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NORTHEAST BUSINESS PARK

Declared Fish Habitat Area Partial Revocation Support Study

25 July 2008
Job No. 7800/40

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Document Control

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NORTHEAST BUSINESS PARK

DECLARED FISH HABITAT AREA PARTIAL REVOCATION SUPPORT STUDY

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EXECUTIVE SUMMARY

The Northeast Business Park (NEBP) is a proposed master planned mixed industry and business park, featuring an associated marina, marine industry precinct and complementary residential, commercial and community uses.

The establishment of a world class marina facility is proposed as part of the NEBP. This 911 berth marina will provide an important link in the regional marine industry network.

NEBP is located on a strategically significant 769 hectare privately owned former pine plantation on the southern banks of the Caboolture River at Morayfield, close to the heart of Caboolture. The site has a unique set of strategic attributes, making it an ideal location for an integrated development.

The entire northern frontage of the NEBP site adjoins the Deception Bay declared Fish Habitat Area (FHA). The eastern portion of the NEBP site's northern boundary adjoins the Moreton Bay Ramsar wetlands and Moreton Bay Marine Park.

This report provides supporting information in respect of the proposed revocation of approximately 0.27 ha of the Deception Bay Declared Fish Habitat Area, or approximately 0.02%. The works that will take place within the revoked areas are the construction of infrastructure to facilitate public access to the Caboolture River.

Following excavation of the marina basin, a lock will be established to connect the marina basin to the Caboolture River. The basin itself would be excavated from disused farmland and tidal flow into and out of the basin would be controlled by a lock system. The lock entrance to the marina basin is necessary to minimise the potential impacts of the development on the natural tidal prism. The marina will remain perched above the natural water level in the Caboolture River. The remaining shoreline of the Caboolture River would be protected as riparian buffer, which would maintain its status as a biological corridor and Fish Habitat Area.

In order to construct the proposed marina, together with a fishing platform and three canoe landings for public use, it will be necessary to undertake works within 0.27 ha of the currently defined FHA. It will therefore be necessary to amend the boundary of the FHA by the formal process of partial revocation of the FHA.

The existing declared FHA, particularly as it exists within the estuary of the Caboolture River, is marginal and far from pristine (in contrast to many other declared FHAs in the state). The small extent of revocation associated with the proposed NEBP development will not in itself or cumulatively, add to this condition, provided all measures are taken to manage and monitor construction and operational phases. On the other hand, very significant mitigation measures are offered to contribute to the ecological stewardship of the river, with the potential to develop a strong partnership between the development and environmental regulators. The proposed entrance of the marina precinct occurs along a section of the river which despite being within the declared FHA, is degraded, with poor fish habitat values, and few mangroves or saltmarshes are present.

This report provides responses to specific information requested by the Department of Primary Industries and Fisheries (DPIF), and:

- defines the works within the declared FHA;
- summarises the potential direct impacts of the proposed works on fish habitat values;

- identifies and summarises potential indirect impacts on fish habitat values arising from proposed navigational dredging associated with the development;
- identifies the benefits to fish habitat values that are expected to arise from the development of the site, including improvements in water quality and habitat improvements;
- discusses proposed and potential offsets both within and outside the property boundary; and
- summarises the proposed best practice measures which are to be implemented on site to improve ecological values including fish habitat values.

Off-site impacts resulting from the development of the proposed NEBP have been clarified within this report and it has been concluded that any negative impacts resulting from the development of the NEBP and associated off-site activities such as dredging will be more than offset by the predicted benefits of the proposal, including:

- improvements in stormwater runoff from the site;
- diversion of treated sewage effluent which is currently discharged to the Caboolture River, for use on the NEBP site;
- a total reduction in pollutant load entering the Caboolture River of 305 tonnes of Suspended Solids, 1.0 tonne of Phosphorus, 5.3 tonnes of Nitrogen and 30.3 tonnes of gross pollutants, when compared to the existing case;
- revegetation and rehabilitation of the on site riparian buffer;
- facilitation of off site rehabilitation projects though commitment to a funding model; and
- provision of on site, and potentially off-site offsets, as required by the DPI&F's Fish Habitat Management Operational Policy FHMOP 005 (2002) – Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss.

Since the positive impacts of development across the economic, social and environmental aspects of the triple bottom line outweigh the negative impacts under the total project scope assessment, the development is deemed to deliver a positive net benefit to the State of Queensland. This is true for the development as a whole, and also for the marine infrastructure portion of the development, which was assessed alone in accordance with the requirements of the *State Coastal Management Plan*.

The overall conclusion that is drawn is that the existing declared FHA, particularly as it exists within the estuary of the Caboolture River, is marginal and far from pristine (in contrast to many other declared FHAs in the state). The small extent of revocation associated with the proposed NEBP development will not in itself or cumulatively, add to this condition, provided all measures are taken to manage and monitor construction and operational phases. On the other hand, very significant mitigation measures are offered to contribute to the ecological stewardship of the river, with the potential to develop a strong partnership between the development and environmental regulators.

It is submitted that the information contained in this report supporting the proposed partial revocation of the FHA is consistent with fundamental legislative principles and the authorising law.

The community and stakeholder consultation undertaken in respect of the EIS would satisfy the consultation requirements for the partial revocation of the FHA.

1. INTRODUCTION

This report has been prepared by Cardno (Qld) Pty Ltd on behalf of Northeast Business Park Pty Ltd in response to the Information Request issued by the Department of Primary Industries and Fisheries ("DPI&F") (Ref 08-00054/NAM/140/007[72]) in respect of the Environmental Impact Statement (EIS) prepared for development of the Northeast Business Park.

With respect to the above, section 2.0 of this report provides information in response to items raised by DPI&F in relation to the impacts of the proposed development on portions of the adjacent Deception Bay declared Fish Habitat Area (FHA).

1.1 Background

The Northeast Business Park (NEBP) is a proposed master planned mixed industry and business park, featuring an associated marina, marine industry precinct and complementary residential, commercial and community uses.

The establishment of a world class marina facility is proposed as part of the NEBP. This 911 berth marina will provide an important link in the regional marine industry network.

NEBP is located on a strategically significant 769 hectare privately owned former pine plantation on the southern banks of the Caboolture River at Morayfield, close to the heart of Caboolture. The site has a unique set of strategic attributes, making it an ideal location for an integrated development.

In view of the size and strategic significance of the site, NEBP was declared to be a "significant project" pursuant to the *State Development and Public Works Organisation Act 1971* (SDPWO Act), and the proponent was prepared an EIS for the project, which was submitted to the Coordinator General in January of 2008, and was publicly notified during February and March of 2008.

Presently a largely cleared, ecologically degraded site, the NEBP site provides substantial opportunities for rehabilitation, sustainable development and enhanced community accessibility to the Caboolture River. With the majority of the site designated for urban purposes, the scale of the site is sufficient to accommodate a wide range of activities, taking advantage of the site's limited physical and visual relationships with existing communities.

The entire northern frontage of the NEBP site adjoins the Deception Bay declared Fish Habitat Area (FHA). The eastern portion of the NEBP site's northern boundary adjoins the Moreton Bay Ramsar wetlands and Moreton Bay Marine Park.

The proposed entrance of the marina precinct occurs along a section of the river which despite being within the declared FHA, is degraded, with poor fish habitat values, and few mangroves or saltmarshes are present.

Following excavation of the marina basin, a lock will be established to connect the marina basin to the Caboolture River. The basin itself would be excavated from disused farmland and tidal flow into and out of the basin would be controlled by a lock system. The lock entrance to the marina basin is necessary to minimise the potential impacts of the development on the natural tidal prism. The marina will remain perched above the natural water level in the Caboolture River. The remaining shoreline of the Caboolture River would be protected as riparian buffer, which would maintain its status as a biological corridor and Fish Habitat Area.

1.2 Extent of Revocation

The extent of the declared FHA is presented as Figure 1, and is based on digital cadastral boundaries obtained from Smart Map dated 13 March 2007. This boundary has been accepted by DPI&F as the boundary of the FHA (J. Beumer, email, 28 March 2008). Acopy of the original deed of title is attached as Appendix A.

The partial revocation of declared FHA will be limited to the following defined areas from the Deception Bay declared FHA:

- 2500m^2 to establish the entrance to the marina basin and associated water lock;
- 150m^2 to construct a public fishing jetty; and
- 75m^2 to construct 3 small public canoe landings, each approximately 25 m^2 in area.

The locations of the above defined revocation areas are provided in Figure 2.

It is important to note that the area of the declared FHA to be revoked under the proposal (i.e. a total of 0.27 ha) constitutes a very small portion of the Deception Bay declared FHA which covers a total of 1400 ha of Moreton Bay and the Caboolture River, extending upstream to the existing weir. It should also be noted that no other areas of any declared FHA will be directly affected by the proposal.

1.3 Revocation Process

Fish Habitat Areas (FHA) are declared by regulation under section 120 of the Fisheries Act 1994.

The legislative process for amending or revoking a fish habitat area requires the DPI&F to undertake an initial assessment of the proposal and prepare Terms of Reference (TOR) for a Revocation Assessment Study, which includes but is not limited to the following:

- to document the need for the revocation;
- to document all site options for the proposed works;
- to identify impacts on the declared fish habitat area on fisheries;
- to outline mitigation measures for the loss of declared fish habitat land;
- to outline mitigation measures to reduce impacts from any proposed works; and
- to summarise methods and results whole of government, stakeholder and community consultation undertaken for the proposal.

The DPI&F forwards the TOR to the proponent to outline information required for a formal assessment of the revocation proposal. The DPI&F's submission to the EIS is taken to be the TOR for the Revocation Assessment Study. This report constitutes a Revocation Assessment Study prepared on behalf of Northeast Business Park Pty Ltd.

It is proposed that the DPI&F provide relevant sections of this report to the Business Regulation Reform Unit within the Department of State Development for assessment and advice regarding the requirements for a Regulatory Impact Statement. It is considered that the partial revocation of the FHA is not likely to require a Regulatory Impact Statement under the Statutory Instruments Act 1992. Should a Regulatory Impact Statement be required the information provided in this report would assist in any response.
This report will also form the basis of an assessment report and recommendation by the DPI&F for the consideration of the Minister.

Should the Minister support the proposed partial revocation of the FHA it is anticipated that the DPI&F will instruct the Office of Parliamentary Counsel to draft an amending regulation to the provisions of the Fisheries Regulation for the partial revocation of the FHA. The amending regulation will then be submitted to Cabinet and the Governor in Counsel for consideration. If endorsed, the Governor in Counsel will sign the amendment to the Fisheries Regulation to formally declare the new FHA.
It is submitted that the information contained in this report supporting the proposed partial revocation of the FHA is consistent with fundamental legislative principles and the authorising law.

The community and stakeholder consultation undertaken in respect of the EIS would satisfy the consultation requirements for the partial revocation of the FHA.

1.4 Coastal Environment Values of the site

Coastal Values

The Caboolture River and the NEBP site have a range of natural coastal features. The lower reaches of the Caboolture River are included within the Moreton Bay Marine Park. The river has been shown to support a range of benthic and pelagic fish species, and the majority of the tidal reach of the river falls within the Deception Bay declared FHA. The eastern portion of the NEBP site's northern boundary adjoins the Moreton Bay Ramsar wetlands and Moreton Bay Marine Park. The entire frontage of the NEBP site adjoins the Deception Bay FHA.

The Coastal Management District (CMD) which extends along the northern border of the site is declared under the *Coastal Protection and Management Act 1995*. The landward extent of the CMD adjoining the site is generally defined as land up to HAT or extending 40m inland from MHWS, whichever is the greater.

Marine Vegetation

Surveys to map the extent of marine vegetation that currently exists on the NEBP site were completed by The Ecology Lab Pty Ltd ("Ecology Lab"), the results of which are detailed in Table 43 of Ecology Lab's subsequent report entitled *Redevelopment of Land at Caboolture: Aquatic Ecology Investigations for the Proposed Northeast Business Park November 2007*. In summary Ecology Lab recorded the following areas of marine vegetation occurring on the site, mainly associated with the northern boundary of the site (i.e. banks of the Caboolture River) and with the small tidal channels and drains predominantly located in the centre of the site.

- Approximately 18.6ha of mangroves, a proportion of which is degraded by previous farming practices on the site.
- Approximately 7ha of saltmarshes.

The distribution and extent of the above areas of marine vegetation is illustrated on Figure 9 of the Ecology Lab report entitled *Distribution and extent of marine plants within the NEBP project site,* and this figure is presented in Appendix B.

The proposed entrance to the marina is in a section of the river subject to some erosion and with few marine plants. Several small, mangrove-lined channels occur to the east of the proposed marina entrance. Three species of mangroves have been identified on the NEBP site – grey mangroves (*Avicennia marina*), milky mangroves (*Ceriops* spp.) and river mangroves (*Aegiceras corniculatum*). The channel closest to the proposed entrance contains little water and, at this stage, is considered to be of limited value as aquatic habitat. There are several other areas of marine vegetation within the site. Under the proposed NEBP development, these areas would be protected within buffer zones.

Additionally, Raff Creek and the numerous other small tidal channels and drains on the site would be rehabilitated and their ecological value as fish habitat enhanced.

Outside the site, a mangrove forest exists approximately 3 kilometres upstream from the mouth of Caboolture River on the northern side of the river, to a point just downstream of the confluence with King John Creek. Further upstream, nearer the NEBP site, the mangrove forests are much less extensive. The largest stand of mangrove forest in the upstream areas occurs opposite the existing marina and slipway "Monty's Marina" whilst a smaller stand occurs within the north eastern extent of the NEBP site.

Water Quality

Monitoring of the Caboolture River conducted by the Ecosystem Health Monitoring Program as part of the he South East Queensland Regional Water Quality Management Strategy have consistently graded the overall water quality of the Caboolture River 'poor' to 'fair'. Investigations conducted on the water quality of the Caboolture River adjacent to the NEBP site have described water quality as 'poor' in relation to the Water Quality Objectives (WQO's) which have been published by the EPA for the Caboolture River.

The Healthy Waterways *Ecosystem Health Monitoring Program Report Card 07* awarded the marine areas of Deception Bay with a 'D' rating which indicates a further decrease in water quality since *Report Card 06* when Deception Bay was awarded a 'C-'. The description of the water quality of Deception Bay on *Report Card 07* is as follows:

- Elevated nutrients and phytoplankton abundance in southern section
- Reduced water clarity in northern section
- Decrease in compliance of some water quality parameters due to change in guidelines
- Stable seagrass meadows in northern section but increased *Lyngbya* coverage

The decrease in water quality in the Caboolture River is described in detail in the report entitled *Spatial and temporal trend analysis of water quality in South East Queensland 2006*, prepared by the CSIRO for Moreton Bay Waterways & Catchments Partnership Moreton Bay. In summary this report describes the decrease in water quality of the Caboolture River in that:

> *…The trend analyses for Caboolture River suggest that Total Phosphorus, Dissolved Inorganic Phosphorus, Total Nitrogen, Secchi Depth, and Turbidity have changed significantly over time.*

Table ES2 of Ecology Lab's report entitled *Summary and Analysis of Aquatic Environmental Values* provides a summary of the water quality components, concerns and the corresponding key issues for the NEBP proposal relating to aquatic environmental conditions.

It has been widely documented that the water quality in the Caboolture River has deteriorated considerably over time. This deterioration has been attributed in all studies to the following pressures (in no particular order of importance):

- coastal development;
- the two waste water treatment plants which discharge into the river;
- the installation of a weir 19km upstream the mouth of the Caboolture River; and
- unmanaged stormwater runoff.

1.5 Fish Habitat Values

The current state of the declared FHA in the area that will be directly affected by the proposed revocation is highly degraded with extremely reduced ecological values. Photographs of the Caboolture River provided as Plates 1-5, reproduced from the EIS are included herewith as Appendix C. In particular, Plate 2a shows the location of the proposed marina entrance, which is almost devoid of mangroves. A detailed assessment of the aquatic habitat values of the site is provided in the Ecology Lab Report entitled *Redevelopment of Land at Caboolture: Aquatic Ecology Investigations for the Proposed Northeast Business Park November 2007*.

The quality of the FHA is limited by the following specific problems:

- The weir located upstream from the NEBP site truncates the estuary some 19 km from the mouth of the Caboolture River. This removes a large amount of habitat for juvenile fish stocks (including prawns which have been identified as significant in the lower parts of the river).
- Shallowing in the river downstream of King John Creek. This affects tidal flushing and potential exchange of fish larvae and juveniles between the river and Deception Bay – such exchange is critical to the life cycle of many coastal fishes.
- River bank erosion, particularly in the middle reaches of the river and particularly along shores where cattle can graze up to the river's edge. Clearly, erosion is not just limited to boat passage, with bank collapse likely to be attributed to access by cattle and flood events when the weir overtops. Currently passage is essentially unrestricted for both large and small boats – this will only increase as the population of the area expands – irrespective of the proposed development.
- Water quality is demonstrably degraded – The Waterways Programme acknowledges this condition and the EIS provides detailed, quantitative data pin-pointing areas of concern, including severely reduced dissolved oxygen in bottom waters, elevated nutrients and elevated copper associated with poorly (or un-) regulated practices at the existing marina.
- Outbreaks of Lyngbya due to elevated nutrients and perhaps elevated concentrations of dissolved iron.

The Healthy Waterways Draft Action Plan (2007) for dealing with coastal algal blooms recognises that to address this issue will require the implementation of Actions Plans, including:

- a Point Source Pollution Management Action Plan;
- a Water Sensitive Urban Design Action Plan; and
- a Non-Urban Diffuse Source Management Action Plan.

Under the draft plan of coastal algal blooms, Action Item #1250 commits the DPI&F to carrying out reviews of the values of declared Fish Habitat Areas in the Moreton Bay Catchment. Moreover, the Action Description states:

> *…Carry out reviews of the values and boundaries of the Declared Fish Habitat Areas (including those affected by Lyngbya blooms) to monitor the need for amendment of Fish Habitat Areas' boundaries (e.g. if values of existing Fish Habitat Areas are degrade by continuing Lyngbya blooms). This is discussed further in Section 2.3.1 of Appendix L2 to the EIS.*

Thus, irrespective of the proposed NEBP development, revocation may be required (and potentially at a much larger scale than the modest requirements of the NEBP) if regulators fail to implement plans to control water quality degradation.

The NEBP proposal offers the only firm and time-committed opportunity to contribute to such plans in the catchment of the estuary.

The overall conclusion that is drawn from the above is that the existing declared FHA, particularly as it exists within the estuary of the Caboolture River, is marginal and far from pristine (in contrast to many other declared FHAs in the state). The small extent of revocation associated with the proposed NEBP development will not in itself or cumulatively, add to this condition, provided all measures are taken to manage and monitor construction and operational phases. On the other hand, very significant mitigation measures are offered to contribute to the ecological stewardship of the river, with the potential to develop a strong partnership between the development and environmental regulators.

2. ITEMS IDENTIFIED IN THE DEPARTMENT OF PRIMARY INDUSTRIES AND FISHERIES TERMS OF REFERENCE

2.1 Analysis of Sites Potentially Suitable For Establishment of a Marina

Section 2.2 of the NEBP EIS considered the availability of alternative locations in Southeast Queensland which could accommodate the combined proposal of a marina and marine industries cluster. This demonstrates the appropriateness of the site for the development.

The analysis of potential marina sites undertaken by the Proponent and Pacific Southwest, as described in Appendices E7 and E8 of the NEBP EIS, revealed the difficulties of finding any substantial marina sites in the region north of the Brisbane River.

It is noted that in today's rigourous assessment process, the development location depends on a number of equally important aspects, and is not simply a matter of geographic location. The project must qualify in each particular aspect as achievable otherwise the "Development Risk" is significantly increased.

One can have a suitable site which is geographically well located but statutory encumberances or physical features may prevent that site from realizing its development potential. There are a number of characteristics that need to be taken into account.

In addition to the difficulties of identifying marina sites, the ability to co-locate the marina with a Marine Industries precinct is one of the key attributes of the development and requires a rare combination of marine navigability, environmental appropriateness, adjoining land use suitability, linkages to infrastructure and location with respect to centres and population. It is also noted that the residential component is of critical importance to the feasibility of the entire project, and that the site must be of sufficient size to accommodate a range of residential land use types.

The NEBP site is unique site in that it has a multitude of characteristics that are not available to other sites that will secure its success. These characteristics are listed below.

1. Development of the site and the marina will have an overall positive net benefit to the environment.
2. The marina site and the development will provide significant ongoing contributions (funding, rehabilitation, stormwater management and education) for the better management of the Caboolture River and ultimately the Deception Bay Fish Habitat Area and the Moreton Bay Marine Park.
3. The marina will be constructed by dry excavation thus reducing significantly problems with dredge plumes.
4. The site including the marina is freehold tenure not Crown leasehold.
5. The site is close to a large population centre with an existing although constrained marine industry cluster. The provision of a facility such as the marina will add value and remove constraints from that cluster.
6. The site has good access to the main highway.
7. The marina site has good deep water frontage.
8. The Tidal Prism of the Caboolture River can be managed within minimum acceptable thresholds.
9. The site is currently degraded. Any development will improve the environmental profile of the site.

10. The site can be developed without interfering with the flood storage capacity of the flood plain.
11. The marina has marked and controlled navigation channel access (although this has silted up and requires dredging).
12. The marina site has the ability to be developed beyond 250 berths, which is the size necessary to make the project financially viable in the long term.
13. The site is accessible by tall-masted vessels (no bridge structures) therefore is not an exclusive marina.
14. The marina site is virtually devoid of marine vegetation and fronting the River the bank severely eroded.
15. The marina is recognized by Government and the community as necessary and important.

The NEBP site not only allows the location of a Shipyard directly adjacent to the marina, the proximity of the Mixed Industry Business Area (MIBA) allows the creation of a substantial marine industries precinct within the MIBA, facilitating a specialist cluster of marine related industries supporting the continued strengthening of the Marine Industries in SEQ, as well as supporting crossover industries such as renewable energy and advanced materials which may also locate in the MIBA.

The Department of Tourism and Regional Development has recorded the current status of existing and proposed marinas. An analysis of this Government data has indicated that no other site between the Mary River and Brisbane has these characteristics to meet the growing demand of boating registrations in Queensland and sustain the wealth of the marine industry, and subsequently local jobs. In particular there is a lack of existing and proposed sites north of the Brisbane River. This is consistent with Port Binnli Pty Ltd investigations over the last 5 years to determine potential viable water development sites in Queensland.

The Department has also indicated its support of large self funded developers which should lead to improved facilities, practices and professionalism within the marina industry and also recognizes the planning approval process to manage this demand requires significant overhaul. Studies are proposed to inform the overall strategic planning framework for future private and public investment in the provision of marine infrastructure. In the interim the NEBP development addresses the shortfall in marina berths, and in combination with the economic, social and environmental benefits, is a unique proposal and appropriately sited.

In summary, the NEBP site provides a unique array of attributes which clearly supports this synergistic co-location. There is no doubt that there is no other opportunity of this nature in the northern sector of Brisbane.

2.2 Caboolture River Water Quality Quantification

Stormwater quality modelling has been undertaken by Parsons Brinckerhoff using the MUSIC model, and is detailed in the Stormwater Management Plan that is presented as Appendix H1 of the EIS.

Model parameters do not exist for hydrocarbons, heavy metals and faecal coliforms, therefore stormwater targets are based on loads and event mean concentrations for Total Suspended Solids (TTS), Total Phosphorous (TP), Total Nitrogen (TN) and gross pollutants. The predicted quality of stormwater runoff from the developed site was compared with water quality of runoff calculated from the existing agricultural land use.

A summary of the mean annual pollutant loads in stormwater leaving the site, as modelled both before and after development, is presented in Table 1. It can be seen that the

development of the site will result in a 49-86% improvement in the total pollutant load, despite a 21% increase in water flows which results from changes to drainage paths which are necessarily incorporated into the development. This is a significant improvement over the current situation.

Table 1 Mean Annual Pollutant Loads in Stormwater

	Undeveloped case	Developed (mitigated) case	% change
Flow (ML/yr)	2030	2460	+ 21 %
Total Suspended Solids (tonnes/yr)	390.00	84.60	- 78 %
Total Phosphorous (tonnes/yr)	1.06	0.30	- 72%
Total Nitrogen (tonnes/yr)	7.41	3.77	- 49%
Gross Pollutants (tonnes/yr)	34.90	4.59	- 86%

Up to 2.6ML/day of water used on site will be recycled water sourced from South Caboolture and Burpengary East sewage treatment plants. Assuming that both plants achieve a high level of nutrient removal and meet criteria of 2mg/L TN and 0.3mg/L TP (as has been reported for the South Caboolture Sewage Treatment Plant), this equates to a mean annual pollutant load reduction of 1708 kg/yr TN and 285 kg/yr TP.

The above calculations do not reflect the fact that Burpengary East is currently producing effluent with nutrient levels well in excess of the quality criteria assumed above. In addition, the above calculations do not take into account the additional demand for recycled water that may arise from industrial uses on the site in the future.

The existing nutrient loads, in particular the effluent from the Burpengary East sewage treatment plant are likely to contribute to ongoing problems with phytoplankton and *Lyngbya*. Such problems severely affect the value of the fish habitat area and may ultimately lead to large scale review of the fish habitat area itself (see Action Item #1250 of the Healthy Waterways (2007) draft Action Plan for Coastal Algal Blooms which requires reviews by DPI&F of values and boundaries of existing FHAs that are degraded by continuing *Lyngbya* blooms – see also Appendix L2 of NEBP EIS).

The total reduction in pollutant load entering the Caboolture River which can be attributed to the development from improvements in stormwater quality and recycling of sewage effluent will be 305 tonnes of Suspended Solids, 1.0 tonnes of Phosphorus, 5.3 tonnes of Nitrogen and 30.3 tonnes of gross pollutants, when compared to the existing case.

It is not feasible to fully quantify the expected improvements in water quality within the Caboolture River as NEBP Pty Ld has no control over any external inputs to the River system.

2.3 Net Benefits Assessment

The *Northeast Business Park - Net Benefit Assessment Final Report* prepared by the AEC Group and dated July 2008, provides a comprehensive Net Benefits Assessment of the proposed NEBP development and provides assessment of all potential impacts of the development both on site and off site. In this revised version of the Net Benefit Assessment that was submitted with the EIS, AEC has reviewed the qualitative and quantitative impact assessments and has provided additional supporting information and justification where required, in particular in relation to offsite impacts. A copy of the AEC Group report will accompany the Supplementary EIS prepared by Cardno for NEBP.

The direct quantifiable impact of the total project scope of the Northeast Business Park is identified to be positive with a BCR of greater than one, thereby satisfying the direct component of the threshold assessment and the direct component of the Formal assessment requirements of the Net Benefit Test.

The indirect quantifiable impact of the total project scope of the Northeast Business Park is also identified to be positive with a BCR of greater than one, and therefore satisfies the indirect component of the Threshold assessment and the indirect component of the Formal assessment requirements of the Net Benefit Test.

In quantifiable economic terms, the Northeast Business Park development, under the 'total project scope' assessment provides a net benefit to the State of Queensland with the benefits of the proposed development exceeding the cost.

Table 2 below summarises the quantitative cost benefit analysis that was undertaken by AEC for the total project scope.

Table 2: Quantitative Cost Benefit Analysis Summary

Impact	Present Value of Revenues ($M)	Present Value of Costs ($M)	Net Present Value ($M)	BCR
Direct Impacts	575	401	174	1.43
Indirect Impacts	3,251	926	2,324	3.51
Total Impacts	**3,826**	**1,328**	**2,498**	**2.88**

Source AEC Group

The qualitative cost benefit analysis found that all aspects across the triple bottom line (economic, social and environmental) are expected to realise a net benefit as a result of the Northeast Business Park development.

Qualitative impact assessment shows that the Northeast Business Park is expected to return positive net economic, social and environmental benefits, with net ratios of benefits to cost of 3.1, 1.6 and 2.25 respectively.

Since the positive impacts of development across the economic, social and environmental aspects of the triple bottom line outweigh the negative impacts under the total project scope assessment, the development is deemed to deliver a positive net benefit to the State of Queensland.

Table 3 below summarises the qualitative cost benefit analysis that was undertaken by AEC for the total project scope.

Table 3: Qualitative Cost Benefit Analysis Summary

Aspect	Average Likelihood	Average Consequence	Average Impact	Number of Impacts	Total Score
Economic					
Benefits	Almost Certain	Moderate	High	8	22
Costs	Almost Certain	Major	Very High	2	-7
Net Position					***15***
Social					
Benefits	Likely	Major	High	9	29
Costs	Likely	Moderate	Medium	9	-18
Net Position					***11***
Environmental					
Benefits	Likely	Minor	Medium	10	18
Costs	Possible	Minor	Low	8	-8
Net Position					***10***
Overall Rating					***36***

2.4 Proposed Activities within Declared Fish Habitat Areas

Figure 2 presents the extent of activities proposed within the declared FHA. Such activities comprise:

- construction of 3 canoe landings, each approximately 25m^2 in area;
- construction of a fishing platform 150m^2 in area; and
- capital dredging works for the construction of the entrance to the proposed marina of 2500 m^2 in area.

Activities such as any off site bank erosion control works which may be required in the future have not at this stage been defined and will be dependant on the results of the proposed long term bank erosion monitoring. However, it is not anticipated that any such works would occur within the declared FHA, and would rather comprise works such as vegetation enhancement or engineered protection above high water, with the objective of preventing erosion from progressing excessively into private land.

It is noted that capital dredging of the Caboolture River navigation channel is proposed as part of the development, and that ongoing maintenance dredging will thereafter be required. As the navigation channel is, by definition, excluded from the declared FHA, these capital dredging works will not take place within the FHA.

Associated with the capital dredging of the navigation channel will be the installation of a temporary pipeline for the transfer of dredge spoil to the designated placement area (refer to Figure 3 for the approximate location of the Dredge Spoil Pipeline). An approval to undertake operational works within a Declared Fish Habitat Area and to disturb marine plants will be required to install the Dredge Spoil Pipeline. Such an application seeking approval for operational works under the *Fisheries Act 1994* will assessed against of relevant Fish Habitat Management Operational Policies (FHMOP). In seeking an approval to undertake operational works within a Declared Fish Habitat Area, a Resource Allocation Authority will also be required to be issued by the DPI&F pursuant to Section 76b of the *Fisheries Act 1994*.

2.5 Summary of Impacts on declared Fish Habitat Areas

With the exception of the small frontage that would be re-shaped to allow access to the marina basin, the boundary between the proposed development and the FHA would not be disturbed. Mapping of shoreline habitats during the preparation of the EIS found that there was very little marine vegetation along the frontage that is to be disturbed. Replicated, quantitative surveys indicated that the intertidal shoreline and subtidal river bed adjacent to the marina basin had low benthic diversity and productivity. Hence, ecological impacts outside but immediately adjacent to the property were assessed as being small in scale and of minimal consequence in terms of the ecological values.

Capital and ongoing maintenance dredging would be required between King John Creek and the mouth of the Caboolture River. The dredging would be confined approximately to the existing navigation channel and would cause physical disturbance to a section of subtidal, unvegetated sediments. The dredging would commence at the upstream end of the channel and work downstream over timescales of months. A pipeline would transport slurry from the river to the development site where it would be treated and used as fill. Direct impacts therefore are related to the removal of sediments and physical disturbance along the route of the pipeline.

Logistically, dredging would be done in sections and would cause a lowering of the bed level of the navigation channel to facilitate boat traffic. It is understood that sediments remaining after dredging would be similar to those being removed. The dredging would

cause a loss of benthic invertebrates and small, bottom-dwelling that where unable to avoid the dredge head. Larger and more active fishes would be able to avoid entrainment. Following dredging the new bed would become colonised from two sources:

a) propagules transported by currents to vacant sediments; and

b) lateral migration of biota from the undisturbed sediments adjacent to the dredge footprint.

Considerable research has been done on rates of recolonisation following dredging. Typically, rapid recolonisation occurs when there is ready access to the vacant sediments by colonisers and when sediments are similar to those that were removed. Both conditions occur in the current case. It is to be expected that recolonisation of dredged areas would occur over timescales of months. A rigorous monitoring programme using current best practice in ecological monitoring would determine the rate of recolonisation which would then be used to refine the plan for ongoing maintenance dredging. Overall, direct impacts related to the dredging operation are considered to occur over a relatively long section of the lower part of the river, but to be short-term in duration. These impacts would also be offset by benefits to other ecological values (e.g. flushing and water quality in the upper parts of the estuary)

The pipeline route would cause some disturbance to marine vegetation, including mangroves and saltmarshes. Much of the route would be along the Farry Road easement and careful consideration during placement should help to minimise the extent of disturbance. A careful management plan developed in consultation with appropriately qualified ecologists and followed up by periodic monitoring and audition should provide a reliable means of ensuring minimal impacts. Table 4 provides a summary of the expected impacts of the proposed NEBP upon the declared FHA outside the property boundary.

Table 4: Summary of Impacts on Declared FHA Outside the Property Boundary

Impact	Cause of Impact	Scope of Impact	Impact Type (Direct / Indirect)	Term of Impact (Short/ Medium/Long)
Reduction in fish habitat.	Removal of mangroves to establish entrance to marina.	Minor as little marine vegetation exists in the 2500m^2 subject area. Surveys have revealed that the river bed at the marina entrance has low benthic diversity and productivity.	Direct	Long
Reduction in fish habitat.	Removal of mangroves to establish a public fishing jetty and 3 small canoe landings.	Minor as combined area that may require the removal of mangroves is 225m^2.	Direct	Long
Loss of benthic invertebrates from river bed.	Dredging of navigation channel to facilitate boat traffic.	Minor as the invertebrates lost will be rapidly replaced by the migration of biota from undisturbed sediments adjacent to the dredge footprint.	Direct	Short
Loss of marine vegetation.	Establishment of the dredge pipeline	Minor as the pipeline will be located to minimise disturbance to marine vegetation.	Indirect	Short
Increase in pressure on fisheries	Increased accessibility created by dredging of navigation channel	Minor as additional commercial vessels are unlikely to access the river	Indirect	Long

2.6 Impacts of Dredging and Increased Vessel Usage

A Supplementary Report on Coastal Processes has been prepared by Cardno Lawson Treloar (July 2008), which details:

- tidal hydraulic and flushing impacts within the Caboolture River due to the capital dredging program associated with the NEBP development;
- sediment transport impacts both within and at the mouth of the Caboolture River associated with the NEBP development and capital dredging program; and
- any impacts of increased boating traffic on riverbank erosion within the Caboolture River.

The report concludes that:

1. Sediment transport within the river will be impacted by the dredging of the navigation channel. However, the impacts are largely confined to the banks immediately adjacent to the navigation channel. The dredge area includes adequate batter slopes and buffers to adjacent riverbanks to minimise any riverbank erosion. Morphologic modelling undertaken by CLT and presented in the report, 'Northeast Business Park - Caboolture River Siltation Study' (ref. 790033/03/R3) dated January 2008 did not indicate that the proposed dredging would have any direct erosion impact on adjacent riverbanks.
2. Sand and sediment transported within the Caboolture River is not likely to be a current significant source of sand for the natural creation of beaches at the mouth of the river. It is therefore not anticipated that the dredging of an entrance channel from the mouth of the Caboolture River into Moreton Bay would adversely impact of sediment supply to the sand banks and beaches adjacent to the river mouth. There may be some lateral movement of the channel under extreme events, such as flooding. However, the impacts of the dredged channel under extreme events would not be significantly different to the impacts in the existing scenario.
3. The waves generated by boat movements are generally similar in condition to wind generated waves. The Caboolture River is largely orientated in the direction of predominate winds and as such there is potential for wind generated waves to form within the river. There is also an existing speed restriction in the Caboolture River of 6 knots or no wash for boats in excess of 8m. Provided the speed restrictions are complied with the impact of boat wash associated with the development should be minimal. An education program should be implemented to inform boat users of their responsibilities in this regard.

The Supplementary Report on Coastal Processes is appended to the Supplementary EIS.

Existing river boat traffic was surveyed by Three Plus over 5 separate days as part of the Community Consultation Exercise (refer to Appendix G of the EIS, Chapter 4, Section 18). The survey noted an average of 23 moored or mobile vessels on the Caboolture River on each day.

The precise number and size of vessels using the marina and dry boat stacker berths will be formalised during the detailed design stage of the development. The increased boat traffic within the Caboolture River generated by the development is related to the number of vessels using the NEBP marina facilities and a precise estimate is therefore not available for this assessment. The assessment of the impacts of increased boat traffic which is contained within the Supplementary Report on Coastal Processes therefore considers a range of scenarios from 100 to 500 boat movements daily. As stated above, the report concludes that provided the speed restrictions are complied with the impact of boat wash associated with the development should be minimal.

2.7 Impacts of Increased Flows Resulting From Development and Dredging

Investigations have been undertaken of the tidal hydraulics and flushing impacts due to the proposed capital dredging within the Caboolture River and are contained within the report entitled '*Supplementary Report on Coastal Processes''* by Cardno Lawson Treloar (CLT), presented as Appendix F of the Supplementary EIS. The assessment was undertaken using the methodology summarised below.

- Use of modelling of the Caboolture River developed for the previous assessment of siltation within the dredged navigation channel detailed in the report, '*Northeast Business Park - Caboolture River Siltation Study*' presented as Appendix M1 of the NEBP EIS. The model incorporates variables such as tides, winds etc and is calibrated by field measurements taken along four locations within the River and at a site within King John Creek.
- Incorporate boundary conditions based on spring and neap tide flows into the Caboolture River.
- Analyse tidal hydrodynamics changes of the Caboolture River following capital dredging works.

The results of this analysis are detailed as described below.

Tidal Prism Impact

The tidal prism is defined as the volume of water that is drawn into the river from the ocean through the river mouth during a flood tide. The tidal prism has been calculated for existing and post-dredging scenarios at three locations from the Caboolture River mouth to the downstream extent of the NEBP site.

The tidal prism was calculated for the neap flood tide occurring on 22 February 2006 and the spring flood tide occurring on 28 February 2006. Results have shown that the NEBP development and associated capital dredging of the navigation channel within the lower reaches of the Caboolture River is predicted to have only a small increase on the tidal prism. At the mouth of the Caboolture River this is estimated to be an increase of only 2.5% and 2.8% for the neap and spring tide events, respectively.

The increase in tidal prism is due to the additional volume provided by the dredged channel and the improved conveyance of flow through the lower reaches of the Caboolture River following the capital dredging within the navigation channel.

Water Level Impact

The predicted water levels for both the existing and post-dredging scenarios have been recorded at five locations from the Caboolture River mouth to the upstream extent of the NEBP site.

This analysis indicates that the NEBP development and associated dredging of the navigation channel in the lower reaches of the Caboolture River is predicted to have negligible impact on the tidal phase and high tide water levels throughout the River. In particular the following information is provided.

- At the mouth of the Caboolture River (Uhlmann Road Boat Ramp and Beachmere Boat Ramp) the difference between the predicted existing and post-dredging scenario tidal water levels is negligible. The impact to the tidal phase at these two locations is also predicted to be negligible.
- At the confluence of the Caboolture River and King John Creek the impact to the high tide water level and tidal phase is predicted to be negligible. However, there is predicted to be a minor reduction in the low tide water level at this location.

- Within the Caboolture River at the downstream extent of the NEBP site the impact to the high tide water level is predicted to be negligible. The low water level at this location is predicted to be reduced by up to 0.1m during spring tide events. However, there is a well defined channel through this section of the Caboolture River and the reduced low tide water level is not anticipated to impact on navigation to the marina.
- Within the Caboolture River at the upstream extent of the NEBP site the spring high tide water levels is predicted to be increased by up to 0.03m. The low water level at this location is predicted to be reduced by up to 0.07m during spring tide events. This reduced low tide water level is not anticipated to impact on navigation to the marina.

Tidal Flushing Impact

The NEBP development and associated dredging of the navigation channel within the lower reaches of the Caboolture River is predicted to slightly increase the tidal prism and have relatively minor impacts on the predicted low tide water levels within the River.

The hydraulic modelling presented in Section 6 of the supplementary report on coastal processes indicates that the tidal flushing of the Caboolture River is not predicted to change considerably in the post-dredging scenario when compared to the existing case.

Coastal policy 2.4.7 of the Southeast Queensland Regional Plan identified the increased risk of algal blooms (*Lyngbya majuscula*) associated with the opening of the river to Moreton Bay. Due to the small changes in tidal prism and flows, it is therefore not anticipated that the NEBP development or navigation dredging associated with the development will increase the occurrence of algal blooms. The existing extent of ecosystem health within the Caboolture River has been recorded historically by Healthy Waterways and more recently, as part of the NEBP development proposal by The Ecology Lab in Appendix L2 of the NEBP EIS.

2.8 Summary of Best Practice Management

Protection and Enhancement of Coastal Values

Generally the Coastal Management District (CMD) has been protected in the master planning of the site, with the Proponent maintaining more than half of the site as undeveloped open space to act as an environmental buffer between the proposed development and the tidal environment of the Caboolture River. In particular, open space has been allocated to areas of the CMD (including use as golf course), and roads are designed to pass over Raff Creek using bridge structures that have been designed in accordance with Code for prescribed tidal works in the Coastal Regulation; Schedule 4A.

The CMD will also be rehabilitated, offsetting the loss of the segments of the CMD in which development is proposed. In addition a 100m buffer from the banks of the Caboolture River will be retained, and this buffer includes part of the CMD. The buffer will be rehabilitated by weed eradication and replanting of vegetation to extend the riparian vegetation zone, which is identified as an important tool in stabilising riverbanks and improving stormwater runoff and ultimately water quality. Stable riverbanks will result in less siltation to coastal waters thereby protecting sensitive ecosystems within the protected Moreton Bay Marine Park and Moreton Bay Ramsar Wetlands. This action is consistent with the committed actions of the Moreton Bay Action Plan for 2007-2012 (South East Queensland Healthy Waterways Partnership, 2007). A visual interpretation of the proposed 100 buffers and revegetation works is provided in the *Open Space Landscape Masterplan* prepared for NEBP by PLACE Planning and Design ("PLACE") and provided as Figure 10 in their report entitled *Northeast Business Park - Landscape Masterplan 2007*. A copy of the *Open Space Landscape Masterplan* is provided herewith as Figure 4.

The objectives of the rehabilitation works that would occur throughout the site would accord with the 'Desired Aims and Outcomes' described by PLACE in the above report and would include the following objectives.

- Retain and protect remnant vegetation communities and the Ramsar wetland communities by rehabilitation with endemic vegetation open space areas disturbed by site works or historical landscape modification.
- Interface with the Caboolture community by fostering co-operative partnerships with community and environment groups keen to contribute to the rehabilitation of the site. For example, NEBP in partnership with Friends of Caboolture Regional Environmental Education Centre (FO :CREEC) have applied for funding through a Federal Government Envirofund Round 10 'Coastal and Marine' Grants to trial a pilot project on site. The pilot project will involve a small portion of the river bank with the aim of establishing a process for the ongoing stabilisation and rehabilitation of the entire bank and foster long term relationships with local community members and environmental groups.
- Revegetate disturbed areas.
- Re-establish fringing vegetation communities along the tributaries of Raff Creek.
- Revegetate buffers between developed areas within the site, and between site development and adjoining residential areas.
- Provide controlled public access.
- Provide public recreational facilities.
- Provide trail linkages to surrounding areas.

The NEBP development has been designed to minimise the risk of erosion impacts, allow for natural short-term fluctuations in the shoreline to occur without requiring the construction of future property protection works, and is located entirely within freehold land.

Where the development does occur within the erosion prone area it has been set back a minimum of 100 metres from the river bank, with the Proponent agreeing to stabilisation and rehabilitation of the erosion prone area by planting riparian vegetation at a density and composition to enhance ecological processes.

It is an objective of this development that works are consistent with the Coastal Protection Management Act and that soft engineering stabilisation structures (when necessary) will be preferred to hard engineering solutions for erosion protection.

Other structures associated with the development within the erosion prone area including fishing jetties, coastal boardwalks and canoe landings are considered as temporary and/or relocatable and therefore are not assessed against the RCMP.

Water Quality

The proponent has focused on improving the poor water quality of the Caboolture River in the design, construction and ongoing management of the marina. The proponent has commissioned various technical studies to determine appropriate mitigation measures for the minimisation of the potential impacts on water quality arising from activities related to the development.

Management strategies have been devised to address potential impacts from potentially contaminative activities. Mitigation measures that are part of the NEBP development include the following:

- Erosion and sedimentation controls during construction works in accordance with the Construction Environmental Management Plan prepared for the site.

- Storage of flammable and combustible materials in accordance with relevant Australian Standards.
- Bunded dewatering dredge spoil disposal ponds in accordance with the Dredging Site Based Management Plan.
- Disposal of contaminated land in accordance with a Remediation Action Plan.
- Storage and disposal of wastes in accordance with a Waste Management Plan.
- Conducting surface water monitoring to establish baseline surface water quality.
- Water quality release criteria in accordance with Water Quality Objectives (WQOs) under the *Environmental Protection (Water) Policy 1997* (EPP Water) for the middle estuary of the Caboolture River (apart from suspended solids which have been increased for releases during construction based on existing water quality and nature of construction activities on site).
- WQOs for marina water quality management consistent with the EPP Water under the Marina Site Based Management Plan.
- Water Sensitive Urban Design.
- Assessment of land for suitability for effluent irrigation.
- Identification, treatment and management of exposed ASS in accordance with the Acid Sulfate Soils Management Plan.
- Provision of refuelling, waste and sewage pump out facilities which are designed in accordance with Australian Standards and managed in accordance with best practice guidelines.
- Operation of the marina in accordance with the Clean Marinas Australian Code of Ethics and Compliance Checklist.
- Rehabilitation of riparian vegetation to protect and enhance the intrusive values of the natural water cycle.
- Riverbank erosion monitoring program and management initiatives.
- Establishment of significant open space to minimise disturbance to natural landforms, wetlands, watercourses and riparian zones.
- Installation of duel reticulation for new commercial and residential development to minimise wastewater generation and promote efficient use of potable water.
- Significant Council headwork's contributions to ensure treatment of wastewater to a standard suitable for effluent reuse.

The Stormwater Management Plan demonstrates that the quality and quantity of stormwater runoff will be managed in accordance with best practice, to ensure that environmental values of the estuaries and other coastal waters are protected.

The improved water quality expected by the proposal will enhance ecological communities within the River, and hence improve the waterway as fish habitat.

Best practice will be achieved through the implementation of management measures recommended in the Stormwater Management Plan including:

- soft engineering approaches such as the rehabilitation of the riparian vegetation within the site, the use of bio-retention basins and swales;
- control of land management practices, in particular during construction to minimise erosion and sedimentation potential; and

- hard engineering where appropriate, such as the use of gross pollutant traps and stormwater quality improvement devices for the treatment of stormwater runoff from the marine industry and MIBA areas.

In respect of these issues, the NEBP development makes provision for

- the retention of approximately 55% of the site within the Open Space network, which encompasses the majority of the site's riparian vegetation, wetlands and shorebird habitats;
- the removal of livestock from the site and the management of weeds and feral pests;
- extensive rehabilitation of degraded habitats within the site, including the Caboolture River riparian zone, wetlands and shorebird habitats;
- protection of ecological values and function of the Caboolture River and ultimately Moreton Bay through appropriate buffering, stormwater management and environmental management practices; and
- improved environmental awareness through the establishment and operation of an Environment Centre.

The proposal includes the rehabilitation of 9km of riparian land fronting the Caboolture River, and is therefore compliant with the Policy. Furthermore, the proponent has committed to the facilitation of off site rehabilitation measures with the objective of improving the quality and functionality of riparian vegetation.

Riverbank Erosion
The NEBP development has committed to extensive mitigating strategies to reduce the risk of accelerated erosion. The Proponent proposes:

- revegetation and rehabilitation of 9km of the riparian zone on the right bank within the NEBP project area that is severely degraded;
- maintaining a 100m riparian buffer between the development and high water mark (with the exception of the marina lock allowing boat access to and from the Caboolture River by marina users);
- developing a funding model through a component of the marina berth and dry storage levy that will be allocated to a trust administered by local environmental catchment groups to restore eroded areas downstream of the NEBP site;
- leading by example being a responsible developer and erosion conscious private land owner;
- investing $18 million in managing stormwater runoff from a previously unmanaged 769ha former pine plantation;
- committing to a mariner education program by the Marina Management about the Caboolture River ecosystem;
- adhering to Government objectives for protecting and preserving the environment;
- implementing an improved and managed (regulated) boat speed environment within the Caboolture River; and
- undertaking an erosion monitoring program to measure potential impacts on riverbanks from the Caboolture River estuary to upstream of the NEBP site.

Table 5 provides a summary of the Best Practice Management Measures which would be incorporated into the NEBP.

Table 5: Summary of Best Practice Management Measures to be incorporated into the NEBP

Measure	Impact of Measure	Scope of Measure	Term of Impact Short/Medium/Long
Provision of controlled public access.	Minimisation of disturbance and damage to open space areas on the site and the interface with the Caboolture River.	Throughout all open space areas within the site and along the entire interface with the Caboolture River.	Long
The retention of approximately 55% of the site within the Open Space network, which encompasses the majority of the site's riparian vegetation, wetlands and shorebird habitats.	Reestablishment of natural areas and associated ecological and environmental values and the protection of these values in perpetuity.	Throughout all open space areas within the site.	Long
Revegetation of disturbed areas on the site and the re-establishment of fringing vegetation communities along the interface with Caboolture River and Raff Creek.	Reestablishment of natural areas and associated ecological and environmental values.	Throughout all open space areas within the site and along the entire interface with the Caboolture River and Raff Creek.	Long
Revegetation of buffers between developed areas within the site, and between site development and adjoining residential areas.	Protection of the ecologically significant areas of the site from disturbance associated with anthropogenic activities in the developed areas of the site.	Between all open space areas and development areas of the site.	Long
Set back of development a minimum of 100 metres from the river bank.	Minimisation of erosion trough removal of river bank disturbance factors.	Along the interface with the Caboolture River.	Long
The incorporation of the riverbank erosion monitoring program and management initiatives including soft engineering stabilisation structures such as the rehabilitation of the riparian vegetation within the site and the use of bio-retention basins and swales.	Minimisation of erosion and increases in water and marine ecosystems quality on the site and in the Caboolture River.	Throughout the site.	Long
The use of hard engineering where appropriate, such as the use of gross pollutant traps and stormwater quality improvement devices for the treatment of stormwater runoff from the marine industry and MIBA areas.	Increases in water quality in receiving waters of the Caboolture River.	As necessary to appropriately treat water leaving marine industry and MIBA areas of the site.	Long
Appropriate design and management of the marina.	Improvement of the poor water quality of the Caboolture River.	Marina and associated infrastructure.	Long
Storage of flammable and combustible materials in accordance with relevant Australian Standards.	Minimised risk of to ecologically and environmentally significant areas imposed by flammable and combustible.	Throughout site.	Long
Bunding of dewatering dredge spoil disposal ponds in accordance with the Dredging Site Based Management Plan.	Minimisation of risk to ecologically and environmentally significant areas of the site and receiving waters of the Caboolture River.	Throughout site.	Short
Disposal of contaminated land in accordance with a Remediation Action Plan.	Minimisation of risk to ecologically and environmentally significant areas of the site and receiving waters of the Caboolture River.	Throughout site.	Medium

Measure	Impact of Measure	Scope of Measure	Term of Impact Short/Medium/Long
Storage and disposal of wastes in accordance with a Waste Management Plan.	Increased on site amenity decreased environmental degradation caused by inappropriate disposal of waste.	Throughout site.	Long
WQOs for marina water quality management consistent with the EPP Water under the Marina Site Based Management Plan and the operation of the marina in accordance with the Clean Marinas Australian Code of Ethics and Compliance Checklist.	Maintenance of high water quality in the marina.	Marina.	Long
Water Sensitive Urban Design and the installation of duel reticulation for new commercial and residential development to minimise wastewater generation and promote efficient use of potable water	Sustainable water use on the site.	Throughout site.	Long
Identification, treatment and management of exposed ASS in accordance with the Acid Sulfate Soils Management Plan	Minimisation of risk to ecologically and environmentally significant areas of the site and receiving waters of the Caboolture River.	Throughout all open space areas within the site and along the entire interface with the Caboolture River and Raff Creek.	Medium
The removal of livestock from the site and the management of weeds and feral pests.	Cessation of the detrimental impacts of livestock and a significant reduction in the prevalence of weeds on the site.	Throughout the site.	Long
The investment of $18 million in managing stormwater runoff from a previously unmanaged 769ha former pine plantation.	Increases in water quality in receiving waters of the Caboolture River.	Throughout the site.	Long
committing to a mariner education program by the Marina Management about the Caboolture River ecosystem	Protection of the ecologically and environmental values of the Caboolture River through public understanding and appreciation of such values.	Within the marina and the Caboolture River.	Long
Implementing an improved and managed (regulated) boat speed environment within the Caboolture River	Minimisation of risk to fisheries and other ecologically and environmental values of the Caboolture River.	Throughout the Caboolture River.	Long

Monitoring

An Environmental Monitoring Program (EM Program) has been prepared to consolidate and clarify environmental monitoring commitments and recommendations and where appropriate detail environmental monitoring procedures. This Environmental Monitoring Program forms part of the Supplementary EIS response to the request by the Coordinator General on 18 June 2008.

The EM Program details concisely and clearly the monitoring proposed during the construction and operational components of the proposed NEBP development and should be read in conjunction with the environmental management plans prepared and appended to the NEBP EIS and Supplementary EIS, and any revision thereof.

The Environmental monitoring proposed is extensive in comparison to similar development requirements however the Proponent is committed to improving the ecosystem health of the Caboolture River through sustainable land use practices and best practice marine management. The Proponent therefore designs to monitor the effectiveness of such practices using rigorous methodologies targeting potential environmental issues resulting from proposed and existing natural and anthropogenic causes.

The specific elements which are addressed in the EM Program include:

- *Surface Water Quality.*
- *Groundwater Quality.*
- *Riverbank Erosion.*
- *Marine Flora.*
- *Marine Fauna.*
- *Acid Sulfate Soils.*
- *Contaminated Land.*
- *Terrestrial Flora.*
- *Terrestrial Fauna.*
- *Environmental Nuisance.*

The incorporation of this EM Program into the proposed NEBP development will make a valuable contribution to coastal management and surveillance monitoring in the northern part of Moreton Bay.

Under Maritime law, the responsible body to monitor and manage the movement of ships in Queensland waters is Maritime Safety Queensland. The use of boating patrols and cameras as a preventative action to limiting impacts of boat wash which increase proportionally with speed, will be in cooperation with MSQ and funded through a berth levy.

In conclusion, the combination of initiatives proposed by the Proponent are consistent with industry ‘best practice’ and will result in a significant improvement to the Caboolture River. The result of these initiatives will benefit all those in the community that use the river and enjoy its environmental amenity and aspects whilst providing a development which advances the identity and prosperity of the Caboolture region and ecological health of the Caboolture River.

2.9 Proposed Offsets Outside the Property Boundary

At present, no specific offsets have been proposed outside of the property boundary for the purposes of mitigation of impacts on tidal habitats. As discussed in section 4.8.2.2 of the EIS, and section 2.5 of this report, the predicted off site impacts of the development on fish

habitat will be low, and will be offset by improvements in water quality and the proposed facilitation of riparian rehabilitation works outside the property boundary.

It is acknowledged that there will be a requirement to submit applications to DPI&F for the disturbance and removal of marine plants, and for these applications to be approved prior to commencement of operational works on site. In accordance with *Fish Habitat Management Operational Policy FHMOP 005 (2002) – Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss*, such offsets may be proposed either within or outside the NEBP site. It has already been identified within the EIS process that there are significant opportunities for offsets for marine vegetation to occur within the NEBP site.

Offsets provided in respect to the loss of declared FHA associated with the proposed revocation will be determined in accordance with the provisions of the DPI&F's *Fish Habitat Management Operational Policy FHMOP 005 (2002) – Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss*.

The purpose of this policy is to:

> *…assist and guide decision-making (permit assessment) and negotiation of proposals to achieve mitigation of impacts through avoidance and minimisation of impacts (on-site), and compensation for marine fish habitat losses (off-site), which are likely to result from authorities granted under the Queensland Fisheries Act 1994.*

Specific details relating to the precise dimensions and locations of offset measures will be determined and provided at such time as the disturbance and removal (i.e. for which the revocation is required) of marine fish habitat loss is required.

2.10 Proposed Offsets within the Property Boundary

Offsets provided in respect to the loss of declared FHA associated with the proposed revocation will be determined in accordance with the provisions of the DPI&F's *Fish Habitat Management Operational Policy FHMOP 005 (2002) – Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss*.

The purpose of this policy is to:

> *…assist and guide decision-making (permit assessment) and negotiation of proposals to achieve mitigation of impacts through avoidance and minimisation of impacts (on-site), and compensation for marine fish habitat losses (off-site), which are likely to result from authorities granted under the Queensland Fisheries Act 1994.*

Specific details relating to the precise dimensions and locations of offset measures will be determined and provided at such time as the disturbance and removal (i.e. for which the revocation is required) of marine fish habitat loss is required. However, some 5.5 hectares of land has been identified on site which represents existing degraded tidal lands that could be rehabilitated to provide fish habitat of an equivalent or greater quality than the portion of the FHA which is proposed to be revoked. It is anticipated that any offset for impacts on fish habitats would include this area.

2.11 Comments Provided by Sunfish and the Queensland Seafood Industry Association

Written comments have been sought from Sunfish and the Queensland Seafood Industry Association. These will be provided following the outcome of face to face meetings which have been arranged with each of the above organisations.

2.12 Proposed Schedule of Works Associated With Dredging and Placement and Removal Navigation Markers

Dredging works are proposed to be completed over a period of approximately 2 years, commencing in mid 2009. At this stage a detailed schedule of works has not been established, however works are likely to follow the sequence outlined below.

1. Formal designation of the new navigation channel alignment (as shown on Figure 5, with comparison to the existing channel).
2. Establishment of overland dredge transfer pipeline and the section of submerged pipeline extending between the NEBP site at Farry Road and the upstream limit of dredging works.
3. Mobilisation of dredge and commencement of dredging works at the upstream extent of dredging, progressively moving downstream.
4. Progressive establishment of submerged dredge spoil transfer pipeline within the dredged channel as dredge moves downstream.
5. Validation survey to confirm extent of channel and batter slopes in compliance with specification.

2.13 Summary of the Positive and Negative Impacts of the Development to Fisheries

Table 6 below provides a summary of the positive and negative impacts of NEBP on the fish habitat of the Deception Bay Declared Fish Habitat Area.

Table 6: Summary of Positive and Negative Impacts of NEBP on Fish Habitat.

Impact	Impact is upon	Positive or Negative	Term of impact Short/Medium/ Long	Extent of impact	Mitigation/Management measures to be employed
Improvement of fish habitat	Fish habitats and fisheries productivity	Positive	Long	Throughout the entire extent of the sections of the Caboolture River bordering the site and tidal floodplains within the site.	Fish habitat will be improved through appropriate revegetation and restoration of the Caboolture River banks and tidal areas. These areas will then be managed and protected in perpetuity.
Decreased erosion of river banks	Banks of Caboolture River	Positive	Long	Throughout the entire extent of the sections of the Caboolture River bordering the site.	A reduction in river bank erosion will occur through appropriate management of waterway activities and rehabilitation and protection of river bank environs.
Restoration and creation of wetlands	Fish habitats and fisheries productivity	Positive	Long	Approximately 55% of the site will be set aside as 'Green Space' under the proposed development. Substantial improvement of the tidally influenced on-site wetlands and channels connecting to the Caboolture River will be included in this area.	The wetlands located on the site will be improved through extensive revegetation works, improvement of flow in tidal channels and management of anthropogenic impacts caused by inappropriate access and weed introduction.
Improved water quality (site run-off)	Fish habitats and fisheries productivity	Positive	Long	All surface water leaving the site.	Surface water will be treated via bioretention systems to ensure only high quality water drains from the site into the Caboolture River.
Management of weed/pest species	Fish habitats and fisheries productivity	Positive	Long	Throughout the site.	Appropriate weed management will occur throughout the site to reduce weed infestations and prevent the occurrence of future weed incursion.
Dredging of Caboolture River	Benthic productivity	Negative	Short	Entrainment and hence loss of benthic invertebrates which provide food for fish. Once a section of the channel is dredged, recolonisation would begin immediately and occur over timescales of months.	Recolonisation rates to be determined by monitoring and dredging refined accordingly.

Impact	Impact is upon	Positive or Negative	Term of impact Short/Medium/ Long	Extent of impact	Mitigation/Management measures to be employed
Removal of marine vegetation	Fish habitats and Caboolture River bank	Negative	Medium	The removal of marine vegetation will be required on the site to facilitate the construction on the NEBP. The specific extent of marine vegetation clearance will be determined at the detailed design phase.	Any marine vegetation removal which occurs will be appropriately offset through onsite and offsite rehabilitation and restoration of fisheries habitat.
Increased vessels on Caboolture River	Fish habitats and Caboolture River bank	Neutral to slightly positive	Long	Increased boat traffic over time inevitable regardless of NEBP – in the absence of the development less opportunity for management & regulation	Strict regulation of boat speeds/wash, supported by education, signage and cameras if necessary. Encourage regulators to control other processes of erosion, such as access to river banks by cattle along other sections of the river

3. CONCLUSIONS

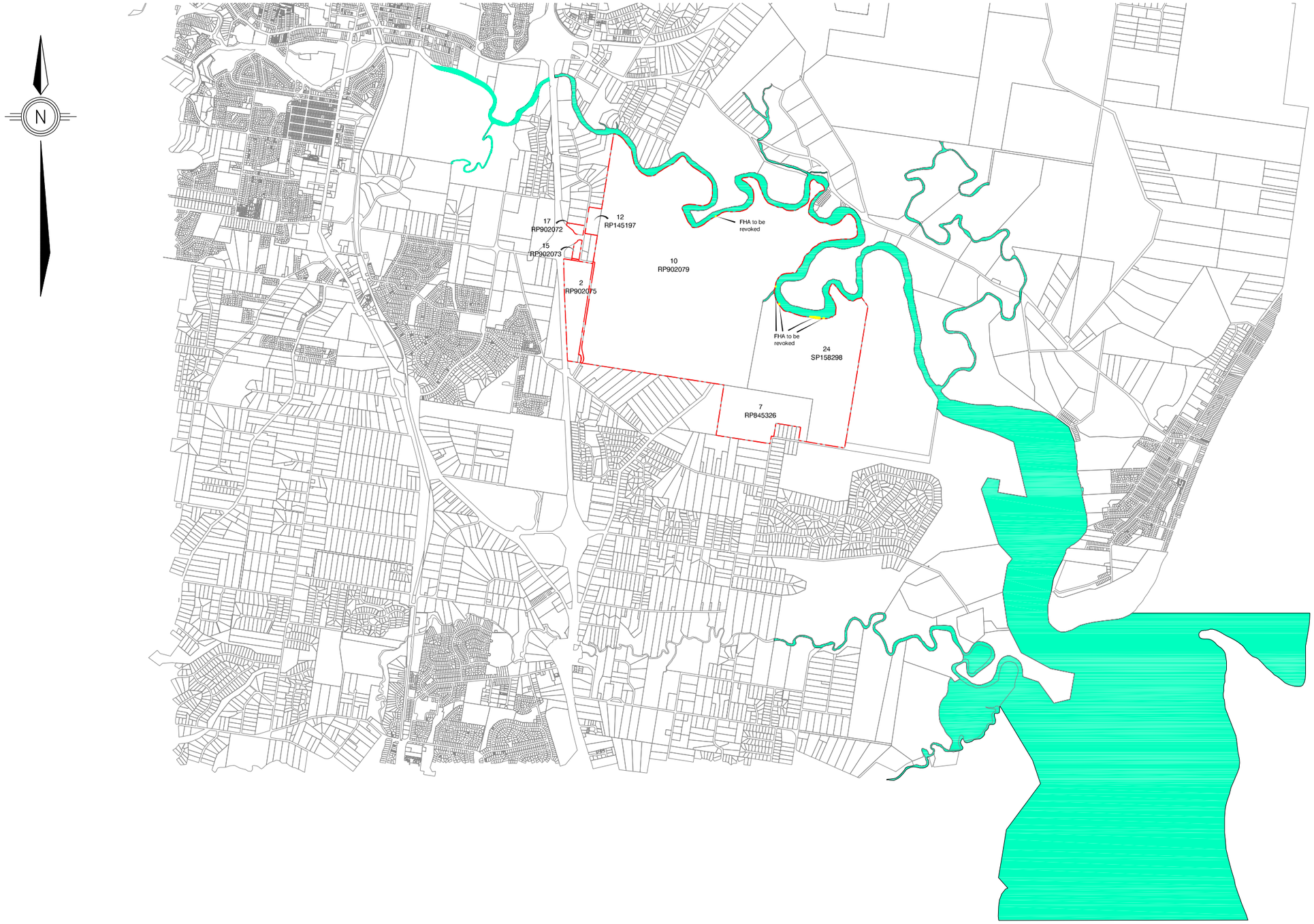
This report provides supporting information in respect of the proposed revocation of approximately 0.27 ha of the Deception Bay Declared Fish Habitat Area. The works that will take place within the revoked areas are the construction of infrastructure to facilitate public access to the Caboolture River.

Off-site impacts resulting from the development of the proposed NEBP have been clarified within this report and it has been concluded that any negative impacts resulting from the development of the NEBP and associated off-site activities such as dredging will be more than offset by the predicted benefits of the proposal, including:

- improvements in stormwater runoff from the site;
- diversion of treated sewage effluent which is currently discharged to the Caboolture River, for use on the NEBP site;
- revegetation and rehabilitation of the on site riparian buffer;
- facilitation of off site rehabilitation projects though commitment to a funding model; and
- provision of on site, and potentially off-site offsets, as required by the DPI&F's *Fish Habitat Management Operational Policy FHMOP 005 (2002) – Mitigation and Compensation for Works or Activities Causing Marine Fish Habitat Loss*.

The overall conclusion that is drawn is that the existing declared FHA, particularly as it exists within the estuary of the Caboolture River, is marginal and far from pristine (in contrast to many other declared FHAs in the state). The small extent of revocation associated with the proposed NEBP development will not in itself or cumulatively, add to this condition, provided all measures are taken to manage and monitor construction and operational phases. On the other hand, very significant mitigation measures are offered to contribute to the ecological stewardship of the river, with the potential to develop a strong partnership between the development and environmental regulators.

FIGURES



Scale 1:50,000 (A3)

FIGURE 1
DECEPTION BAY DECLARED FISH HABITAT AREA

Rev: Orig. Date: 18 July 2008

Project No.: 7800/40

Northeast Business Park Pty Ltd

CAD FILE: I:\7800-40\ACAD\DFHA Partial Revocation SS\Figure 1 - Proposed areas of revocation of the Deception Bay Declared Fish Habitat Area.dwg
XREF's: Caboolture_mga94

PRINT DATE: 23 July, 2008 - 8:53am

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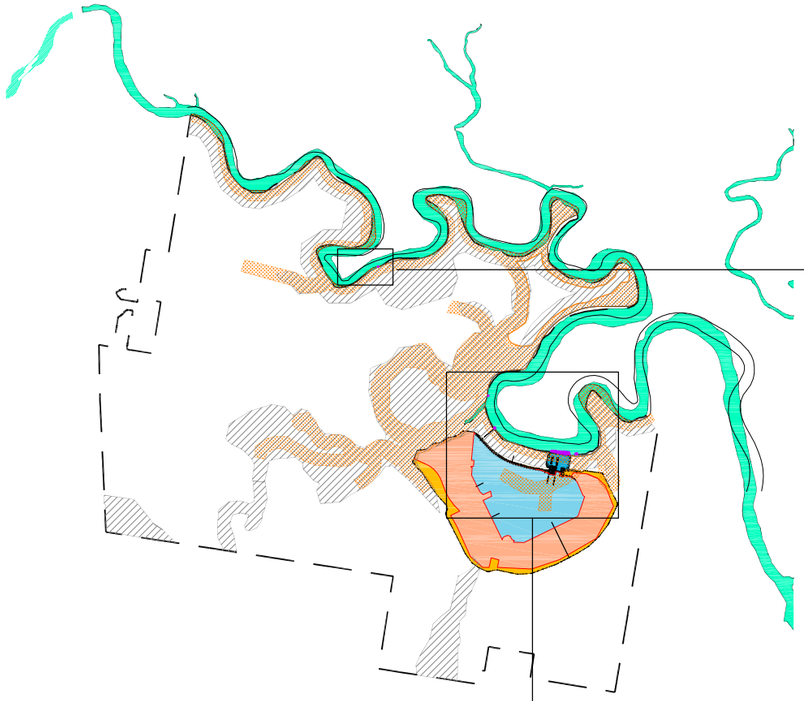
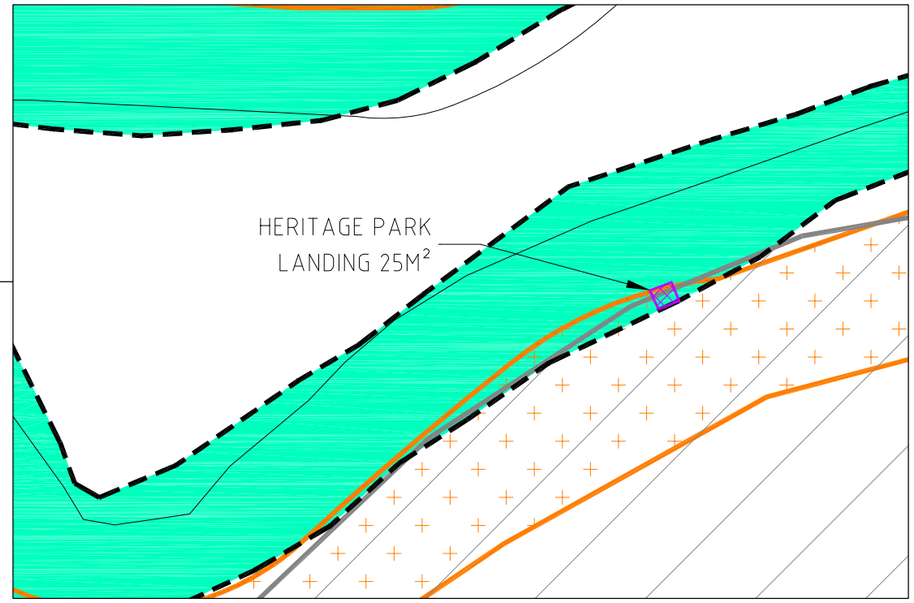


SITE LAYOUT



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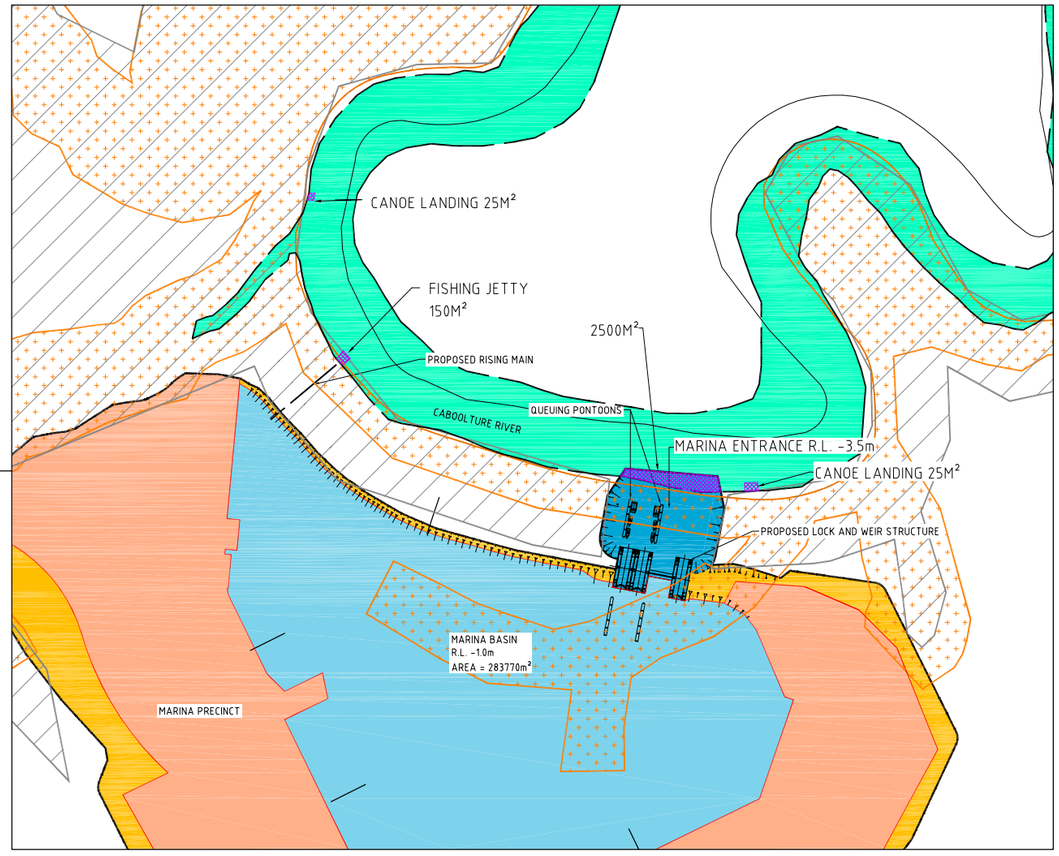


LEGEND:

- CADASTRAL BOUNDARY
- ENVIRONMENTAL PROTECTION ZONE
- COASTAL MANAGEMENT DISTRICT (CMD)
- MARINA WATER LEVEL R.L. 2.0
- LEAVE ENTRANCE LEVEL R.L. -3.5
- MARINA PRECINCT
- TRANSITION REVETMENT - BASIN
- EARTHWORKS EXTENT
- FISH HABITAT AREA
- AREA TO BE EXCISED FROM FHA (NOT TO SCALE)

N.T.S

FIGURE 2

FISH HABITAT AREA AND MARINA PRECINCT LAYOUT PLAN

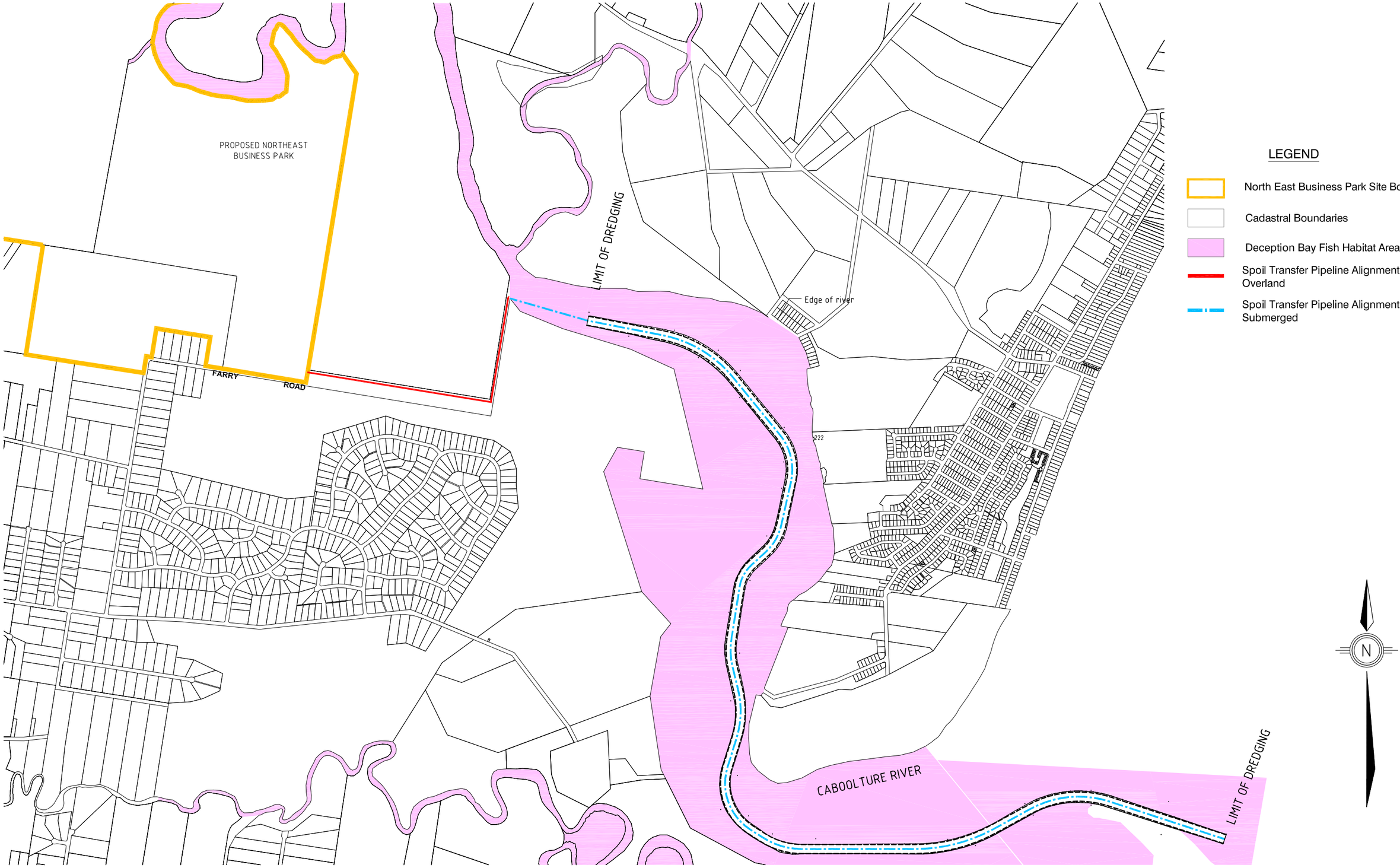
Rev: Orig. Date: 19 June 2008

Project No.: 7800/40

Northeast Buisness Park Pty Ltd

CAD FILE: I:\7800-40\ACAD\DFHA Partial Revocation SS\Figure 2 - Areas excised from FHA_v2.dwg
XREF's: X-Base

PRINT DATE: 23 July, 2008 - 8:54am



Scale 1:20,000 (A3)

FIGURE 3
LOCATION OF DREDGE SPOIL PIPELINE

Rev: Orig. Date: 9 July 2008

Project No.: 7800/40

North East Business Park Pty Ltd

CAD FILE: I:\7800-40\ACAD\DFHA Partial Revocation SS\Figure 3 - Location of Dredge Spoil Pipeline_v2.dwg
XREF's: Caboolture_mga94; redata

PRINT DATE: 23 July, 2008 - 8:55am

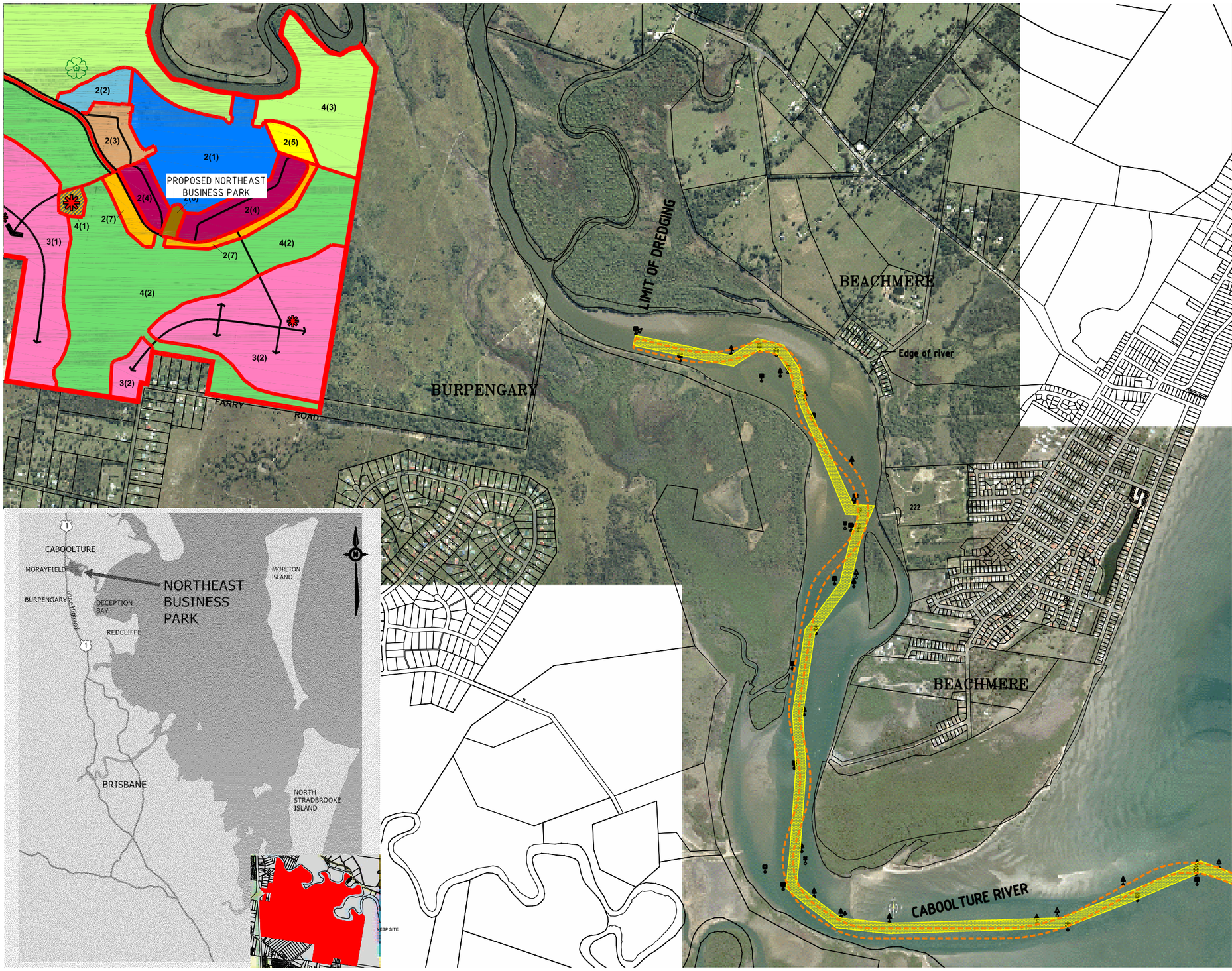
Image sourced from PLACE Planning and Design, Landscape Master Plan Report - Figure 10

N.T.S

FIGURE 4
OPEN SPACE LANDSCAPE MASTERPLAN

Rev: Orig. Date: 18 July 2008

Project No.: 7800/40



200 0 200 400 600 800 1000m
1:20,000

Scale 1:20,000 (A3)

FIGURE 5

EXISTING AND PROPOSED CABOOLTURE RIVER NAVIGATION CHANNELS

Rev: Orig. Date: 18 July 2008

Project No.: 7800/40

Northeast Business Park Pty Ltd

CAD FILE: I:\7800-40\ACAD\DFHA Partial Revocation SS\Figure 5 - Existing and proposed caboolture river navigational channel.dwg
XREF's: X-Base-Design 3; X-A1-B0-SHT FINAL_v2

PRINT DATE: 18 July, 2008 - 3:20pm

APPENDIX A

Deed of Title

VOL: 57 FOLIO:014

10057014

No. 10,752.

Folio 14
Vol LVII

FULLY CANCELLED

Date
County of Stanley
Parish Unnamed
Acres 1280 , 0 r . 0 p

Victoria by the Grace of God of the United Kingdom of Great Britain and Ireland Queen Defender of the faith and so forth , —

To all to whom these presents shall come **Greeting**

Know ye that in conformity with the Regulations dated the first day of August 1861 for the encouragement of the Cultivation of Cotton **We** of our special Grace with the advice of our Executive Council of Queensland by virtue of an Act of the Parliament of Queensland made and passed in the twenty fourth year of the Reign of Her present Majesty Queen Victoria intituled "The Alienation of Crown Lands Act of 1860" Have granted and for us our heirs and successors **Do hereby grant** unto Robert Douglas, William Hobbs and Henry Buckley their heirs and assigns Subject to the several and respective reservations hereinafter mentioned **All that** piece or parcel of Land in our said Territory of Queensland Containing by admeasurement One thousand two hundred and eighty acres be the same more or less situated in the County of Stanley Parish Unnamed, Commencing on the right bank of the Caboolture River at the Northeast corner of Captain Whish's Six hundred and ninety six acres and bounded thence on the West by a line bearing South One hundred and thirty seven chains and sixty links, on the South by a line bearing East one hundred and two chains, on the East by a line bearing North fifty two chains to a small Creek thence by that Creek downwards to the Caboolture River and thence by that River upwards to the point of Commencement **Being deed numbered** Ten Thousand seven hundred and fifty two With all the Rights and appurtenances whatsoever belonging thereto **To hold** unto the said Robert Douglas, William Hobbs and Henry Buckley as tenants in Common their Heirs and Assigns for ever **Yielding** and **Paying** therefor yearly unto us our Heirs and Successors the quit rent or sum of One Farthing for ever if demanded **Provided nevertheless** and we do hereby reserve unto us our Heirs and Successors all such parts and so much of the said Land as may hereafter be required for making public ways Canals or Railroads in over and through the same to be set out by our Governor for the time being of our said Territory or some person by him Authorized in that respect and also all sand Clay Stone Gravel and Indigenous Timber and all other materials the natural produce of the said Land which may be required at any time or times hereafter for the Construction and repair of any public ways Bridges Canals and Railroads or any fences embankments Dams Sewers or drains necessary for the same together with the right of taking and removing all such materials And we do hereby further Reserve unto us our Heirs and Successors the right of full and free

Transfer No 10077 of the whole of the within land to George Raff produced 11 May 1866 at 11 . 2 am
90 . 40 4 June 1866
[illegible]
Deputy Reg. Genl.

ingress egress and regress into out of and upon the said Land for the several purposes aforesaid In testimony whereof we have caused this our Grant to be sealed with the Seal of our said Territory

Witness our trusty and well beloved Sir George Ferguson Bowen Knight Grand Cross of our most distinguished Order of Saint Michael and Saint George Captain General and Governor in Chief of the Colony of Queensland and its Dependencies and Vice Admiral of the Same at Government House Brisbane in Queensland aforesaid this twenty second day of February in the twenty eighth year of our Reign and in the year of our Lord one thousand eight hundred and sixty five

S. W. Bowen

Entered in the Register of Grants C. folio 102 in the Surveyor Generals Office Brisbane this 23rd day of February 1865

Recorded and Enrolled in the Registry Office at Brisbane in the Colony of Queensland in the Register of Grants C page this day of 1865

Registrar General

To All to whom these Presents shall come Greeting Whereas the name of the Parish and the Portion number have been omitted from the within deed of Grant and it is intended to rectify the same Now Know ye that I Sir Herbert Charles Chermside Major General of His Majesty's Forces Knight Grand Cross of the Most Distinguished Order of St Michael and St George Companion of the Most Honourable Order of the Bath Governor of the State of Queensland and its Dependencies in the Commonwealth of Australia by and with the advice of The Executive Council of the said State and by virtue of "The Titles to Land Act of 1858" do hereby declare that the Parish name "Caboolture" and the Portion number "Ten" be read and taken as inserted in the within Grant and in every deed from which the said Parish name and portion number have been omitted

(28) Given under my Hand and the Seal of the said State at Government House Brisbane this Twenty second day of June in the year of Our Lord one thousand nine hundred and four

(sgd) Herbert Chermside

By His Excellency's Command
sgd Joshua T. Bell.

Entered in the Register of Errors in Deeds Book 7 Page 146 in the Survey Office Brisbane this Twenty seventh day of June A.D. 1904

sgd H Macintosh
for Chief Clerk

Entry of Correction made this 7 day of July 1904

Dep. Registrar of Titles

APPENDIX B

Distribution of Marine Plants on the Site

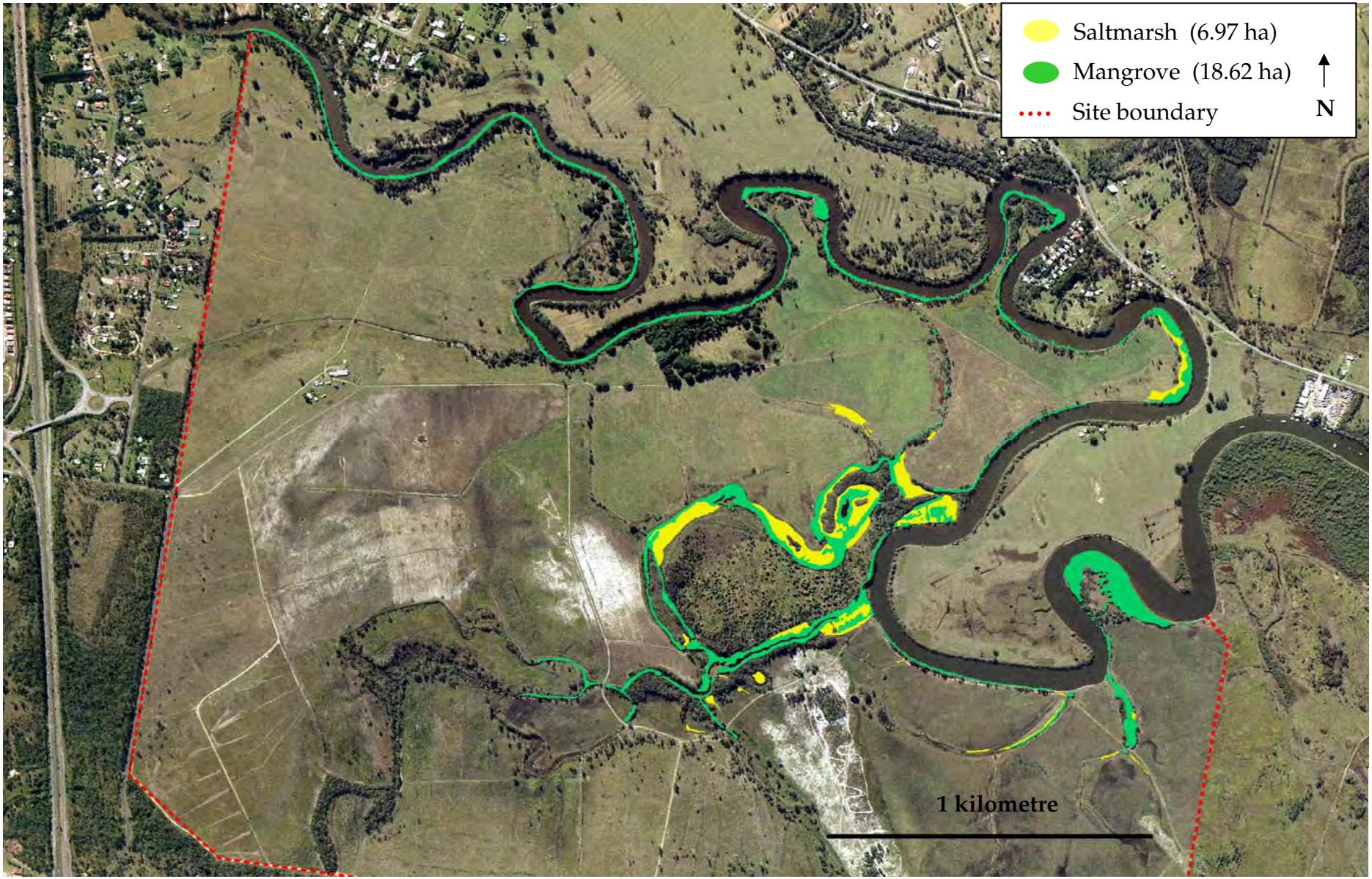


Figure 9. Distribution and extent of marine plants within the NEBP project site.

APPENDIX C

Site Photographs

PLATES

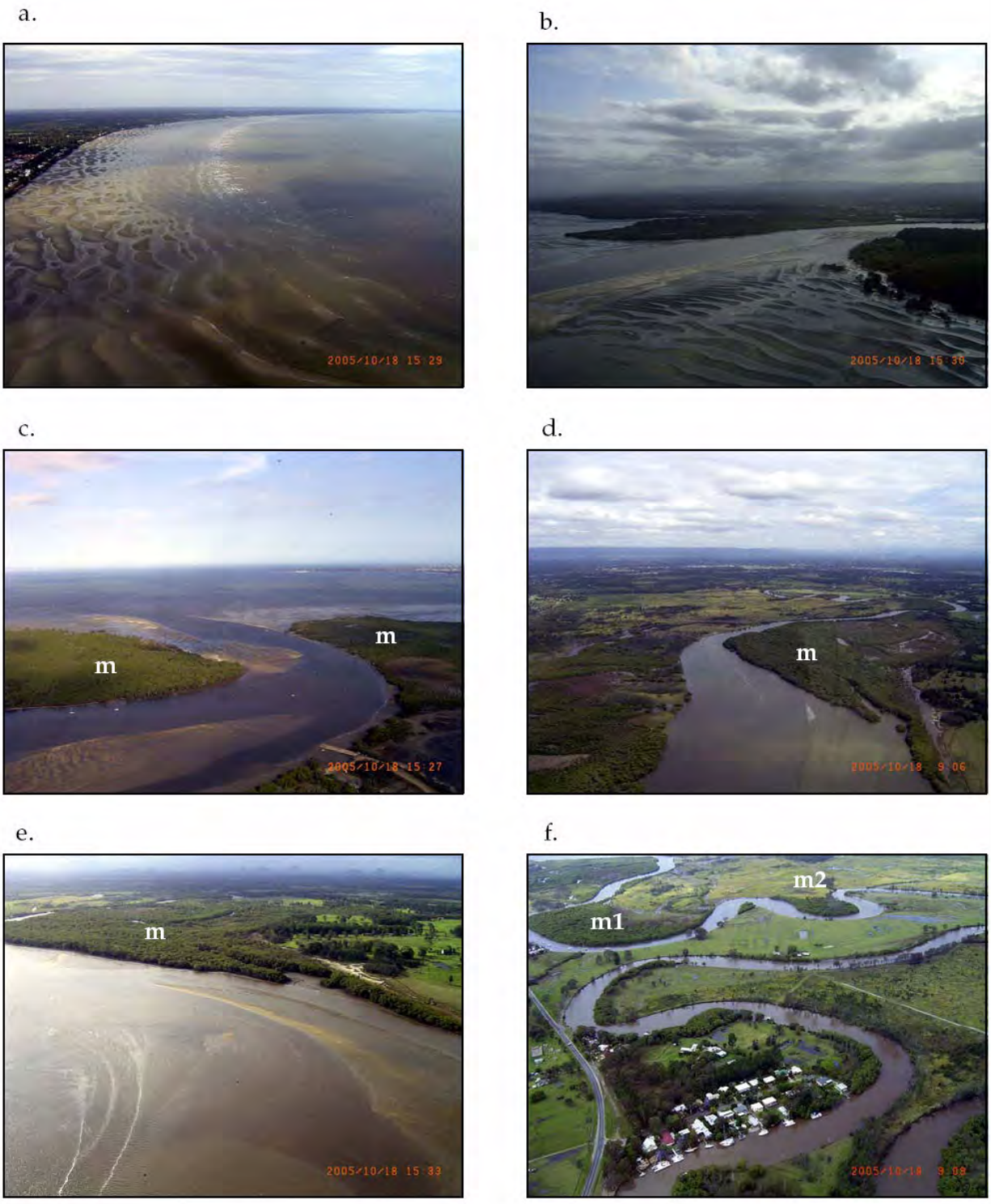


Plate 1. Aerial photographs of key features of the Caboolture River: a) tidal flats on Deception Bay north of Caboolture R.; b) entrance to Caboolture R. looking upstream; c) entrance to Caboolture R. looking towards Deception Bay – note well defined tidal flats; d) large stands of mangroves (m) just upstream of river entrance; e) mud/sand flat adjacent to river channel and mangroves; f) mangroves in middle reach of river (m1 & m2) – m2 is within buffer area on NEBP property.

a.

b.

c.

d.

e.

f.

Plate 2. Aerial photographs of key features of the NEBP and surrounds: a) proposed entrance to the marina (arrow); b) large wetland at western end of NEBP; c) large wetland within NEBP inundated at spring high tide; d) Raft Creek within NEBP at high tide; e) Raft Creek at low tide; f) artificial freshwater pond upstream of NEBP and upstream of tidal influence. NOTE: saltmarsh and mangrove wetlands shown within NEBP in plates b-e occur within proposed buffer areas on NEBP property.

a.

b.

c.

d.

e.

f.

Plate 3. Photographs of key features of the aquatic habitats of the NEBP property: a) entrance from the Caboolture River to small tidal channel at eastern end of property (adjacent to proposed marina entrance); b) mangroves along tidal channel in (a); c) stony culvert across tidal channel, looking "upstream"; d) entrance to Raft Creek from Caboolture River; e) further upstream in Raft Creek, showing muddy banks; f) saltmarshes with mangroves in the background. All wetlands, except (a) & (b) within proposed buffer areas.

a.

b.

c.

d.

e.

f.

Plate 4. Photographs of Caboolture Weir (upstream of NEBP property): a) weir spillway - upstream to the right of plate; b) fishway on downstream, southern side of weir; c) upstream of weir under dry conditions – note extensive macrophytes; d) downstream of weir under dry conditions – no large beds of macrophytes present; e) overtopping of the weir - upstream view - no macrophytes evident; f) overtopping of weir – downstream view.

a.

b.

c.

d.

e.

f.

Plate 5. Photographs of existing infrastructure, Caboolture River): a) commercial marina and slipway downstream of NEBP property, with large stand of mangroves (m1) previously shown in Plate 1f; b) waterfront properties and private berths adjacent to Beachmere Rd and opposite NEBP property; c) water view of same area as shown in (b); d) private boat ramp, mooring piles and erosion control works; e) Caboolture Waste Water Treatment Plant (WWTP) with Caboolture R. in background; f) Burpengary WWTP between Caboolture R. (upper) and Burpengary Ck.

a.

b.

c.

d.

e.

f.

Plate 6. Erosion issues, Caboolture River: a & b) bare river banks with erosion evident in intertidal zone; c) mature mangroves overhanging river; d) pneumatophores (peg roots) of mangroves stabilising the shoreline; e) onsite erosion from unauthorised vehicles; f) car dumped in the Caboolture River on project site upstream of entrance to proposed marina basin.