Eastern By-Pass Routes for Launceston: Evaluation

Report

In April, 1976, the Minister for Transport, requested the Commonwealth Bureau of Roads to report on 'the justification and timing for the construction of an Eastern by-pass of Launceston, including the question of whether such a by-pass would warrant inclusion in the Declared National Highway System'. After identifying the most desirable of a number of alternative Eastern by-pass routes, the report states that at this time there is no economic warrant for an Eastern by-pass.

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BUREAU OF TRANSPORT ECONOMICS

EASTERN BY-PASS ROUTES FOR LAUNCESTON: EVALUATION

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FOREWORD

In April, 1976, the Minister for Transport, the Hon. P.J. Nixon M.P., requested the Commonwealth Bureau of Roads to report on "the justification and timing for the construction of an Eastern By-pass of Launceston, including the question of whether such a by-pass would warrant inclusion in the Declared National Highway System". The Bureau of Roads has made its recommendations to the Minister.

This report comprises the technical information requested by the Bureau from staff of its Transport Planning Division for submission to the Minister in support of its recommendations. The report is being published by the Bureau of Transport Economics, following the amalgamation of the two Bureaux in June, 1977.

After identifying the most desirable of a number of alternative Eastern By-pass routes, the report states that at this time there is no economic warrant for an Eastern By-pass. Other factors influencing the case for a By-pass are discussed. It is concluded that an alignment should be fixed as early as possible to permit orderly development in the By-pass corridor, whilst retaining the option to construct a route in the future. A number of improvements to existing roads are suggested prior to construction of the full route.

I would like to express my thanks to the Tasmanian Public Works Department (now Department of Main Roads), Housing Department, Local Government Authorities for their assistance and to the numerous individuals who contributed to the study.

(G. K. R. REID)
Acting Director

Bureau of Transport Economics,
CANBERRA
July, 1977.

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CHAPTER 1 - ALTERNATIVE ROUTES FOR AN EASTERN BY-PASS

There have been suggested at various times a number of alternative routes for an eastern by-pass of Launceston. Most of these have been located in rural areas to permit higher geometric standards to be obtained without affecting residential areas. An example of such a route was a by-pass located 5 kilometres east of the declared urban area. This by-pass was eliminated from further detailed examination on the grounds that it would not attract urban traffic, and the low volume of through traffic would generate few benefits in relation to the large construction costs involved.

The following proposals are considered in more detail:

(i) Alternative 1 - The 1968 LATS[1] Route;
(ii) Alternative 2 - The PWD[2] Route;
(iii) Alternative 3 - Upgrading of Existing Roads; and
(iv) Alternative 4 - The Modified LATS Route.

The remainder of this chapter describes these alternatives.

ALTERNATIVE 1 - THE 1968 LATS ROUTE

The LATS Report proposed a predominantly two-lane urban arterial road facility with at-grade intersections (Figures 1 and 2) leaving the Bass Highway near Prospect Vale. The route crosses the Midland Highway and, skirting development at Youngtown, utilises a road reservation (established since LATS) between Opossum Road and Penquite Road, Norwood. The route then follows the floodplain of the North Esk River between Queechy Lagoon and the river before crossing the railway line and river passing

(1) Launceston Area Transportation Study, (carried out in 1967-68).
(2) The Section of the previous Public Works Department (PWD) concerned with roads is now known as the Department of Main Roads (DMR).

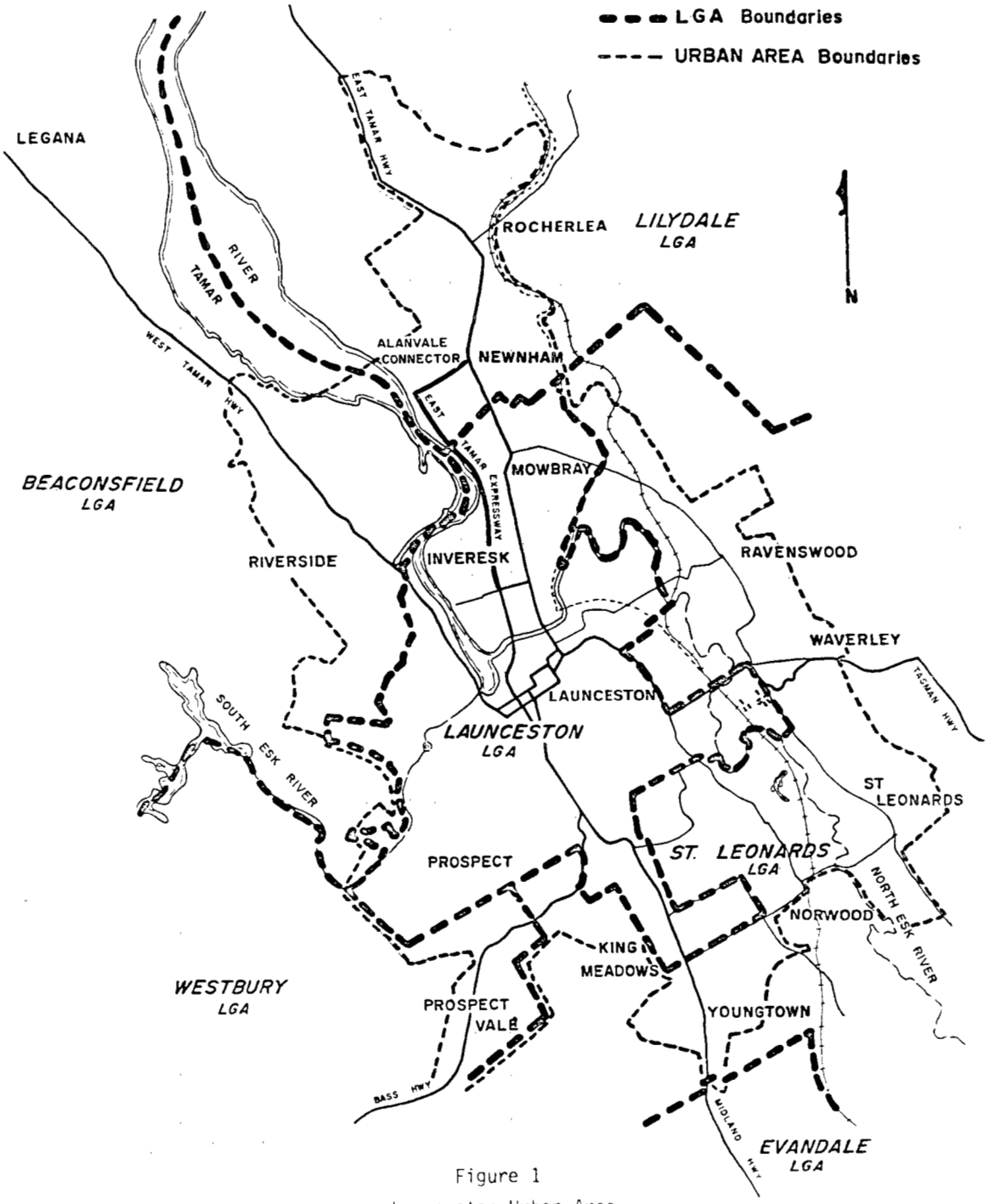

Figure 1
Launceston Urban Area

between the Tasmanian Board Mills and the Launceston Abattoirs. It remains at a low level on the east side of the river valley until an at-grade intersection with Vermont Road. It incorporates part of the existing Vermont Road but requires a major deviation utilising Pleasant Street in the vicinity of Invermay Road.

The LATS Route has three major shortcomings. The route is located in an environmentally sensitive area around Queechy Lagoon and further north it severs the Launceston Abattoirs from land planned for its expansion and currently used for agistment. Finally the LATS Route terminates at Invermay Road, and does not provide a direct link between Vermont Road and East Tamar Highway to by-pass the urban development of Newnham.

Alternative 4, the Modified LATS Route was developed to overcome these shortcomings.

ALTERNATIVE 2 - THE PWD ROUTE

The route designed by the PWD to meet announced general National Highway Standards provides for a rural freeway alignment for four lanes with limited access and grade separation (See Figure 2). It begins at the Bass Highway near Prospect Vale, crosses the Midland Highway at Franklin Village, skirts around Youngtown and crosses Opossum Road south of Station Road. Station Road itself is crossed near the railway crossing, requiring the eventual acquisition of six houses and the realignment of part of the railway line.

In crossing the North Esk floodplain the route crosses Queechy Lagoon and the river and then passes under St. Leonards Road just south of the abattoirs and the board mills. Approximately twenty buildings would be affected in the vicinity of the Tasman Highway as a result of the by-pass route and inter-change facilities.

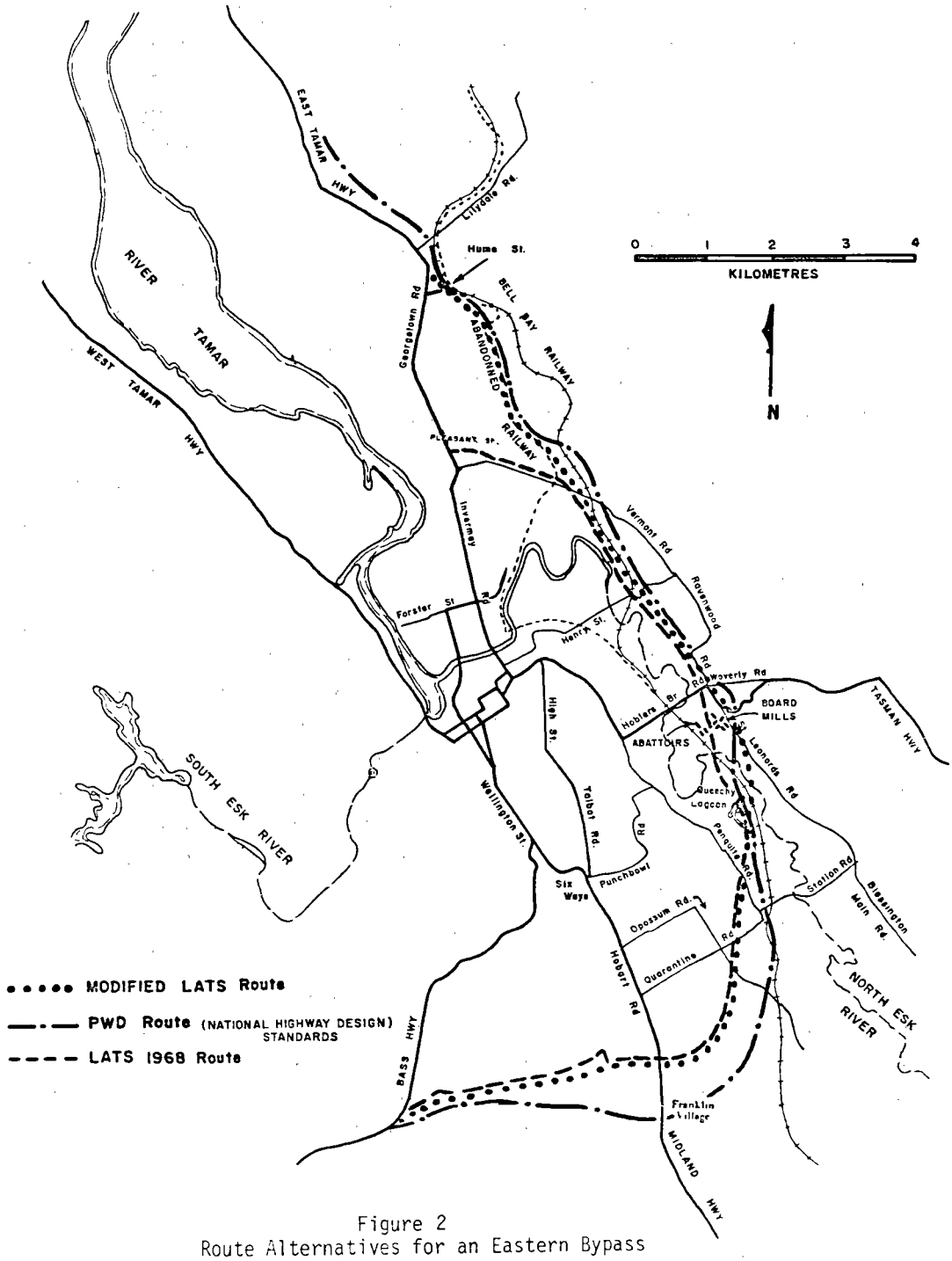

Figure 2
Route Alternatives for an Eastern Bypass

Between Hoblers Bridge Road and Henry Street the route is essentially through farmland although two dwellings and other farm buildings would be affected. North of Henry Street the by-pass runs parallel to, and east of, the Bell Bay Railway line as far as Vermont Road where several more houses would be affected.

Between Vermont Road and the East Tamar Highway the route crosses to the west side of the railway line near the Launceston City Council Quarries and passes under Lilydale Road between Rocherlea School and its playing fields. This section would affect wholly or partially about seven residential properties. The route was ultimately designed to link into a high standard replacement for the East Tamar Highway but for this investigation it was assumed to terminate at the interchange with Lilydale Road.

ALTERNATIVE 3 - UPGRADING OF EXISTING ROADS

While the future and precise location of an eastern by-pass has been the subject of controversy, the existing road system has deteriorated. Local and arterial roads were not constructed to cater for the heavy vehicles that are now using them. Some local authorities have suggested that a route functioning as an eastern by-pass, and which could accommodate heavy traffic, could be developed through the strengthening and reconstruction of existing roads (Figure 3). The route links Hobart Road to Invermay Road via Quarantine Road, Station Road, St. Leonards Road, Ravenswood Road and Vermont Road.

This proposal would entail the upgrading of Quarantine Road and include the re-routing of Station Road as already planned by St. Leonards Council. (This proposal ascends from the Station Road bridge across the North Esk River behind houses fronting Station Road and links into St. Leonards Road through vacant land 0.5 kilometres north of the existing Station Road intersection). Reconstruction work along St. Leonards Road is already in progress. Minor upgrading would also be necessary along Ravenswood and

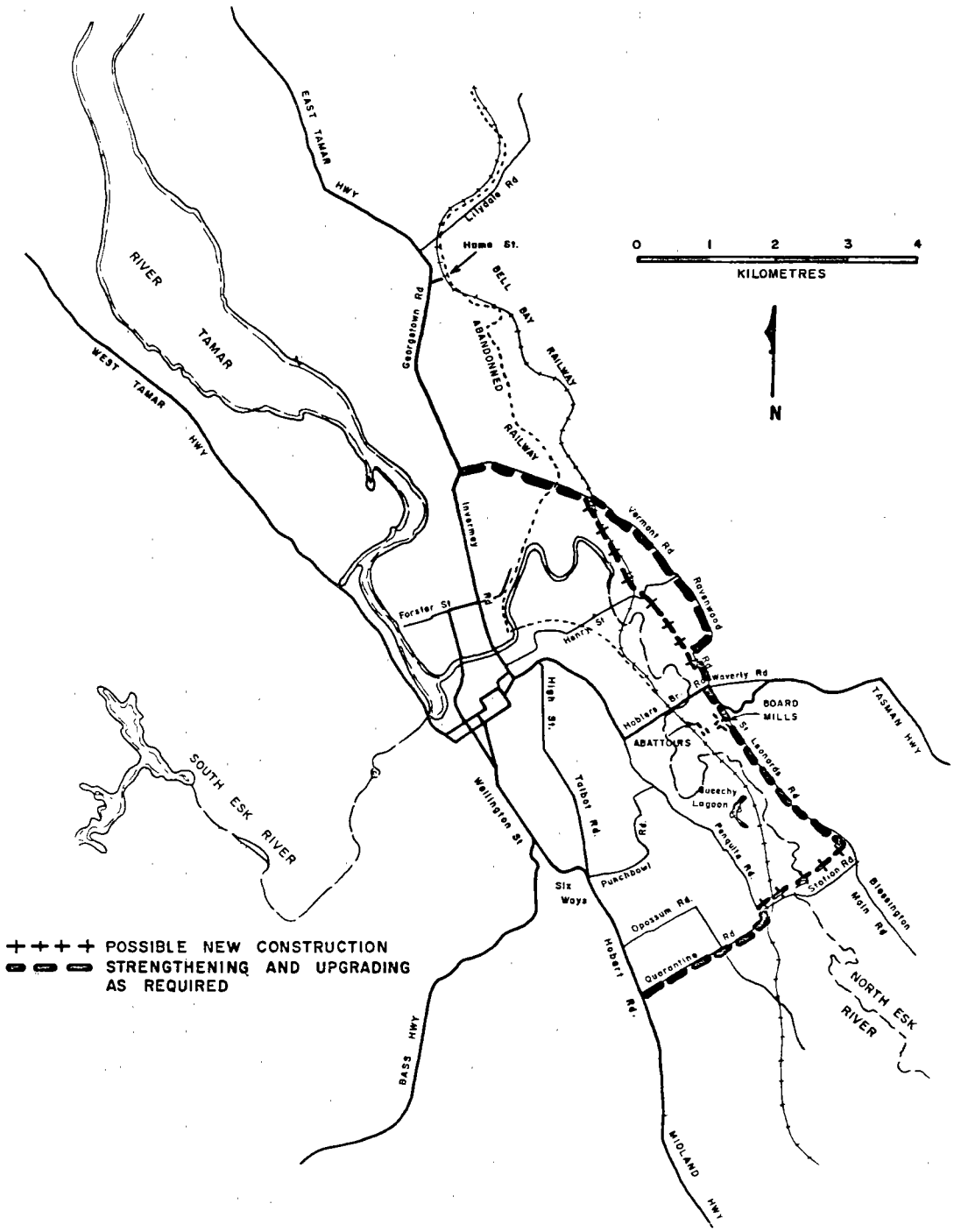

Figure 3
An Eastern Bypass through Upgrading of Existing Roads

Vermont Roads. Substantial reconstruction would be required at the junction of Hoblers Bridge, Ravenswood and St. Leonards Roads, and at the Vermont Road and Invermay Road intersection.

ALTERNATIVE 4 - THE MODIFIED LATS ROUTE

As outlined above, the LATS Route has three major shortcomings which the Modified LATS Route (Figure 2) has been designed to eliminate.

The Modified LATS Route closely follows the LATS Route from the Bass Highway across the Midland Highway and along the North Esk floodplain as far as Queechy Lagoon. Queechy Lagoon is important for the birdlife of the North Esk and should be avoided if possible. The LATS Route location between the abattoirs and the Tasmanian Board Mills is unlikely to be acceptable to local authorities, in particular to Launceston City Council who operate the abattoirs. Severe foundation problems as well as considerable impact on Queechy Lagoon would be involved. However, a location to the east of the board mills and St. Leonards Road would involve substantial housing acquisition.

The most satisfactory solution to these problems is to link the by-pass into St. Leonards Road opposite Queechy Lagoon and to utilise that road as far north as Hoblers Bridge Road. This minimises roadworks on the floodplain without interfering with the abattoirs, the board mills or houses adjacent to St. Leonards Road. This route would require reconstruction of the intersections between Hoblers Bridge/St. Leonards Roads and Ravenswood/St. Leonards Roads.

The Modified LATS Route follows a line parallel to, but east of, the original LATS proposal from Hoblers Bridge Road to Vermont Road[1], and then follows approximately the old railway reservation as far as Hume Street, from where connection would be made

(1) The Bell Bay Railway has been constructed since the 1968 LATS Report. The Modified LATS Route lies west of the Railway between Henry Street and Vermont Road.

to Georgetown Road through what is now the storage yards of the Besser Brick Factory. It would be necessary for these yards to be relocated to ensure the continued viability of the factory.

Many of the proponents of the northern extension of an eastern by-pass associate it with an additional connection from Vermont Road to Forster Street along the route of the abandoned railway. This would then provide an alternative to Invermay Road as a northern approach to the city. As such, this connection has been included in the comparative evaluation of the alternative routes.

CHAPTER 2 - EVALUATION OF ROUTE ALTERNATIVES

Four alternative routes for an eastern by-pass were described in Chapter One. Alternative 1 had three major shortcomings and Alternative 4 was developed to overcome these. In this chapter, Alternatives 2, 3 and 4 are evaluated in terms of their social and environmental consequences, road user impact and cost of construction. The overall evaluation takes account of all these factors.

SOCIAL ISSUES

Housing Acquisition

Launceston has, for some time, experienced a housing shortage, particularly of smaller units for elderly people and houses to suit large families. The waiting list of 800 applicants for government housing is growing rapidly as only 150 new houses are constructed by the Housing Department each year.

Within this general context a number of projects such as the East Tamar Expressway and General Hospital have required substantial housing acquisition. Other public projects have threatened to demand further resumption. Strong opposition to such acquisition has been expressed both by affected residents and by bodies such as the Regional Council for Social Development and the Inveresk Area Development Association.

When the PWD alignment for the eastern by-pass became known, residents directly affected by the proposal joined the existing Acquisition Action Group, and gained the support of local politicians and authorities. Much of the opposition expressed to an eastern by-pass has therefore been based on the acquisition issue and its implications for the level of housing stock available.

Any proposal that demands housing acquisition will cause substantial social hardship to those affected as well as encountering entrenched local opposition. The Tasmanian Government is reviewing its compensation procedures, but, given existing housing conditions and compensation levels, residents are unlikely to find equivalent replacement housing.

The PWD Route proposal (Alternative 2) requires the acquisition of approximately thirty houses and a large number of other properties and land holdings. Numerous other dwellings are partially affected. Upgrading of existing roads (Alternative 3) and the Modified LATS Route (Alternative 4) affect no dwellings although following detailed design some minor acquisition of residential land may be necessary. Examples are at the junction of Vermont and Invermay Roads in the Upgrading of Existing Roads alternative and at the end of the Hume Street for the Modified LATS Route.

Residential Disruption

The social costs incurred due to traffic, particularly heavy vehicles using residential streets in Launceston have been considerable. The noise, hazards to safety and deterioration of local amenity compounded by the size of some vehicles, such as log trucks, have assumed huge dimensions in the minds of those affected.

The PWD and Modified LATS Routes would divert heavy traffic from residential streets. They would also relieve the problems associated with heavy vehicles negotiating inadequate roads, for example where school children cross at the intersection of Tasman Highway and St. Leonards Road. The Upgrading of Existing Roads alternative would relieve some of these intersection problems but not the general social impact produced by the level and type of existing and foreseeable traffic.

Expectation of Expenditure

In relation to other Australian States, costs in Tasmania are often high and it has often received compensating funding treatment from the Commonwealth Government. Tasmanians feel they suffer special problems because of their isolation and they have recently experienced particularly depressed economic conditions and high unemployment. People in Launceston consider these problems exacerbated for them because, although Launceston's history and size make it a strong competitor with Hobart as an urban centre, the seat of Government is in Hobart and consequently Launceston people feel that Tasmanian policies and administration favour the interests of those in the south.

There is thus in Launceston a widely shared pre-occupation with encouraging economic activity and employment. Any large scale proposals, such as the educational complex at Newnham, expansion of Bell Bay port facilities, and the development of an eastern by-pass represent not only welcome State Government initiatives but also likely generators of activity and employment opportunities. People in Launceston generally tend to support development initiatives, even where personal costs are high.

A high level of expectation has been generated by the proposal for an eastern by-pass. Refutation of the need for it has provoked, and will continue to provoke, further opposition from local politicians and those who have some interest in Launceston's progress. A firm commitment to an eastern by-pass would boost community morale whereas the upgrading of existing road alternative (Alternative 3) would not have the same beneficial social effects. Indeed, unless carefully presented, such an upgrading proposal could be rejected locally, being perceived as further evidence of the State and Commonwealth Governments' abdication of their responsibilities in relation to Launceston.

Uncertainty

Probably the most devastating but difficult to measure social cost resulting from the eastern by-pass proposals has been the uncertainty generated amongst those affected. While people rarely complain about the by-pass itself, they have experienced fears about the falling value of their properties and doubts about whether to invest capital or effort into home improvements.

Any proposal, or lack of one, that perpetuates the state of uncertainty about the precise location of the route, those to be affected, and the timing of their affection, will exacerbate these existing social problems. A firm commitment now to one of the alternative routes for a by-pass would end speculation and overcome the uncertainty that has existed for some time. The upgrading proposal itself would not achieve this, unless it was seen merely as an interim measure prior to the subsequent construction of a full by-pass. This would require the immediate declaration and purchase of a road reservation.

Local Government Rate Base

Most of the urban development currently taking place in Launceston is occuring in the five local government areas, which have historically, been largely rural, surrounding Launceston Municipality (Lilydale, St. Leonards, Evandale, Westbury and Beaconsfield, (See Figure 1)). The cost of servicing these developing areas is a significant burden on the local authorities considering their small population and rate base. Under these circumstances local authorities find it difficult to meet the full costs of the reconstruction of arterial roads originally built to low volume rural standards. In the Launceston area, local government authorities have been unable to maintain adequately existing roads, especially those damaged by heavy vehicles.

The Modified LATS Route follows a line parallel to, but east of, the original LATS proposal from Hoblers Bridge Road to Vermont Road[1], and then follows approximately the old railway reservation as far as Hume Street, from where connection would be made to Georgetown Road through what is now the storage yards of the Besser Brick factory. It would be necessary for these yards to be relocated to ensure the continued viability of the factory.

ENVIRONMENTAL FACTORS

Foundation Problems

The marshy deposits of the North Esk floodplain present construction problems which are most critical towards the northern end of this floodplain and around Hoblers Bridge. Slow long-term settlements of the underlying clays and differential settlement over time compounded by variable shrinkage and swelling of the clays make the construction of stable high standard roads difficult and expensive.

The stability of any construction on the floodplain is dependent upon the size of the earthworks involved. With large fills, rapid settlement as a result of overloading or vibration can result in whole embankments disappearing, as occurred in 1974 when the Bell Bay Railway line was being built.

The activation of potential landslips or reactivation of old landslips could also occur as a result of road construction. Unstable sites occur along the sides of the floodplain and in rural land south of Quarantine and Station Roads.

The effect of these problems on the route alternatives is discussed below.

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(1) The Bell Bay Railway has been constructed since the 1968 LATS Report. The Modified LATS Route lies west of the Railway between Henry Street and Vermont Road.

Natural Values

The natural value of the North Esk River and its floodplain lies mostly in its scenic and recreational appeal. Its biological value in terms of the preservation of rare or endangered species is not great. Queechy Lagoon is important since it provides feeding grounds for a great diversity of waterfowl and some other small native animals. This is the largest locally established breeding area for this fauna, some species of which are also dependent upon a specific water level for successful breeding. As such it is extremely valuable to local secondary and tertiary education institutions for biological studies.

The adverse effects on Queechy Lagoon of a road would vary considerably depending on the actual location of the road. A road (of any standard) located directly through the lagoon could completely degrade its value as a wildlife habitat. A road beside the lagoon could interrupt breeding, for instance by permanently altering water levels through damming behind the road embankment. Under these circumstances the lagoon would however, still retain some value to wildlife.

The potential of the floodplain for recreation purposes is considerable and is, as yet, largely unrealised. Some use is made of the area for walking, picnicking (especially near the Station Road Bridge), observing wildlife and fishing. In addition to this, areas such as Queechy Lagoon have special value for educational purposes.

The construction of any road across the floodplain would reduce the recreational value of the area by the physical presence of a road and associated pollution problems, especially noise pollution. A road would also be a scenic disamenity both for people wishing to use the floodplain for recreation and for those overlooking the floodplain.

The impact of alternative routes on the flood plain is discussed below.

Minimising Environmental Effects

The aim when planning any eastern by-pass should be to:

(i) minimise the length of road actually on the floodplain;
(ii) reduce the effect of construction on key areas such as Queechy Lagoon and frequently used recreation areas such as the Station Road picnic grounds;
(iii) reduce the sections of road in proximity to landslip zones and consequently the amount of contact the road has with sensitive areas on the sides of the valley; and
(iv) reduce scenic disamenity by sensitive design.

The modified LATS Route (Alternative 4) passes between Queechy Lagoon and the river with as little interference as possible to the lagoon[1] and avoids the slip zone west of the lagoon. The route crosses the floodplain directly to join St. Leonards Road. Further north between Henry Street and Vermont Road it is located higher up the valley wall than the 1968 LATS Route (Alternative 1) to avoid slip prone areas.

Both the Modified LATS Route and the PWD Route would divert through traffic from recreation areas such as Hoblers Bridge and the Station Road picnic area. The lower design standard proposal would have less imposing earthworks and reduce the visual impact of a road on the scenic valley of the North Esk River.

ROAD USER IMPACTS

Because of time, budget and staff constraints, the traffic analysis concentrated on the Modified LATS Route (Alternative 4) as this alternative has been designed to overcome the problems identified in the other alternatives.

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(1) Care and protection of the lagoon area would be essential during construction.

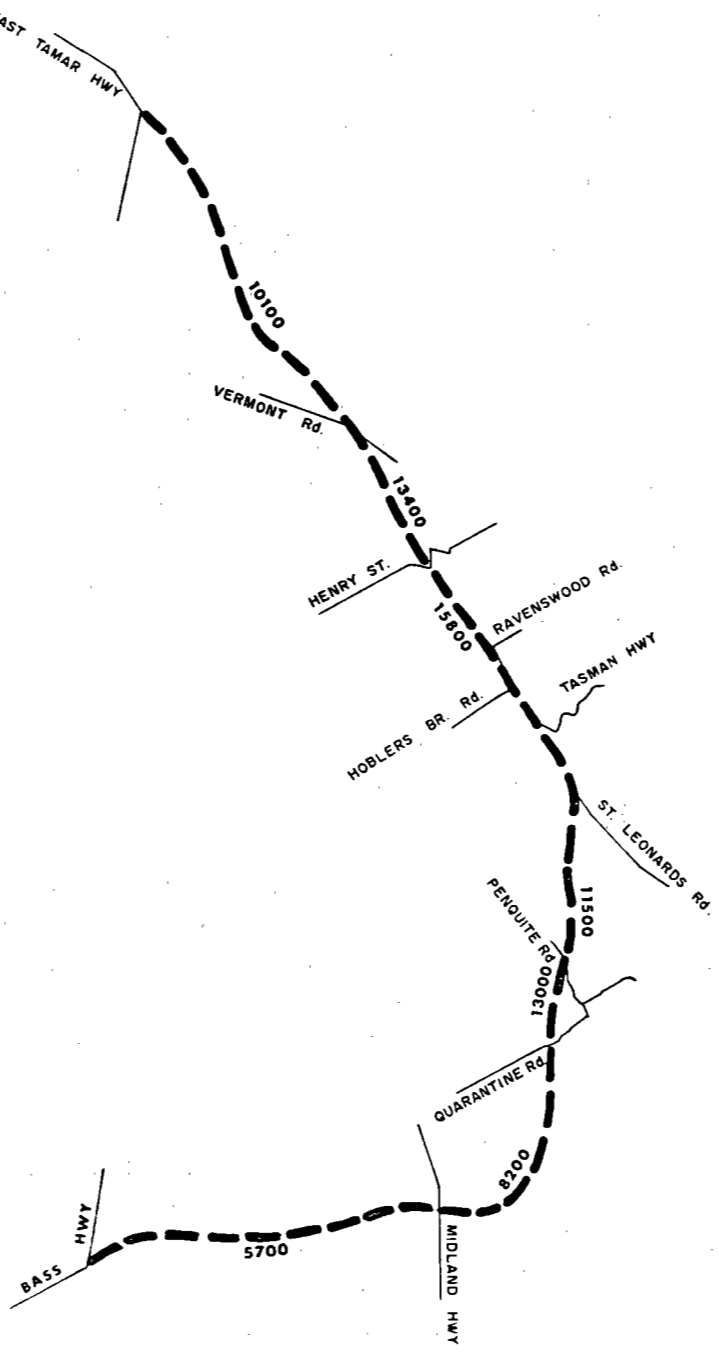

Figure 4
Projected Eastern Bypass Traffic Volumes for 1995
(Vehicles per Day)

The traffic analysis assumes that ongoing road works in Launceston, in particular the East Tamar Expressway and Alanvale Connector, will be completed. The next priority would be the provision either by upgrading existing streets or by new construction of additional capacity for north-south movement south of the city. On these assumptions, the road user benefits[1] of constructing, to urban arterial standard, a full eastern by-pass (i.e. the Modified LATS Route (Alternative 4)) would be about $4 million. The projected traffic volumes for 1995 are shown on Figure 4.

The marginal road user benefits over Alternative 4 of constructing one carriageway along the PWD Route (Alternative 2) are difficult to estimate accurately as most of the traffic using such a route would still be local traffic. The absolute volume of local traffic would be less than with the Modified LATS Route, particularly on the end sections where the route would be located well outside the future built up areas. Local traffic in general would be unlikely to realise the full benefit of the potentially higher speeds on the route because of the short distances for which it would be used by this type of traffic. More importantly however, the overall length of the route would be greater and potentially the benefits to all traffic would not be greater than those for the Modified LATS Route.

The road user benefits of Upgrading of Existing Roads (Alternative 3) would, in the main, accrue to users in other parts of Launceston. The benefits of re-routing traffic (particularly heavy vehicles) away from existing sensitivie areas would be greater than any benefits to existing local traffic (most of these roads currently carry about 1000-2000 vpd, nearly all of this being local traffic). Some existing roads, such as St. Leonards Road, are currently being reconstructed and proposals have been put forward for the reconstruction of Quarantine Road and the construction of a by-pass of Station Road on a new and more direct

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(1) All benefits are calculated using the standard Commonwealth Bureau of Roads procedures. They are calculated in 1976 prices and discounted at 10% p.a. over 30 years to 1976.

alignment. It is planned to reconstruct all these roads to urban arterial road standard, i.e. with kerbs, gutters, lights, footpaths, etc.

Alternative 3 would therefore provide a viable route for heavy vehicles travelling from the south to the abattoirs and board mills. However, the grades and alignment of the Ravenswood Road section are such that, even after improvement, heavy vehicles are unlikely to be attracted to this route without regulation. To avoid this difficulty, a staging strategy has been developed, involving upgrading as in Alternative 3 between the Midland Highway and Hoblers Bridge Road, with construction as in Alternative 4 from there to Georgetown Road. The fullest diversion of heavy vehicles from the city centre would therefore be achieved by the above staging strategy and would lead eventually to Alternative 4.

CONSTRUCTION COSTS

The estimates of construction costs are based on PWD unit cost inputs. The Modified LATS Route (Alternative 4) is estimated to cost $7.5 million (1976 prices) for a two lane urban arterial road standard. This is comprised as below:

(i)	Bass Highway - Midland Highway	$1.0m
(ii)	Midland Highway - Penquite Road	$1.1m
(iii)	Penquite Road - Hoblers Bridge Road	$3.0m
(iv)	Hoblers Bridge Road - Henry Street	$0.4m
(v)	Henry Street - Vermont Road	$0.7m
(vi)	Vermont Road - Georgetown Road	$1.3m
		$7.5m

The cost of the first stage PWD Route (Alternative 2), designed with two lanes to National Highway geometric standards, but without grade separation is estimated by the PWD to cost $11 million (1976 prices). The increase in construction cost over

the Modified LATS Route is due to the larger earthworks necessary and the longer route distance.

Upgrading of the Existing Roads (Alternative 3) is estimated to cost around $2 million. This estimate needs careful interpretation. It does not represent the cost of upgrading existing roads to full urban arterial road standard but rather the cost of those works necessary for the route proposed to become a viable by-pass route (e.g. realignment of intersections and reconstruction of substandard pavements but not including kerbs, gutters, lights or footpaths).

Upgrading of the southern half of the route only, as required by the staging strategy previously outlined, is estimated to cost about $1.5 million. New works for the northern half of the route, would cost about $1.1 million between Hoblers Bridge Road and Vermont Road and a further $1.3 million between Vermont Road and Georgetown Road.

OVERALL EVALUATION

The overall evaluation brings together the social, environmental, road-user and construction issues outlined earlier in this chapter. The quantifiable road-user benefits and construction costs can be traded off in a Benefit Cost Ratio (BCR) for each project. In particular, a BCR of less than unity indicates that a particular project is not economically warranted at this time. Such a conclusion however, needs to be weighed against social and environmental considerations, available financial resources and any unquantifiable road-user and construction aspects, before a final conclusion can be reached on whether construction is justified.

The Benefit Cost Ratio (BCR) of construction of the Modified LATS Route (Alternative 4), the economically most desirable eastern by-pass alternative is 0.6. This indicates that at the present time there is no economic warrant for its construction. But the

economic analysis is unable to exclude the possibility that a full by-pass could be required in the future, a conclusion which is supported by capacity limitations on north-south routes, particularly through Six Ways.

Some social benefits would be derived from construction of a by-pass and diversion to it of traffic from existing roads. Social disruption in residential and commercial areas would be lessened and the cost of local road maintenance would be reduced. These additional benefits strengthen the case for earlier construction of certain sections of the Modified LATS Route.

The PWD Route (Alternative 2), costing $11 million in its first stage, ($3.5 million more than the Modified LATS Route), offers no measurable additional benefits despite its higher design standards. Besides imposing the highest social costs of the route alternatives, because of the acquisition it demands, its impact on the natural environment of the North Esk Valley is significantly greater than that of the Modified LATS Route.

The least costly alternative, that of Upgrading the Existing Road (Alternative 3), is unlikely to be attractive to heavy vehicles because of difficult intersections at Quarantine Road and Midland Highways and at Vermont and Invermay Roads, and because of steep grades in Ravenswood Road. These difficulties suggest that this alternative could only be an interim measure and that, in order to create a viable by-pass of the city centre for heavy vehicles, construction as outlined in the staging strategy would be necessary. Problems associated with residential disruption from heavy vehicles such as noise, pollution and safety would otherwise continue. Local disillusion with an upgrading alternative could also foster speculation and anxieties about the possible future construction of a by-pass.

Finally, the investigation indicates that unless a commitment to fix a reservation is made in the near future, the opportunity to establish an acceptable eastern by-pass route in the future will

be lost. Already development pressures within the corridor have limited the range of alternatives considered. Fixing an alignment at an early date would end the uncertainty which has surrounded the by-pass issue and would limit the social costs arising from continued speculation.

Taking the above factors into account, it is clear that:

(i) at this time there is no economic warrant for an eastern by-pass route. However, the immediate economic warrant should not be seen as an adequate indicator of the need for an eastern by-pass and at some time in the future there could be a need to construct such a route. The alignment should be fixed as early as possible to enable orderly development within the corridor to proceed;

(ii) the benefits to be obtained from alternative route alignments and standards are such that a route to urban arterial road standard only is indicated. Having regard to the maximisation of benefits for minimum cost the location of such a route should be as shown on Figure 5, i.e. the 'Preferred' or Modified LATS Route;

(iii) taking account of the projected traffic volumes if such a route were constructed, a reservation appropriate to contain a two-lane urban arterial road should be established except for a section of four lanes between Hoblers Bridge Road and Henry Street;

(iv) benefits can be obtained, prior to full construction of the route, by improving existing roads. This will also provide benefits by diverting heavy commercial and export traffic from the city centre. Currently some of these roads are planned for reconstruction to urban arterial road standard although some additional works might be necessary to accommodate heavy vehicles. The following works should be undertaken as finance permits;

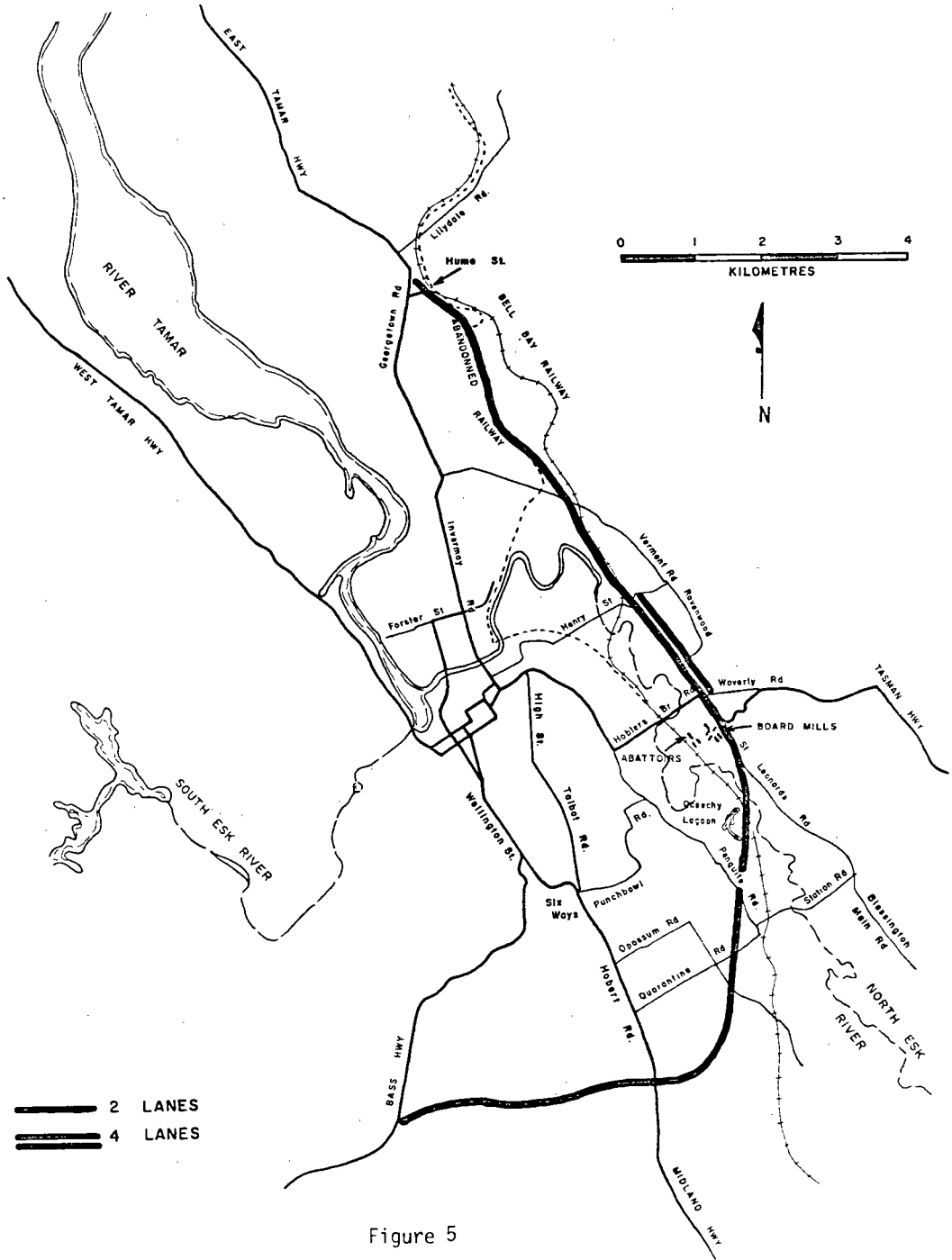

Figure 5

Preferred Route for an Eastern Bypass

(a) Minor intersection improvements;
(b) Reconstruction of Quarantine Road; and
(c) Construction of an alternative road to Station Road.

Even with these improvements, the full potential of the temporary route for use by heavy vehicles will not be fully realised until operational impediments in the existing road system are overcome. This would necessitate the construction of the section of the 'Preferred' or Modified LATS Route from Hoblers Bridge Road to Georgetown Road (Figure 3).