longer in the Gladstone region than the current position. Further, given that marketing plans for the development will target both interstate and international tourists, it is expected that the region as a whole will benefit from the increased exposure and the anticipated additional number of international and interstate tourists and their longer stay in the region.

In the case of tourism, it is acknowledged that there is some uncertainty regarding future visitation numbers due to their sensitivity to exchange rates, petrol prices and other external factors. . Further, regions may become discovered or fall into decline due to changes in demographics, infrastructure, competition and global economic factors. However, given that HHI will offer a range of facilities designed to attract international and interstate tourists as well as local and other intrastate visitors, the economic analysis assumes that 26% of the nights spent at the resort will be tourists visiting HHI are from overseas. This assumption is in line with the overseas visitor proportions for the nearby Townsville and Fraser Coast regions and while higher than the current Gladstone region, it is lower than the Gold Coast and overall Queensland proportion of overseas visitors.

Data from 2006 suggests that 28 per cent of all domestic tourists were from interstate, while the rest were from Queensland (of which 16.7 per cent were from Brisbane). The split between inter and intrastate tourism to HHI island is assumed to remain constant resulting in an assumed rate of 21 per cent interstate and 53 per cent intrastate visitors.

- **Figure 3: Assumed HHI Tourist Origin**



7.2.1. Diverted Tourism

Some of the interstate and international tourist visiting HHI would have been diverted from other Queensland destinations – meaning that a proportion of interstate and international visitors would have visited an alternative Queensland holiday destination. Diverted tourists are not included in the CBA as there is no additional benefit at the state level. The proportion of benefits which can be attributable to 'diverted tourists,' is based on the following:

- In the short term, it is less likely that HHI will be the only reason that international tourists will choose to visit Queensland. However, as HHI develops a reputation, this will become more likely;
- There are no any competing holiday destinations in the Gladstone region. Therefore, international and interstate tourists, visiting the region for business purposes may have more interest in extending their visit to Queensland. In 2006, 18 per cent of all visitors to the Gladstone region were travelling for business (Tourism Queensland 2006);
- Tourists (both international and interstate tourists) already visiting Queensland may choose to extend their trip to visit HHI; and
- Local residents may choose to holiday in HHI rather than travelling interstate. This offsets some of the diverted benefits.

The CBA assumes that 40 per cent of all visitation nights are diverted from other Queensland destinations[9]. Given that uncertainty around this assumption, it is tested in the sensitivity analysis.

7.2.2. Accommodation Revenue

The HHI development offers a large range of privately owned and self catered holiday properties – available in one, two, or three bedrooms, and accommodating up to ten people each. The HHI tourist community therefore provides for a mix of tourist and residential accommodation. **Table 7** presents the number of units, and allocation between tourist and residents for each accommodation venue.

- **Table 7: Mix of tourism and residential accommodation**

Accommodation Type	Total Units	% Tourist	% residents
Headland resort hotel	150	100%	0%
Headland resort apartments	116	100%	0%
Headland Holiday Home	23	50%	50%
Beachfront Holiday homes	150	100%	0%

[9] This 40 per cent figure applies to visitation nights not the number of tourists. This captures existing visitors wishing to extend their stay to visit HHI.

Accommodation Type	Total Units	% Tourist	% residents
Beachfront Apartments	64	100%	0%
Seaside cottages	150	100%	0%
Ridgetop Housing	157	50%	50%
Hillside Terraces	206	0%	100%
Lagoon villas	124	50%	50%
Riparian Eco Homesites	136	0%	100%
Bushland residential	147	0%	100%
Resort town apartments	92	100%	0%
Village town house	56	100%	0%
Golf Course resort Homestead	270	0%	100%
Golf Course resort apartments	255	100%	0%
Boyne Channel Apartments	96	0%	100%
Beachfront Tourist Hotel	150	100%	0%
Conference centre and motel	50	100%	0%
Tourist Park	100	100%	0%
School Recreational Camping	100	100%	0%
Total	**2,592**		

7.2.3. Tourism Accommodation revenue

The tourist accommodation available at Hummock Hill (see descriptions in **Appendix A**) has been classified as either:

- **Budget** – low cost accommodation option located on lower value land. The daily room rate for Budget accommodation has been estimated at a seasonal average of $60. This allows for an average of camping site rates, hostel rates and budget motel room rates.
- **Mid-range** – accommodation provided at rates equivalent to the average daily room rate. In 2006, the average daily room rate in Gladstone was $92. This compares to an average of $160 in Fitzroy. A seasonal average of $130 (in 2007/08 dollars) for the HHI mid-range accommodation has been used in the model to as a conservative average of the region.
- **Resort** – high end, luxury accommodation. $190 per night is the average room rate for the Whitsundays. This average rate is not limited to resort accommodation, and has therefore been used as a very conservative estimate of the resort accommodation rates at HHI.

It is recognised that not all the accommodation types offered on HHI fall neatly into these three budget categories, and that some fall somewhere between two categories. The classification allocated for modelling purposes is presented in **Table 8.**

- **Table 8: Tourist accommodation by budget classification**

Accommodation Type	Budget	Mid- range	Resort
Headland resort hotel	-	Part	Part
Headland resort apartments	-	Part	Part
Headland Holiday Home	-	-	Yes
Beachfront Holiday homes	-	Part	Part
Beachfront Apartments	-	Yes	-
Seaside cottages	-	Part	Part
Ridgetop Housing	-	Part	Part
Hillside Terraces	-	-	-
Lagoon villas	-	Yes	-
Riparian Eco Homesites	-	-	-
Bushland residential	-	-	-
Resort town apartments	-	Yes	-
Village town house	Part	Part	-
Golf Course resort Homestead	-	-	-
Golf Course resort apartments	Part	Part	-
Boyne Channel Apartments	-	-	-
Beachfront Tourist Hotel	-	Yes	-
Conference centre and motel	Part	Part	-
Tourist Park	Yes	-	-
School Recreational Camping	Yes	-	-

The revenue (i.e. profit) from the tourism accommodation is assumed to be equivalent to 15 per cent of the turnover. Whilst the standard long term industry margin is higher (between 20-25 per cent), a more conservative estimate is required to allow for possible losses during the initial years of operation.

The Gladstone Region average occupancy rate reached 68.6 per cent in 2006 (Tourism Queensland 2006). 68 per cent has been used as the assumed occupancy rate for the life of the project. The sensitivity analysis in **Section 9** tests the impact of different occupancy rates.

Based on these assumptions, the revenue from tourist accommodation is estimated at $19.7 million (present value) for Option A and at $12.1 million for Option B.

7.2.4. Tourist expenditure benefits (non accommodation)

It is very difficult to speculate what percentage of total tourism expenditure is on accommodation, and what percentage is spent on non-accommodating good and services. Publicly available data generally provides an average expenditure per visitor per night, but this also includes expenditure by tourists staying at friends/family and not paying for

accommodation. For modelling purposes, it has been assumed that 50 per cent of total tourist expenditure is on accommodation. This assumption is tested as part of the sensitivity analysis.

Based on these assumptions, the revenue from tourist (non-accommodation) is estimated at $131.5 million (present value) for Option A and $80.4 million (present value) for Option B.

8. Summary of Results

A summary of the CBA results is provided in **Table 9**. A summary of the CBA forecasts over the 30 year period is provided in **Appendix C**.

- **Table 9: CBA summary**

Present Value (discounted over a 30 year period using a discount rate of 6 per cent	Option A	Option B	Option C (Option A-Option B)
Land Development costs	$120.8 m	$ 84.2m	$ 36.6 m
Building Development Costs	$804.1 m	$ 553.2 m	$ 250.9 m
Environmental Costs	$1.2 m	$ 0m	$ 1.2 m
Operational Expenditure	$32.6 m	$ 22.8 m	$ 9.8 m
Total Cost	***$958.6m***	***$ 660.2 m***	***$ 298.4 m***
Sale Revenue – Land	$351.2m	$ 241.7m	$ 109.5 m
Sale Revenue - Building	$997.3 m	$ 686.0m	$ 311.2 m
Total sale revenues	***$1,348.5 m***	***$927.7 m***	***$420.7 m***
Tourism Expenditure - Accommodation	$19.7 m	$ 12.1 m	$ 7.7m
Tourism Expenditure – Non- accommodation	$131.5 m	$ 80.4 m	$ 51.1m
Total Tourism benefits	***$151.2 m***	***$ 92.4m***	***$ 58.8 m***
Total Benefits	***$1,499.7 m***	***$1,020.2 m***	***$ 479.5 m***
Net Benefits	$ 541.1m	$360.0 m	$ 181.1 m
Net Present Value	**$ 541.1m**	**$360 m**	**$ 181.1 m**
BCR	**1.6**	**1.5**	**1.6**

9. Sensitivity Analysis

The key sensitivities to be tested include:

Economic Assumptions

- Construction revenue has been indexed at Building Price Index (BPI) which has been estimated at 4.5%. A more conservative approach would be to reduce this to Consumer Price Index (CPI), which is assumed to be 2.5%; and
- Discount rate has been assumed to be 6% real. A discount rate of 5% and 7% will also be tested.

Capital cost assumptions

- It has been assumed that Option B's share of the shared infrastructure cost (including commercial and retail facilities) is 70 per cent. Given that under an Option B scenario, there may be a need for less infrastructure, the sensitivity analysis tests the impact of assuming that Option B's share of the infrastructure is 50%. This assumption also applies to the share of operating expenditure, and statutory and associated costs.

Environmental assumptions

- The population size to which the WTP for the sand dune system is extrapolated. Currently, the analysis applied to the Gladstone Region Population. A more conservative approach would be to apply the WTP value to a larger population. To test the extreme impact, the WTP value has been applied to the Queensland population (3.9 million at a population growth rate of 3 per cent (2006 census), and total Queensland tourist population (18.8 million per year[10]). Whilst this sensitivity is tested for comparison purposes, it should be noted that it is it would be inappropriate to apply the Pitt WTP value to such a large population. The Pitt value was extrapolated from a small population living near the coast, and can therefore not be applied to a diverse population (i.e. the WTP value across the state would not be homogeneous);
- The WTP value applied to the HHI coastal dunes is based on residents' WTP and tourist WTP. The tourism figures used for these calculations are based on Tourism Queensland data from December 2006. To assess the impact of an increase in tourist numbers, the sensitivity analysis tests a 25% increase in tourism to the Gladstone region (i.e. annual tourism is 445,625); and
- Based on the information provided in **Table 5**. The Pitt WTP value has been adjusted down to 70 per cent for the residents' WTP value, and by 30 per cent for the tourists WTP value.

[10] Based on Tourism Australia figures for 2008 – includes domestic and international figures, but excludes day-trip visitors.

A more conservative approach would be to apply an 80 per cent and 50 per cent adjustment to the residential and tourists WTP value respectively.

Land and building revenue

- The economic assessment assumes that 100 per cent of the land and buildings will be sold according to the proposed development schedule. The sensitivity analysis tests the risk that land and building revenue will be reduced by 25 per cent. Whilst this sensitivity is tested for the sake of completeness, it is important to note that if sale rates are reduced, then land and building development costs will also be reduced. It is expected that in the long run, 100 per cent of the land will be developed (and sold), and therefore, it is only the rate of development which may be affected.

Tourism Assumptions

- An occupancy rate of 68 per cent has been assumed based on the current occupancy rate in the Gladstone region. To allow for a potential slowdown in the tourism sector, the impact of a 50 per cent occupancy rate is tested;
- Expenditure on accommodation has been assumed to be 50 per cent of total expenditure. A 10 per cent adjustment (upwards and downwards) is tested;
- HHI visitor nights diverted from other Queensland destinations has been assumed to be 40 per cent. A diversion factor of 50 per cent and 60 per cent is also tested; and
- Profit from tourism accommodation has been assumed to be 15 per cent of total turnover. Given that the short term profit is expected to be lower, and the longer term profit higher (around 20 per cent), margins of 10 and 20 per cent are tested.

The results of the sensitivity analysis are presented in **Table 10**.

Table 10: Sensitivity Analysis

Sensitive Test #	Sensitivity Test	Option A BCR	Option B BCR	Option C BCR
0	No Sensitivity	1.6	1.5	1.6
1	Construction revenue is indexed at CPI	1.4	1.4	1.4
2	Discount rate is 5 % (real)	1.6	1.6	1.6
3	Discount rate is 7% (real)	1.6	1.6	1.6
4	Option B's share of the infrastructure in the Master Plan is 50%	1.6	1.6	1.5
5	WTP calculation assumes a 25% increase in annual tourist	1.6	1.5	1.6
6	WTP value applied to Total Queensland population and total Queensland tourists (i.e. $6.089/Ha for 100 ha)	1.4	1.5	1.3
7	Residents' WTP value adjusted to 80 per cent of Pitt (1992) WTP value	1.6	1.6	1.6
8	Tourists' WTP value adjusted to 50 per cent of Pitt (1992) WTP value	1.6	1.6	1.6
Combined 7 and 8	Combined impact of above	1.6	1.6	1.6
9	Land and building revenue is reduced by 25%	1.2	1.2	1.3
10	Tourism occupancy rate is 50 per cent	1.5	1.5	1.6
11	Percentage of tourist expenditure spent on accommodation is 60%	1.5	1.5	1.6
12	Percentage of tourist expenditure spent on accommodation is 40%	1.6	1.6	1.7
13	Diversion of interstate tourists is 50%	1.6	1.5	1.6
14	Diversion of interstate tourists is 70%	1.5	1.5	1.5
15	Tourism profit margin is 10%	1.6	1.5	1.6
16	Tourism profit margin is 20%	1.6	1.6	1.6
Combines 13 and 15	Diversion is 50% and margin is 10%	1.5	1.5	1.6

As seen from the sensitivity results in **Table 10**, the BCR for Option C (i.e. Option A – Option B) remains greater than one under all scenarios – even the most extreme scenarios which include:

- Applying the WTP value for the sand dunes to the full Queensland population; and
- Decreasing land and building revue by 25 per cent.

As discussed above, the two tests which most significantly impact the BCR should not be considered in isolation. More specifically:

- Whilst it may be appropriate to apply a WTP value to the whole Queensland population, it would be inappropriate to apply the Pitt WTP value to such a large population. The Pitt value would need to be reduced significantly to allow for the fact that residents living a greater distance from the site will be willing to pay less for its preservation; and
- If land and building revenue is decreased due to reduced occupancy rates, it is unlikely that costs will remain constant. The rate of construction growth is directly correlated to the rate of sale, and therefore it is expected that the BCR will remain relatively constant.

10. Conclusions from the quantitative assessment

The results from the CBA conclude that the proposed development delivers a net state benefit returning a value of $541.1 million to the economy assuming a discount rate of six per cent and a 30-year analysis period. This results in a BCR of 1.6. Further, the results show the development which is proposed to be undertaken on the 100 ha of coastal dunes also delivers positive net benefit with a BCR of 1.6 with a return of $181.1 million to the state economy. The analysis therefore indicates the development of the sand dunes meets the requirements of the State Coastal Management Plan.

The CBA also tested the sensitivity of key assumptions affecting the costs and benefits of the assessment. Under all sensitivity tests, the BCR remains greater than one. The sensitive analysis firms the position that the proposed HHI tourist community development project provides a net benefit to the state, and that the development which is planned for sand dunes provides a net state benefit in its own right.

11. Qualitative Assessment

The majority of the cost and benefits associated with the proposed development have been identified and quantified in the analysis above. However there are also benefits (and perhaps some costs) which have not been quantified in dollar terms, but which need to be considered for a more comprehensive Net State Benefit assessment.

The impacts which are considered qualitatively are assessed based on the framework detailed below:

- **Table 11: Qualitative assessment framework**

Level	Descriptor	Description Benefits	Description Costs
1	**Insignificant**	No measurable impact	No measurable impact
2	**Minor**	Possibly detectable benefits that are generally short-term and localised	Possibly detectable cost that are generally short-term and localised. Costs are manageable and reversible after 1-2 years
3	**Moderate**	Detectable benefits maintained over the medium term	Detectable costs with short to medium term impact. Recovery from impacts is achievable over the medium term once management initiatives are implemented
4	**Major**	Wider and longer term benefits maintained over the longer term	Wider and longer term costs maintained over the longer term Recovery from impacts possible with sustained effort over the long term
5	**Severe**	Wider and longer term benefits maintained over the longer term without management and/or works	Wider and longer term costs occurring. Return to pre impact levels unlikely to occur even with mitigation and intervention

The key benefits associated with the proposed project which have not been quantified as part o the CBA relate to potential for delaying public investment in housing and supporting infrastructure, and social infrastructure for a growing population. Benefits are localised but which do not necessarily contribute to the net state benefit are also considered.

The key benefits which are considered qualitatively are outlined in **Table 12**. The key costs which are considered qualitatively are outlined in **Table 13**.

- **Table 12 Qualitative assessment of benefits**

Benefit	Comment	Potential Impact
Improved social infrastructure for region	The HHI tourist based community includes $44 million worth of investments in social infrastructure. All services provided on the Island – including health, aged care, community and education facilities will be available to all visitors and residents of the Islands, as well as residents living in nearby communities.	***Impact: Moderate*** Regional residents will have increased access to (and increased choice of) social infrastructure. The development will therefore reduce pressure on State funding to invest in social infrastructure in the region, as facilities and services will be offered as part of the development.
Potential to delay public investment in regional housing and supporting infrastructure investment	It is recognised that serious investment in regional infrastructure and housing is required in the Gladstone region. The project will contribute to the provision of housing and offer a range of community and social service to support the tourism based community. It is expected that HHI tourist community will provide 5% of the recognised housing requirements for the Gladstone Regional Council. Further, the development includes all the supporting infrastructure needs – e.g. roads, electricity, gas, and water, and public parks.	***Impact: Moderate*** The HHI development will go some way in providing the additional housing requirements for the Gladstone Regional Council and will provide the necessary supporting infrastructure. The privately funded HHI development should therefore enable the State to delay (and potentially re-scope) the planned investment in regional housing and the supporting infrastructure. This frees up funds for competing investment needs in the region.
Delayed investment in tourism related infrastructure	Tourism is a key industry, yet currently in the Gladstone industry, the tourism facility and infrastructure remains	***Impact: Minor*** The provision of improved tourism infrastructure will ease

Benefit	Comment	Potential Impact
	relatively undeveloped outside the Agnes Water/1770 Area. The HHI tourist community will include improved access (for tourists and residents) to beaches via boat ramps and roads to the Island.	pressure on State investment in the Sector. Given that there have been no plans develop HHI as part of a broader State plan, the impact is considered to be minor.
Improved access to leisure and recreation	As mentioned above, the proposed development will include improved access to beaches via boat ramps and roads to the Island. The master plan also includes a golf course, and a range of retail and hospitality facilities.	***Impact: Moderate*** The development will directly benefit the Gladstone residents (and surrounding areas) by providing additional access to leisure and recreation activities.
Increased business activity in the Gladstone Regional Council LGA	At full capacity, the HHI tourist community can increase the population in the region by 3,900 people.	***Impact: Moderate*** The quantitative assessment considers the expenditure by tourists (from interstate and overseas) which will lead to increased business activity on the Island, and in the Gladstone area. HHI residents and tourists will lead to increased demand for goods and services from Gladstone (by visitors, operators of tourist facilities and local residents). Whilst not necessarily contributing to the net state benefit, the development will contribute to the local Gladstone economy.
Additional employment and	The HHI tourist community provides for a mix of tourist and	***Impact: Minor***

Benefit	Comment	Potential Impact
training opportunities	residential accommodation and includes all the supporting services – including education, health, retail, hospitality. The development also includes an educational centre which will support research in environmental management and provide facilities for residents and tourists to undertake study programs linked to a major Queensland university.	The HHI tourist community will provide new job opportunities in the region – particularly in the hospitality, retail and tourism sector. These sectors tend to rely on a combination of full time, part time and casual staff, and therefore it is expected that more youth employment opportunities will be available. Over the long run. it is unlikely that there will be any employment benefits (at a state level) from the construction activity, given the low unemployment in the sector.
Community Engagement	The Island has a range of unique features such as bushland, adjacent areas of seagrass and coastal waterways. These features and values need to be managed appropriately, to minimise the impact of the development. The Proponent will undertake a program of community education and engagement with the purpose of informing tourists and residents on how to live on the Island and how to look after the values of the Island.	***Impact: Moderate*** The active involvement of the Proponent with tourists and residents through workshops, public information sessions related to living on the Island, induction of new residents and construction workers will create a culture of shared learning and understanding of the Island's values.

- **Table 13: Qualitative assessment of costs**

Cost	Comment	Potential Impact (after mitigation activities)
Increased traffic in the region	It is expected that there may be some heavy vehicle trips during the initial stages of development.	***Impact: Minor*** It is expected that the traffic will be predominantly light as the development is residential.
Increased demand for accommodation and community services/facilities during construction	During the construction of the development employees will need to be housed near to the site, if not already living locally. Similarly, community services and facilities will be required.	***Impact: Minor - Moderate*** Construction labour during the construction period may impact the housing availability. This is true also for community services and facilities. It is expected that the phased construction will mitigate part of this impact. In addition the Proponent is committed to using local contractors and companies for the majority of the construction, with the use of firms from outside the region for only specialist construction roles. The Proponent will also prepare an accommodation management strategy to manage the accommodation needs of the project, which will include the construction of a workers village on the Island.
Changes to surrounding views resulting from Hummock Hill Island development (i.e. amenity costs)	It is expected that views from the water, Wild Cattle Island, Tannum Sands (especially with the bridge to the Island) will be affected.	***Impact: Minor*** The amenity impacts are being minimised via the following measures:

Cost	Comment	Potential Impact (after mitigation activities)
		• vegetation screens have been planned to prevent the bridge from being seen from land based views; and • housing will be of muted colours and existing vegetation screens will be maintained. Development seeks to preserve the character and amenity of the locality by protecting approximately 50% of the development from development (i.e. a dedicated environmental protection area).
Impacts on native vegetation	The proposed development will result in the loss of 341ha of remnant vegetation comprising 11 ecosystems listed as endangered', 'of concern' and 'not of concern'. The developed will encroach upon land mapped as essential habitat for the Koala and Wallum Froglet. Vegetation in the watercourses may be disturbed during construction as fauna passages will be required.	***Impact: Minor*** The following measures are being implemented to mitigate and/or manage the negative impact on native vegetation: ▪ Environmental Management Plans have been prepared and environmentally sensitive and responsive designs have been implemented in order to minimise the impact upon sensitive areas; ▪ Compensatory habitat and biodiversity offsets have

Cost	Comment	Potential Impact (after mitigation activities)
		been provided; ▪ A management process will be employed to monitor the groundwater dependent ecosystems near the golf course; and ▪ The required 10m buffer will be maintained during construction to avoid disturbance to the vegetation in the watercourses. ▪ There will be active management of the vegetation offset area, with the management of weeds a key feature, which is expected to improve the value of habitat and overall biodiversity outcomes for the Island. ▪ Management of the balance of the lease area will provide direct benefits to this part of the Island through the management of weeds, the Island population and engagement of the tourists and residents in bushland management.
Impacts on marine mammals	Marine mammals such as turtles and dugongs are known to migrate through, or inhabit, the Rodds Bay area. Turtles are	***Impact: Minor*** The only habitat loss will be in order for Boyne Creek Bridge

Cost	Comment	Potential Impact (after mitigation activities)
	known to inhabit areas in the vicinity of Hummock Hill, specifically the green turtle, the loggerhead turtle and flatback turtle.	and road and public boat ramps. Reduction and avoidance of disturbance to marine habitats is the primary mechanism for mitigating against impacts on marine mammals and to ensure marine conservation is maximised. It is expected that there will be minimal impact on marine fauna and fauna during construction and operation, based on modelling. Golf course effects are expected to be negligible on marine mammals, as is increased boat traffic problems (due to signage and education).

Most of the costs identified in the qualitative assessment are considered to be short term and reversible with adequate management plans. It would appear that the benefits identified in **Table 12**, which are generally 'moderate', would outweigh the mostly 'minor' costs identified in **Table 13**. As a conservative approach, it is assumed that the qualitative assessment would not impact the results obtained from the CBA.

12. References

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Appendix A Land development costs

Land Development Category	Component
Primary Infrastructure	Bruce Highway-Turkey Beach Road intersection Access road to the Island Bridge over Boyne Creek Water supply desalination plant Waste water treatment plant HV power to Island and substation Gas supply main to island Solid waste transfer station
Internal Roads	Trans Island Boulevard and services Distributor roads (25m wide) Collector roads (16m wide) Local roads (12m wide) Cul de sac heads Roundabouts Town Centre roads, ralkways, plaza service conduits
Drainage	Swale drains Stormwater pipes Stormwater lagoons (6 Ha) Bioretention devices
Water and Wastewater Reticulation	Sewerage reticulation Water reticulation Potable water reservoir (3 ML) Recycled water reticulation Recycled water reservoir (3 ML) Rainwater tanks
Electricity	HV reticulation LV reticulation
Gas	Reticulation
Telecommunications	CDMA base station Microwave tower Reticulation
Land Clearing	Land clearing
Landscaping	Capital works
Community Infrastructure	Beachside public parks

Land Development Category	Component
	Boyne Channel Marine Centre and boat ramp
	Colosseum Inlet boat ramp and parking
	Golf course
	Clubhouse and all support facilities
	Airstrip runway
	Airstrip support services
	Essential services facilities -ambulance, fire, police
	Medical Centre
	Educational facility - development contribution
Site Preparation for Commercial and Retail Development Land	Boyne Channel Home Offices land
	Tourist park
	School recreational camping ground
	Headland Resort Hotel
	Beachfront Tourist Hotel
	Conference Centre and Motel
Statutory and Associated Costs	DNR lease payments
	Freeholding costs
	Vegetation Offsetting Costs (DNRW)

Appendix B List of Tourist Accommodation

The following is a list of the key tourist accommodation facilities which will be provided on HHI.

Headland resort hotel - 150 rooms and is in a prime position in the headland, behind the headland holiday homes and near town centre and conference centre. Excellent eastern and northern ocean views are available from the position.

Headland resort apartments – 116 apartments are planned on the coastal headland with exceptional ocean views towards Tannum Sands in the north as well as south easterly to the coast and beaches.

Headland Holiday Home - Exclusive home sites close to the extremity of the headland with outstanding ocean and coastline views to the east, north and south. The proximity to the ocean and the extent of the views from these allotments set them apart.

Beachfront Holiday homes – Located in two areas on the island. One extends along the beachfront around the north facing bay. It will contain 44 lots and will be separated from the beach only by a reserve which retains the natural vegetation. Good ocean and coastline views will be available to the first row of lots through the trees. The second area is south east of the headland and will provide 106 lots. Some are separated from the beach by a wider, and more densely vegetated reserve. Water views will be sparse. Others are set back from the beach on land rising up from the beach. Some of the subject allotments will have almost uninterrupted views of the beach and ocean. Others will be separated from the beach by a wide vegetation reserve and will have sparse water views.

Beachfront Apartments –These are close to the beach area facing north across the bay to the ocean. They have extensive coastline and ocean views north to Tannum Sands. These sites will provide good coastline and ocean views which are a little less expensive than the views from the headland resort apartments.

Seaside cottages – Located in an elevated section close to the beach extending southward from the headland. They will have small allotment areas of about 500m^2. Good ocean views will be available from the front facing lots and distant glimpses will be available from those at the rear. The Seaside Cottage allotments are relatively small and their quality falls somewhere between the very best elevated allotment and more mediocre sites.

Ridgetop Housing – Well elevated lots on the ridges of the two prominent hills and adjoining "Hummock" which links the hills. This locality is about 1 ½ kilometres from the water. Lots will be in a bush land setting and most will have expansive, but distant ocean or Boyne Channel views. The Ridgetop Housing Lots will have distant ocean views of various degrees of excellence.

Lagoon villas - Located to the west of the headland on the landward side of the east/west ridge. They will cluster around a man made lagoon. Most will have direct lagoon outlook. Others will have little or no lagoon visibility. Most of the allotments in the Lagoon Villas precinct will have direct frontage to a lagoon but some allotments will have no direct lake frontage.

Resort town apartments – Located close to the town centre and headland resort hotel. This is elevated land overlooking the beachfront apartments with restricted coastal and sea views to the north. These are positioned just above the beachfront apartments. They are higher in elevation but further from the beach.

Village town house – The Village Townhouses are close to the town centre with its various amenities. It is on the landward side of the ridge with no ocean views.

Golf Course resort apartments – Overlooking golf fairways in three separate sections of the course. No ocean or water influence is available to these sites. Apart from their outlook to the fairways and the golf course association these sites are fairly standard.

Beachfront Tourist Hotel - will comprise 150 rooms and will be in the northern most section of the development to the west of the beachfront holiday homes. It will have northerly coastline views towards Tannum Sands.

Conference centre and motel - Planned for the elevated section in the north of the island. It will be close to the western side of the town centre. Northerly ocean and coastline views are available looking over the resort town apartments. The motel will consist of 50 rooms. Conference centres are not profit centres in their own right, but provide a focal point for accommodation at nearby motels and hotels. Therefore no value is attached to the conference centre site component.

Tourist Park – Located in a somewhat remote position at the rear of the lakeside villas. It will occupy an area of 10 hectares and will be utilised as a 100 site camping ground..

School Recreational Camping - The site for the School Recreation camp lies on the western boundary of the site, mid-way between, the beachside resort and the tourist park. Reserved for schools, sporting teams and the like, this area provides camping and associated facilities similar to the Tourist Park but also caters for recreational needs with a sporting field and associated ancillary buildings. The site has the potential to maximise the educational opportunities of the natural resources and environment of HHI. The school recreation camp mirrors the principles outlined in the Education/ sporting precinct strategy.

Appendix C CBA results

Option A: CBA Results

		Economic costs				ECONOMIC BENEFITS			
Project Year	Fiscal Year End	Land and building development costs	Environmental development costs	Opex	Total costs	Land and building revenue	Tourism expenditure benefits	Total benefits	Net Benefits Total
		$m	$m	$m	$m	$m	$m	$m	$m
1	2007/08	$ 1.57 m	$ 0.07 m	$ 1.42 m	$ 3.05 m	$ 0.00 m	$ 0.00 m	$ 0.00 m	-$ 3.05 m
2	2008/09	$ 8.53 m	$ 0.07 m	$ 1.50 m	$ 10.09 m	$ 0.00 m	$ 0.00 m	$ 0.00 m	-$ 10.09 m
3	2009/10	$ 8.36 m	$ 0.07 m	$ 1.35 m	$ 9.78 m	$ 0.00 m	$ 0.16 m	$ 0.16 m	-$ 9.62 m
4	2010/11	$ 28.74 m	$ 0.07 m	$ 1.13 m	$ 29.94 m	$ 40.44 m	$ 1.42 m	$ 41.86 m	$ 11.92 m
5	2011/12	$ 42.39 m	$ 0.07 m	$ 0.89 m	$ 43.36 m	$ 67.38 m	$ 1.87 m	$ 69.25 m	$ 25.89 m
6	2012/13	$ 27.68 m	$ 0.07 m	$ 0.73 m	$ 28.48 m	$ 39.57 m	$ 3.27 m	$ 42.84 m	$ 14.36 m
7	2013/14	$ 43.67 m	$ 0.07 m	$ 0.74 m	$ 44.48 m	$ 70.04 m	$ 3.72 m	$ 73.75 m	$ 29.27 m
8	2014/15	$ 43.36 m	$ 0.08 m	$ 0.74 m	$ 44.18 m	$ 67.90 m	$ 4.16 m	$ 72.06 m	$ 27.88 m
9	2015/16	$ 47.34 m	$ 0.08 m	$ 0.75 m	$ 48.17 m	$ 72.80 m	$ 4.44 m	$ 77.24 m	$ 29.07 m
10	2016/17	$ 31.05 m	$ 0.08 m	$ 0.74 m	$ 31.87 m	$ 50.48 m	$ 4.61 m	$ 55.09 m	$ 23.22 m
11	2017/18	$ 19.40 m	$ 0.08 m	$ 0.73 m	$ 20.21 m	$ 32.60 m	$ 4.68 m	$ 37.28 m	$ 17.07 m
12	2018/19	$ 30.52 m	$ 0.08 m	$ 0.72 m	$ 31.32 m	$ 47.76 m	$ 4.76 m	$ 52.52 m	$ 21.20 m
13	2019/20	$ 20.48 m	$ 0.08 m	$ 0.71 m	$ 21.28 m	$ 33.89 m	$ 5.65 m	$ 39.54 m	$ 18.26 m
14	2020/21	$ 54.23 m	$ 0.08 m	$ 0.56 m	$ 54.88 m	$ 82.61 m	$ 6.54 m	$ 89.15 m	$ 34.27 m
15	2021/22	$ 21.06 m	$ 0.09 m	$ 0.33 m	$ 21.48 m	$ 35.22 m	$ 6.62 m	$ 41.84 m	$ 20.36 m
16	2022/23	$ 10.09 m	$ 0.09 m	$ 0.13 m	$ 10.31 m	$ 11.51 m	$ 6.69 m	$ 18.20 m	$ 7.89 m
17	2023/24	$ 21.03 m	$ 0.09 m	$ 0.00 m	$ 21.12 m	$ 36.61 m	$ 6.69 m	$ 43.30 m	$ 22.18 m
18	2024/25	$ 0.00 m	$ 0.09 m	$ 0.00 m	$ 0.09 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.60 m
19	2025/26	$ 0.00 m	$ 0.09 m	$ 0.00 m	$ 0.09 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.60 m
20	2026/27	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.59 m
21	2027/28	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.59 m
22	2028/29	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.59 m
23	2029/30	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.59 m
24	2030/31	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.59 m
25	2031/32	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.58 m
26	2032/33	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.58 m
27	2033/34	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.58 m
28	2034/35	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.58 m
29	2035/36	$ 0.00 m	$ 0.12 m	$ 0.00 m	$ 0.12 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.57 m
30	2036/37	$ 0.00 m	$ 0.12 m	$ 0.00 m	$ 0.12 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.57 m
Undisc Total		$ 459.49 m	$ 2.68 m	$ 13.20 m	$ 475.37 m	$ 688.80 m	$ 152.25 m	$ 841.05 m	$ 365.68 m
Discounted Total		$ 287.47 m	$ 1.20 m	$ 9.77 m	$ 298.44 m	$ 420.71 m	$ 58.82 m	$ 479.53 m	$ 181.09 m

Assumptions	
Discount Rate	6.00%
Calculations	
Benefits (disc)	$ 479.53 m
Costs (disc)	$ 298.44 m
Benefit/Cost Ratio	1.6
NPV	$ 181.09 m

Option B: CBA results

		Economic costs				ECONOMIC BENEFITS			
Project Year	Fiscal Year End	Land and building development costs	Environmental development costs	Opex	Total costs	Land and building revenue	Tourism expenditure benefits	Total benefits	Net Benefits Total
		$m	$m	$m	$m	$m	$m	$m	$m
1	2007/08	$ 1.57 m	$ 0.07 m	$ 1.42 m	$ 3.05 m	$ 0.00 m	$ 0.00 m	$ 0.00 m	-$ 3.05 m
2	2008/09	$ 8.53 m	$ 0.07 m	$ 1.50 m	$ 10.09 m	$ 0.00 m	$ 0.00 m	$ 0.00 m	-$ 10.09 m
3	2009/10	$ 8.36 m	$ 0.07 m	$ 1.35 m	$ 9.78 m	$ 0.00 m	$ 0.16 m	$ 0.16 m	-$ 9.62 m
4	2010/11	$ 28.74 m	$ 0.07 m	$ 1.13 m	$ 29.94 m	$ 40.44 m	$ 1.42 m	$ 41.86 m	$ 11.92 m
5	2011/12	$ 42.39 m	$ 0.07 m	$ 0.89 m	$ 43.36 m	$ 67.38 m	$ 1.87 m	$ 69.25 m	$ 25.89 m
6	2012/13	$ 27.68 m	$ 0.07 m	$ 0.73 m	$ 28.48 m	$ 39.57 m	$ 3.27 m	$ 42.84 m	$ 14.36 m
7	2013/14	$ 43.67 m	$ 0.07 m	$ 0.74 m	$ 44.48 m	$ 70.04 m	$ 3.72 m	$ 73.75 m	$ 29.27 m
8	2014/15	$ 43.36 m	$ 0.08 m	$ 0.74 m	$ 44.18 m	$ 67.90 m	$ 4.16 m	$ 72.06 m	$ 27.88 m
9	2015/16	$ 47.34 m	$ 0.08 m	$ 0.75 m	$ 48.17 m	$ 72.80 m	$ 4.44 m	$ 77.24 m	$ 29.07 m
10	2016/17	$ 31.05 m	$ 0.08 m	$ 0.74 m	$ 31.87 m	$ 50.48 m	$ 4.61 m	$ 55.09 m	$ 23.22 m
11	2017/18	$ 19.40 m	$ 0.08 m	$ 0.73 m	$ 20.21 m	$ 32.60 m	$ 4.68 m	$ 37.28 m	$ 17.07 m
12	2018/19	$ 30.52 m	$ 0.08 m	$ 0.72 m	$ 31.32 m	$ 47.76 m	$ 4.76 m	$ 52.52 m	$ 21.20 m
13	2019/20	$ 20.48 m	$ 0.08 m	$ 0.71 m	$ 21.28 m	$ 33.89 m	$ 5.65 m	$ 39.54 m	$ 18.26 m
14	2020/21	$ 54.23 m	$ 0.08 m	$ 0.56 m	$ 54.88 m	$ 82.61 m	$ 6.54 m	$ 89.15 m	$ 34.27 m
15	2021/22	$ 21.06 m	$ 0.09 m	$ 0.33 m	$ 21.48 m	$ 35.22 m	$ 6.62 m	$ 41.84 m	$ 20.36 m
16	2022/23	$ 10.09 m	$ 0.09 m	$ 0.13 m	$ 10.31 m	$ 11.51 m	$ 6.69 m	$ 18.20 m	$ 7.89 m
17	2023/24	$ 21.03 m	$ 0.09 m	$ 0.00 m	$ 21.12 m	$ 36.61 m	$ 6.69 m	$ 43.30 m	$ 22.18 m
18	2024/25	$ 0.00 m	$ 0.09 m	$ 0.00 m	$ 0.09 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.60 m
19	2025/26	$ 0.00 m	$ 0.09 m	$ 0.00 m	$ 0.09 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.60 m
20	2026/27	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.59 m
21	2027/28	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.59 m
22	2028/29	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.59 m
23	2029/30	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.59 m
24	2030/31	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 0.10 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.59 m
25	2031/32	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.58 m
26	2032/33	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.58 m
27	2033/34	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.58 m
28	2034/35	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 0.11 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.58 m
29	2035/36	$ 0.00 m	$ 0.12 m	$ 0.00 m	$ 0.12 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.57 m
30	2036/37	$ 0.00 m	$ 0.12 m	$ 0.00 m	$ 0.12 m	$ 0.00 m	$ 6.69 m	$ 6.69 m	$ 6.57 m
Undisc Total		$ 459.49 m	$ 2.68 m	$ 13.20 m	$ 475.37 m	$ 688.80 m	$ 152.25 m	$ 841.05 m	$ 365.68 m
Discounted Total		$ 287.47 m	$ 1.20 m	$ 9.77 m	$ 298.44 m	$ 420.71 m	$ 58.82 m	$ 479.53 m	$ 181.09 m

Assumptions	
Discount Rate	6.00%
Calculations	
Benefits (disc)	$ 479.53 m
Costs (disc)	$ 298.44 m
Benefit/Cost Ratio	1.6
NPV	$ 181.09 m

Option C: CBA Results

		Economic costs				ECONOMIC BENEFITS			
Project Year	Fiscal Year End	Land and building development costs	Environmental development costs	Opex	Total costs	Land and building revenue	Tourism expenditure benefits	Total benefits	Net Benefits Total
		$m	$m	$m	$m	$m	$m	$m	$m
1	2007/08	$ 1.57 m	$ 0.07 m	$ 1.42 m	**$ 3.05 m**	$ 0.00 m	$ 0.00 m	**$ 0.00 m**	**-$ 3.05 m**
2	2008/09	$ 8.53 m	$ 0.07 m	$ 1.50 m	**$ 10.09 m**	$ 0.00 m	$ 0.00 m	**$ 0.00 m**	**-$ 10.09 m**
3	2009/10	$ 8.36 m	$ 0.07 m	$ 1.35 m	**$ 9.78 m**	$ 0.00 m	$ 0.16 m	**$ 0.16 m**	**-$ 9.62 m**
4	2010/11	$ 28.74 m	$ 0.07 m	$ 1.13 m	**$ 29.94 m**	$ 40.44 m	$ 1.42 m	**$ 41.86 m**	**$ 11.92 m**
5	2011/12	$ 42.39 m	$ 0.07 m	$ 0.89 m	**$ 43.36 m**	$ 67.38 m	$ 1.87 m	**$ 69.25 m**	**$ 25.89 m**
6	2012/13	$ 27.68 m	$ 0.07 m	$ 0.73 m	**$ 28.48 m**	$ 39.57 m	$ 3.27 m	**$ 42.84 m**	**$ 14.36 m**
7	2013/14	$ 43.67 m	$ 0.07 m	$ 0.74 m	**$ 44.48 m**	$ 70.04 m	$ 3.72 m	**$ 73.75 m**	**$ 29.27 m**
8	2014/15	$ 43.36 m	$ 0.08 m	$ 0.74 m	**$ 44.18 m**	$ 67.90 m	$ 4.16 m	**$ 72.06 m**	**$ 27.88 m**
9	2015/16	$ 47.34 m	$ 0.08 m	$ 0.75 m	**$ 48.17 m**	$ 72.80 m	$ 4.44 m	**$ 77.24 m**	**$ 29.07 m**
10	2016/17	$ 31.05 m	$ 0.08 m	$ 0.74 m	**$ 31.87 m**	$ 50.48 m	$ 4.61 m	**$ 55.09 m**	**$ 23.22 m**
11	2017/18	$ 19.40 m	$ 0.08 m	$ 0.73 m	**$ 20.21 m**	$ 32.60 m	$ 4.68 m	**$ 37.28 m**	**$ 17.07 m**
12	2018/19	$ 30.52 m	$ 0.08 m	$ 0.72 m	**$ 31.32 m**	$ 47.76 m	$ 4.76 m	**$ 52.52 m**	**$ 21.20 m**
13	2019/20	$ 20.48 m	$ 0.08 m	$ 0.71 m	**$ 21.28 m**	$ 33.89 m	$ 5.65 m	**$ 39.54 m**	**$ 18.26 m**
14	2020/21	$ 54.23 m	$ 0.08 m	$ 0.56 m	**$ 54.88 m**	$ 82.61 m	$ 6.54 m	**$ 89.15 m**	**$ 34.27 m**
15	2021/22	$ 21.06 m	$ 0.09 m	$ 0.33 m	**$ 21.48 m**	$ 35.22 m	$ 6.62 m	**$ 41.84 m**	**$ 20.36 m**
16	2022/23	$ 10.09 m	$ 0.09 m	$ 0.13 m	**$ 10.31 m**	$ 11.51 m	$ 6.69 m	**$ 18.20 m**	**$ 7.89 m**
17	2023/24	$ 21.03 m	$ 0.09 m	$ 0.00 m	**$ 21.12 m**	$ 36.61 m	$ 6.69 m	**$ 43.30 m**	**$ 22.18 m**
18	2024/25	$ 0.00 m	$ 0.09 m	$ 0.00 m	**$ 0.09 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.60 m**
19	2025/26	$ 0.00 m	$ 0.09 m	$ 0.00 m	**$ 0.09 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.60 m**
20	2026/27	$ 0.00 m	$ 0.10 m	$ 0.00 m	**$ 0.10 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.59 m**
21	2027/28	$ 0.00 m	$ 0.10 m	$ 0.00 m	**$ 0.10 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.59 m**
22	2028/29	$ 0.00 m	$ 0.10 m	$ 0.00 m	**$ 0.10 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.59 m**
23	2029/30	$ 0.00 m	$ 0.10 m	$ 0.00 m	**$ 0.10 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.59 m**
24	2030/31	$ 0.00 m	$ 0.10 m	$ 0.00 m	**$ 0.10 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.59 m**
25	2031/32	$ 0.00 m	$ 0.11 m	$ 0.00 m	**$ 0.11 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.58 m**
26	2032/33	$ 0.00 m	$ 0.11 m	$ 0.00 m	**$ 0.11 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.58 m**
27	2033/34	$ 0.00 m	$ 0.11 m	$ 0.00 m	**$ 0.11 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.58 m**
28	2034/35	$ 0.00 m	$ 0.11 m	$ 0.00 m	**$ 0.11 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.58 m**
29	2035/36	$ 0.00 m	$ 0.12 m	$ 0.00 m	**$ 0.12 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.57 m**
30	2036/37	$ 0.00 m	$ 0.12 m	$ 0.00 m	**$ 0.12 m**	$ 0.00 m	$ 6.69 m	**$ 6.69 m**	**$ 6.57 m**
Undisc Total		**$ 459.49 m**	**$ 2.68 m**	**$ 13.20 m**	**$ 475.37 m**	**$ 688.80 m**	**$ 152.25 m**	**$ 841.05 m**	**$ 365.68 m**
Discounted Total		**$ 287.47 m**	**$ 1.20 m**	**$ 9.77 m**	**$ 298.44 m**	**$ 420.71 m**	**$ 58.82 m**	**$ 479.53 m**	**$ 181.09 m**

Assumptions	
Discount Rate	6.00%
Calculations	
Benefits (disc)	$ 479.53 m
Costs (disc)	$ 298.44 m
Benefit/Cost Ratio	1.6
NPV	$ 181.09 m