Ballina Shire Heavy Haulage Contributions Plan 2011

Adopted <insert date>

Schedule of Plan Amendments

Amendment No	Details	Date of Adoption	Date effective from
Principal Plan	New Heavy Haulage Contributions Plan		

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1. Introduction & Summary Schedules

1.1 Overview of plan

The road network within the Shire of Ballina (**the Shire**) comprises two distinctive parts from an operational and funding perspective. The Highway network that traverses the Shire, which comprises the Pacific Highway and the Bruxner Highway, the maintenance of which is 100% funded either directly or indirectly by the NSW Roads and Traffic Authority. The remaining "local road network" is the responsibility of Ballina Shire Council (**Council**). While some grant funding is provided by State and Federal Governments for road maintenance and upgrading of the local road network in accordance with the prevailing government priorities, the responsibility for maintenance of such roads is borne overwhelmingly by the rate payers of the Shire.

Roads have a design life after which they need reconstruction. Heavy vehicles can significantly reduce the life of a road. The heavy vehicles have a disproportionally greater impact on the life of roads compared to other light vehicles, notwithstanding there greater numbers.

Highways are generally designed and constructed to accommodate heavy vehicles and the damage associated with heavy trucks is recouped through registration and general taxation. Roads within the local road network conversely often have a lower design standard and are more susceptible to wear and tear associated with heavy vehicles resulting in the need for more frequent reconstruction work.

The majority of heavy haulage vehicles that impact on the local road network are associated with the haulage of materials that are quarried and/or processed for road and building construction, such as sand, road base, crushed aggregate and asphalt. Some of these products are used for the production of concrete, which has a secondary trip component from concrete batching plants to development sites, albeit in smaller trucks.

It is evident that not all quarried products are for use within Ballina Shire with some transported via local roads and then via Highways to external destinations beyond the Shire. This applies in particular to major highway upgrading that continues to be undertaken by the NSW Government in this region.

The use of this road network by heavy haulage vehicle contributes to a decline in the serviceable life of roads, thereby bringing forward the cost for renewal.

The location of quarries is determined by the location of the underlying resource, which is inevitably located in the hinterland some distance from the major highways, which requires quarried materials to be transported via parts of the local area network.

The impact of heavy haulage of quarried materials on the local road network is by its nature difficult to ascertain with any precision. The destination and travel routes of heavy haulage vehicles varies widely depending on the major projects being serviced, price competition, substitution, product quality, processing capacities, fuel prices, end use of products etc. The impact of heavy haulage associated with the non-extractive industries will also vary depending on the nature of the business.

Notwithstanding these uncertainties, it is clear that heavy vehicles have a significant impact on the life on parts of the local road network, which imposes significant costs by requiring more frequent reconstruction works to ensure road safety and satisfactory levels of service for all users.

This contribution plan seeks to identify a reasonable level of contribution for developments that generate heavy haulage traffic should pay to Council towards road reconstruction works.

Where the consent authority is a council, a development contribution may only be imposed on a development if it is of a kind allowed by and determined in accordance with a contributions plan, such as this plan.

Council could as a condition of consent require the travel routes for every heavy haulage truck movement to be logged and for this information to be used to calculate the precise cost of the pavement damage and associated need for road reconstruction attributable to those movements. For accuracy this would need to be accompanied by a requirement that each development to provide a weighbridge to determine the precise weight carried by each loaded truck. This is considered an unnecessarily onerous approach would require considerable resources to administer by both operators and Council.

This plan sets out a reasonable estimate of the cost per tonne of extractive material hauled that should be paid to Council for the cost of road reconstruction necessary as a result of the pavement damage to the local road network. This approach is based on:

- The average cost of road reconstruction due to typical heavy haulage vehicles on a tonne per kilometer rate.
- An estimated average travel distance per tonne of weight associated with the transport by typical heavy haulage vehicles on the local road network based on existing quarries and various assumptions about the heavy haulage destinations.

The reasonable contribution rate for non-extractive industry heavy haulage traffic movements will need to have regard to the nature of each development. While the assumed cost per tonne per kilometer for extractive industries may well apply to non-extractive industries, there will be a need to make an assessment of the typical travel distance per tonne on the local road network.

This plan has been prepared in accordance with the requirements of the *Environmental Planning and Assessment Act 1979* (**EP&A Act**) and *Environmental Planning and Assessment Regulation 2000* (**EP&A Regulation**). In preparing the plan Council has had regard to the latest practice notes issued by the NSW Department of Planning in accordance with clause 26(1) of the EP&A Regulation.

1.2 Summary

Table 1.2 Contribution rate

Development type	Contribution rate
Extractive Industries and/or processed quarried material, mines	$0.6455 per tonne
Other Heavy Haulage traffic generating developments	To be determined by a traffic asses

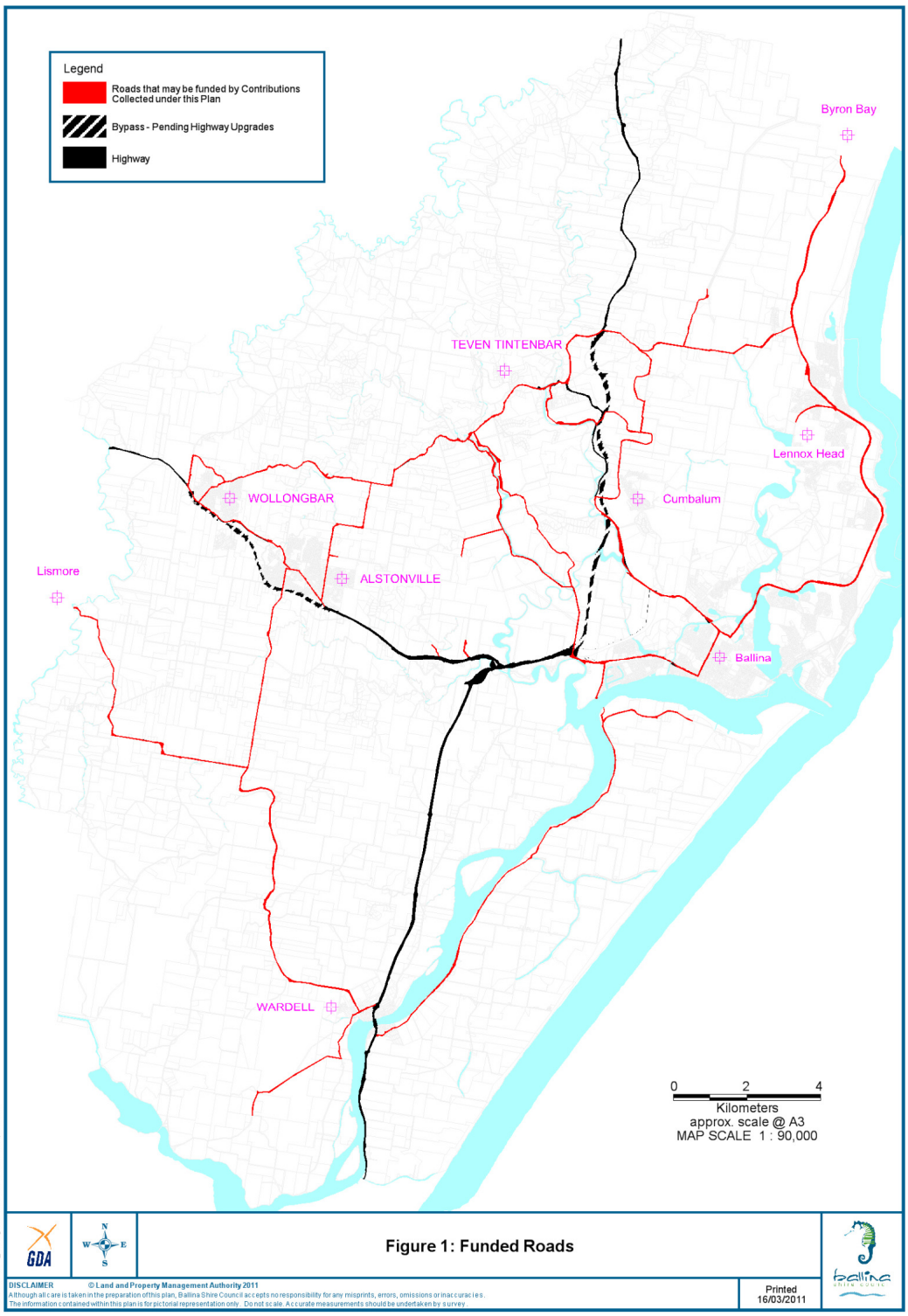
Council will collect monetary contributions from heavy haulage developments and apply the contributions toward the replacement of the local road network.

Potential roads that will be the subject of works partly or fully funded under this plan are the roads that the Council has responsibility for. The locations of these roads are shown in *Figure 1.*

Development that is likely to occasion significant heavy vehicle movements may be approved in any location throughout the Shire.

As a result it is not possible for Council to specify in this plan which sections of the roads shown in Figure 1 will be upgraded or maintained using contributions collected under this plan. It is intended that works programs and application of funds collected under this plan to those works will be determined as part of Council's annual Management Plan process.

Map 1 Funded Roads



1.3 Calculating a contribution under this plan

Contributions in this plan are levied for:

- For the cost reconstructing parts of the local road network .
- The cost of preparing and administering this plan.

The formulas for calculating a contribution under this plan are shown in Section 3.3.2 of this plan.

1.3.1 Worked examples of contributions calculations

The following worked examples are used to illustrate the calculation of contributions under this plan.

Example No.1 - Quarry extracting 20,000 tonnes of road base per quarter	
Tonnes of extracted material	20,000
Rate per tonne for an average heavy haulage trip	$0.6455
Cost per quarter ($)	$12,910

Rates are regularly adjusted for inflation in accordance with the provisions of Section 2.11 & 2.12 of this plan.

Applicants should inquire at the Council for information on the current indexed contribution rate.

1.4 Overview of development contributions

1.4.1 What are development contributions?

Development contributions are contributions made by those undertaking development approved under the EP&A Act toward the provision of public services and public amenities. Development contributions are addressed under Divisions 6 and 6A of Part 4 of the EP&A Act.

Contributions may be in the form of the dedication of land free of cost or the payment of a monetary contribution. The contributions required under this plan do not provide for the dedication of land and is exclusively for the reconstruction of parts of the local road network and the cost of administering the plan.

There are different classes of development contributions provided for under the EP&A Act:

- Special infrastructure contributions;
- Local infrastructure contributions, which may be either section 94 contributions or section 94A fixed rate levies;
- contributions included in voluntary planning agreements; and
- contributions toward the provision of affordable housing.

This Plan is principally concerned with the imposition of conditions of consent requiring development contributions for local infrastructure under section 94 of the EP&A Act.

1.4.2 Contributions must be authorised by a contributions plan

The EP&A Act establishes that a council can require, through imposition of a condition or conditions on a development consent, development contributions if:

- there is a contributions plan applying to the development that is in force and that authorises the contribution; and
- the contribution is imposed in accordance with the provisions of such a plan.

Alternatively, or in addition to the levying of section 94 contributions, a council may negotiate a voluntary planning agreement with a developer for the provision of local infrastructure.

Council may be prepared to negotiate planning agreements with relevant parties for the provision of local infrastructure in relation to major developments. Such agreements may address the substitution of, or be in addition to, the section 94 contributions required under this plan. Any draft planning agreement shall be subject to any provisions of or Ministerial directions made under the EP&A Act or EP&A Regulation relating to planning agreements.

1.4.3 Section 94 contributions must be reasonable

Section 94 of the EP&A Act authorises a consent authority responsible for determining a development application to grant consent to the proposed development subject to a condition requiring the payment of a monetary contribution or the dedication of land free of cost or a combination of them towards the provision of public amenities and public services (public facilities) to meet the development.

The power to levy a section 94 contribution relies on there being a clear relationship (or 'nexus') between the development being levied and the need for the public amenity or service for which the levy is required.

A condition may only be imposed under section 94 towards the future provision of public facilities:

- if the proposed development will or is likely to require the provision of, or increase the demand for, public facilities within the local government area; and
- to require a reasonable dedication or monetary contribution for the provision, extension or augmentation of the public facilities concerned.

A condition may be imposed under section 94 towards the recoupment of the cost of public facilities previously provided if:

- the consent authority has, at any time, provided public facilities within the local government area in preparation for or to facilitate the carrying out of development in the area, and
- development for which development consent is sought will, if carried out, benefit from the provision of those public facilities.

2. Administration and operation of this plan

2.1 Definitions

In this plan, the following words and phrases have the following meanings:

Background Report means *Report into estimated Pavement Damage from Haulage of Quarry Products* prepared by Ballina Shire Council and dated September 2010.

Consumer Price Index means the *Consumer Price Index (All Groups Index) for Sydney* **as published by the Australian Statistician.**

Council means Ballina Shire Council.

EP&A Act means the Environmental Planning and Assessment Act 1979.

EP&A Regulation means the Environmental Planning and Assessment Regulation 2000.

Extractive Industries means the winning or removal of extractive materials (otherwise than from a mine) by methods such as excavating, dredging, tunneling or quarrying, including the storing, stockpiling or processing of extractive materials by methods such as recycling, washing crushing, sawing or separating, but does not include turf farming. For the purpose of this plan, extractive industry also includes mines and the processing and/or refining of extractive materials.

LGA means local government area.

Local Road Network means the road network within the Shire excluding State Highways.

Mine means any place (including any excavation) where an operation is carried out for mining of any mineral by any method and any place on which any mining related work is carried out, but does not include a place used only for extractive industry.

Planning agreement means a voluntary planning agreement referred to in section 93F of the

Quarry or quarried material, quarried product means an extractive industry or material obtained from an extractive industry.

Shire means the Shire of Ballina.

Work in kind means the undertaking of a work or provision of a facility by an applicant which is already nominated in the works schedule of a contributions plan.

2.2 Name of this plan

This contributions plan is called the Ballina Shire Heavy Haulage Contributions Plan 2010.

2.3 Purposes of this plan

The primary purpose of the plan is to authorise the council, when granting consent to an application to carry out development to which this plan applies to require a direct contribution to be made towards the reconstruction of parts of the local road network used or likely to be used by heavy haulage vehicles generated by new development.

Other purposes of the plan are:

- to provide the framework for the efficient and equitable determination, collection and management of development contributions toward the reconstruction of parts of the local road network that are impacted by heavy vehicles;
- to determine the demand the cost of the reduced life of road infrastructure attributable to proposed developments in order to determine a reasonable contribution by those development toward the reconstruction of infrastructure that is required to meet that development;
- to ensure that the existing community is not unreasonably burdened by the provision of public infrastructure required as a result of extractive industry development in the area or other development that relies on the heavy haulage of goods by road;
- to enable the Council to be both publicly and financially accountable in its assessment and administration of the plan; and
- to ensure Council's management of development contributions complies with relevant legislation and practice notes, and achieves best practice in plan format and management.

2.4 Commencement of this plan

This plan came into effect on [*insert date*], which is the date that public notice of the plan's approval by Council was given pursuant to clause 31(4) of the EPA Regulation.

This plan applies to all development applications determined.

2.5 Land to which this plan applies

This plan applies to all of the land within the Shire of Ballina LGA.

2.6 Development to which this plan applies

Any development that, in the Council's opinion, is likely to result in a reduction in the life of road pavements within the local road network due to heavy haulage vehicles shall be required to make a contribution under this plan.

2.7 Development exempted from contributions under this plan

The following developments or components of developments are exempted from the requirement to make a contribution under this plan:

- Extractive industries with an average annual approved output of up to and including 5,000 cubic metres of material or product (to minimize the impact on the economic viability of smaller operations and to recognize the smaller and localized haulage associated with these developments).
- Other developments within an average annual approved total haulage of up to and including 8,000 tonnes of material, products or payloads (or equivalent) (applying the same justification as above).
- Development located with Business and Industrial Zones within the Shire under the provisions of the current Ballina Local Environmental Plan. This makes allowance for the location of these developments on road networks with pavement design and constructed with a higher than life standard. Furthermore, the large volume, various types and unpredictable loadings of vehicles generated by both development within zoned commercial and industrial areas, and vehicles operation within these areas, makes collection of data for efficient and equitable determination of contributions uncertain.

2.8 Relationship to other plans

This plan repeals the operation of the Section 94 Contributions Plan: Heavy Vehicle Traffic Generating Development - Maintenance and Construction of Roads (1996 Contribution Plan) adopted by the Council on 9 February 1996.

The *1996 Contribution Plan* shall continue to apply in respect to those development consents requiring the payment of contributions under that plan.

Funds collected but not yet expended - or monetary contributions yet to be paid - under the *1996 Contribution Plan* will be spent in accordance with requirements of that plan.

Nothing in this plan affects the operation and application of any other contributions plans that apply to land in the Shire of Ballina.

2.9 Development contributions may be required as a condition of consent

This plan authorises the Council, when determining a development application relating to development to which this plan applies, to impose a condition under section 94 of the EP&A Act requiring the payment of a monetary contribution to the Council towards the reconstruction of roads infrastructure to meet the demands of the development.

2.10 Consideration of previous contributions, offers of material public benefit, etc

This clause describes Council's policy in implementing:

- section 94(5) of the EP&A Act (which is concerned with developers making offers to the Council of land or material public benefits as part of settling a section 94 contribution condition); and
- section 94(6) of the EP&A Act (which is concerned with the consent authority considering previous contributions made by developers in calculating a section 94 contribution).

This plan authorises contributions toward the upkeep of the road network to be made on "pay as you go / pay as you use" basis that is directly linked to the reduced life of road pavement associated with heavy haulage vehicles. Council (and not any developer) is the responsible authority for the local road network.

As a result, it will likely be inappropriate for the Council to accept any offers of land or material public benefit from a developer in exchange for a reduction in the monetary contributions imposed in a development consent.

There may however be some circumstances where a developer has, prior to the lodgment of a development application involving heavy haulage development, provided to Council land, money or other material public benefit.

In order for council to consider the previous benefits made by the applicant, details must be submitted at the time of the development application.

A reduction in the contribution requirement under this plan may be considered where it can be demonstrated by the applicant that:

- the benefit was not required to be provided under a condition of consent or under a planning agreement entered into with Council; and
- the land, money or other material public benefit previously provided either continues to provide an ongoing benefit to the community, or offsets some of the need for the road works identified in this plan.

2.11 Indexation of contribution rates under this plan

The purpose of this clause is to ensure that the monetary contribution rates imposed at the time of development consent are adjusted to reflect the increased cost of road reconstruction that applies at the time of payment.

The Council may, without the necessity of preparing a new or amending contributions plan, make changes to the monetary direct contribution rates set out in this plan to reflect quarterly changes to the Consumer Price Index.

The contribution rates will be indexed as follows:

$$\frac{\$C_A \quad X \quad \text{Current CPI}}{\text{Base CPI}}$$

Where:

$C_A is the contribution rate at the time of adoption of the plan expressed in dollars

Current CPI is the *Consumer Price Index (All Groups Index) for Sydney* as published by the Australian Statistician at the time of the review of the contribution rate

Base CPI is the *Consumer Price Index (All Groups Index) for Sydney* as published by the Australian Statistician at the date of adoption of this plan, which is < *insert based CPI*>.

Note: The contribution rate will not be less than the contribution rate specified at the date of the adoption of this plan.

2.12 Indexation of contributions required by a condition imposed under this plan

The purpose of this clause is to confirm that the contribution rate applicable at the time of payment under an existing development consent shall be the indexed rate that would apply as if a new consent was to be issued. i.e. the current rate will be that which is indexed in accordance with clause 2.11.

2.13 Timing of payment of monetary contributions required under this plan

A contribution shall be paid on a quarterly basis at the applicable indexed rate based on the tonnage hauled for that period. Payments shall be made with a "haulage return" that discloses information including applicable quarter, quantities of material, tonnage rate, contribution payment and the like and be certified by a company officer.

Where there has been no heavy haulage a nil return is required to be submitted.

The standard conditions of consent applicable to proposed quarries are provided in ***Appendix 3***.

2.14 Reconciliation of Returns

Council shall require an annual audit to be submitted by an independent auditor to provide a reconciliation between sales and the contributions that have been paid.

Council shall also require a quantitative/volumetric survey of the site to be undertaken prior to the commencement of operations.

Council may require subsequent surveys to be undertaken to volume of material extracted. The volume/weight conversion rates specified in this plan in ***Appendix 4,*** or some other conversion rate acceptable to Council, shall be applied to obtain the weight of material extracted. This shall be reconciled with quarterly and annual returns. Where the survey, if required, indicates that more material has been extracted than indicated by the returns, the applicant/operator shall pay a contribution in respect of the outstanding amount.

2.15 Pooling of funds

Council's ability to undertake road reconstruction in sufficiently large section to achieve a reasonable economy of scale is very limited where it is based on contributions from each development being spent in isolation. To provide a strategy for the orderly delivery of the infrastructure, this plan authorises monetary contributions paid under this or any other contributions plan approved by the Council to be pooled and applied progressively for those purposes.

The priorities for the expenditure of pooled monetary contributions under this plan are the priorities for works as set out in Council's annual Management Plan.

2.16 The Goods and Services Tax (GST)

At the time this plan was made, the position of the Australian Taxation Office was that the payment of development contributions made under the EP&A Act is exempt from the Goods and Services Tax (GST).

Items in the works schedule of this plan have been calculated without any GST component.

2.17 Accountability and access to information

Council is required to comply with a range of financial accountability and public access to information requirements in relation to local infrastructure contributions. These are addressed in Divisions 5 and 6 of Part 4 of the EP&A Regulation and include:

- maintenance of, and public access to, a contributions register;
- maintenance of, and public access to, accounting records for contributions receipts and expenditure;
- annual financial reporting of contributions; and
- public access to contributions plans and supporting documents.

These records are available for inspection free of charge at the Council's administration office.

2.18 Review of contributions plan

This plan with supporting information will be subject to regular review by Council, so as to:

- monitor development trends and income received by the plan;
- ensure that contributions rates reflect actual costs incurred by the plan; and

Contribution rates may be revised by a review of the plan and adjustment to the assumptions within the plan. Any material change in the plan, with the exception of limited adjustments permitted under clause 32(3) of the EP&A Regulation, will require the plan to be amended, including public exhibition of the amendments and consideration of any public submissions received. It is proposed to review this plan after 5 years of operation.

3. Relationship between expected development and demand for infrastructure

3.1 Heavy Haulage Contribution

3.1.1 Overview

In most cases it is difficult to make a precise assessment of the impact of heavy haulage vehicles on the local road network arising from proposed developments such as quarries, because the destination and travel route of heavy haulage vehicles varies depending on a wide range of factors. The purchase of quarried materials by third parties also makes determining the precise impact on the local road network problematic.

Council could as a condition of consent require the travel routes for every heavy haulage truck movement to be logged and use this information to calculate the precise cost of the road pavement damage and commensurate reconstruction needs attributable to those movements. For accuracy this would need to be accompanied by a requirement that each quarry development had a weighbridge to determine the weight of each loaded truck. This is considered an unnecessarily onerous approach to calculating a reasonable contribution that should be reimbursed to Council to fund reconstruction work.

A more reasonable approach is to estimate the likely cost of pavement damage cause by a typically heavy haulage vehicle (per tonne per kilometre), and multiplying this cost with the assumed average trip length of a tonne of hauled material.

Appendix 1 provides the methodology for the estimated cost of pavement damage caused by a typically heavy haulage vehicle.

Ballina Shire is a relatively small and compact local government area with a road network that is symmetrically serviced by a north-south and east-west Highway system. This geography provides a limit to, and degree of consistency between, heavy haulage trip lengths within the local road network from existing quarries to various development linked destinations.

Appendix 2 provides the methodology of the estimated trip length for each tonne of haul material based on an assessment of existing quarries approvals and assumptions about the destination of vehicles.

3.2 Cost of Road Reconstruction as a result of the expected development

The report "*Estimated Pavement Damage from Haulage of Quarry Products*" prepared by Council indicates that the typical cost of the pavement damage by a typical truck used to transport quarried products on the local road network ranges from between $0.046 to $0.072 per tonne per kilometre depending on the road type, traffic flow and surface treatment.

Assuming the typical road in the Shire is a medium traffic volume road with spray seal pavement, the pavement damage by a standard heavy haulage truck used by extractive industries is assumed to be $0.053 per tonne per kilometre.

This rate shall be assumed for other non-extractive industry heavy haulage generating developments that are not exempted under this Plan.

3.3 Calculation of a reasonable development contribution towards Pavement Replacement

3.3.1 Cost per Tonne hauled as a basis for determining reasonable contributions for Extractive Industries.

A reasonable method of determining the fair share of the cost that extractive industry development should pay, is to determine a standard contribution per tonne of material hauled. This can be determined by estimating the likely cost of pavement damage cause by a typically heavy haulage vehicle (per tonne per kilometre) and multiplying this cost by the average trip length per tonne of hauled material. This should be undertaken on a quarterly basis.

It has been established that the average cost of the damage to pavement by a typical heavy vehicle used to transport quarry material for a typical shire road is $0.053 per kilometre.

The assumed travel distance per tonne of quarried material hauled by a heavy haulage vehicle within the local road network is assumed to be 12 kilometres. This is based on an examination of likely travel distance scenario with a range of weightings.

Thus it is reasonable that for each tonne of material transported from a quarry should pay $0.636 i.e.

Assumed travel distance (km) x cost of pavement damage per kilometre ($)

Contribution for each tonne of material hauled for road reconstruction	=	Replacement cost of pavement damage by typical heavy haulage vehicle ($ per tonne/per kilometres)	X	Estimated trip length of each tonne of hauled material
	=	$0.053	x	12
	=	$0.636 per tonne		

Council however may at its discretion use a different travel distances for the purpose of this formula where there is sufficient evidence provided or obtained that indicates that there is a significant difference between the typical/average travel distance and the standard 12 km assumed travel distance.

Plan preparation and administration costs ($Cost$_{Admin}$)

Consistent with its other contributions plans, Council will levy an amount equivalent to 1.5 percent of the assessed cost per tonne of material hauled.

This component will make a reasonable provision for the:

- costs expended by the Council for the preparation of the plan, including consultants fees; and
- anticipated costs of staff time to implement the plan, process and account for contributions, and monitor and amend the plan.
- The processing of quarterly returns.

Contribution component for plan preparation & Administration	=	Contribution rate	X	1.5%
	=	$0.0636	X	1.5%
	=	$0.0095		
TOTAL CONTRIBUTION	=	Contribution for each tonne of material hauled for road reconstruction	+	Component for plan preparation & administration
	=	$0.0636	+	$0.0095
	=	$0.6455		

3.3.2 Cost per Tonne hauled as a basis for determining reasonable contributions for Non-Extractive Industries

A reasonable method of determining the fair share of the cost that non-extractive industry development should pay, is to determine a standard contribution per tonne of material hauled. This can be determined by estimating the likely cost of pavement damage cause by a typically heavy haulage vehicle (per tonne per kilometre) and multiplying this cost by the average trip length per tonne of hauled material.

The cost of payment damage (per tonne per kilometre) assumed in Clause 3.3.1 shall be used unless it can be demonstrated that a more appropriate cost is applicable.

The calculation of the cost by the average trip length per tonne of hauled material haul shall be determined for non-extractive development based on an assessment of the likely trip generation of the development. An assessment by a traffic expert may be required by Council to assist in the determination of the likely trip length per tonne.

Plan preparation and administration costs ($Cost$_{Admin}$)

Consistent with its other contributions plans, Council will levy an amount equivalent to 1.5 percent of the assessed cost per tonne of material hauled as per the methodology outlined in Clause 3.3.1.

TOTAL CONTRIBUTION for non-extractive industries	=	Contribution for each tonne of material hauled for road reconstruction		Component for plan preparation & administration
	=	To be assessed	X	1.015
	=	To be determined		

3.3.3 Volume to Weight Conversion

The different sizes and operating strategies will determine how material that is subject to this plan is measured and/or sold. Some quarries will be sufficiently large to justify the expense of installing a weigh bridge, other will measure material by volume by reference to size of trucks and/or number of loading buckets.

For quarries that use volume to measure and sell material, the applicable conversion rates shall be sourced from Appendix IV.

Where an applicant is of the view that the relevant conversion does not reasonably reflect the real conversion rate for the material, a certified density test may be accepted from the National Association of Testing Authority or some other like organisation acceptable to Council.

Appendix 1 - Road Costs of Heavy Haulage

Pavement Damage from Heavy Haulage

(Ballina Shire Council - Civil Services Group - September 2010)

Introduction

The purpose of this report is to formulate the cost per tonne per kilometre travelled to account for the loss of life from the use of quarry product haulage along Ballina Councils rural road networks.

As the rural road networks are not uniform, a number of assumptions have been used and the road networks divided into 4 categories. These assumptions are described below.

Methodology

The basic aim of the methodology used is to determine the ratio of the cost to replace the asset to the design traffic loading. This will give a replacement cost per ESA. This ratio will form the basis of further calculations to determine loss of life in dollars per single quarry haulage vehicle.

The procedure used has been to treat damage to pavement and wearing course separately as they have different design lives and unit costs. The next step is to obtain a final value by adding the $/tonne/km for pavement to the same for the required wearing course.

Council currently uses the 'AUSTROADS Pavement Design –A Guide to the Structural Design of Road Pavements 2004' and the 'CIRCLY 5' software as its primary pavement design tools. Design Traffic calculations are determined using Chapter 7 of the AUSTROADS Pavement Design Guide 2004.

Four Traffic categories are presented here primarily as a sensitivity analysis comparison for varying conditions experienced within the BSC road networks. These categories are ‘Low’, ‘Medium’ & ‘High’ for sealed roads and ‘Very Low” for unsealed roads. These traffic classifications reflect the typical traffic volumes experienced in BSC Rural Roads.

BSC Urban roads (again discounting RTA roads eg Kerr Street) has very minimal heavy traffic (in the order of 0.005% to 0.05%) and may have very high numbers of class 1 and 2 vehicles (which constitute approx 99.95% to 99.995% of total traffic.) As class 1 and 2 vehicles do not contribute to ESA design, then the design ESA for BSC Urban vehicles are generally low.

The Austroads Pavement Structural Design Guide does not specify standard ESA for design of road pavements. Chapter 7 is dedicated to the calculation of traffic design for individual projects. So a road pavement constructed in 1990 would have been designed using data available at the time, using a 30 year life, traffic classification data and growth percentages from historical data. A sudden increase in traffic loadings from Quarry operations years later would not have been taken into account at the earlier design stage.

Sealed Roads

The cost to spray seal or apply an asphalt overlay has been taken to be constant over the three traffic categories. The cost of the pavement on the other hand will vary as the pavement depth will increase as design traffic increases.

Categories within this group are

- Pavement
- Spray Seal Surfacing
- Asphalt Surfacing

Unsealed Roads

Unsealed Roads are expected to be maintained continuously until they become obsolete. Reconstruction of the pavement becomes highly unlikely and the basis for the costs shall be taken to be that to apply a 50mm granular overlay. This is generally done once every 2 to 3 years.

Unsealed roads generally have lower overall traffic volumes but a higher proportion of heavy vehicles.

'Pavement' is the only category within this group and only one traffic category is considered (very low)

Procedure

Step 1: determine design ESA (see page 4 for details)

Step 2: estimate cost to reconstruct / maintain 1 lane-km for the above ESA

Step 3: calculate $/ESA/km

$$\$ / ESA / km = \frac{\text{Step 2}}{\text{Step 1}}$$

Step 4: calculate $/typical vehicle ESA (see page 4 for details)

$$\$ / Class\ 4\ veh + dog\ / km = \text{Step 3} \times 2.6\ \text{ESA}$$

Step 5: calculate $/tonne/km (assumed 15 tonne typical load for vehicle)

$$\$ / tonne / km = \frac{\text{Step 4}}{15\ \text{tonnes}}$$

Vehicle Description

Using the Austroads 2004 vehicle classification below

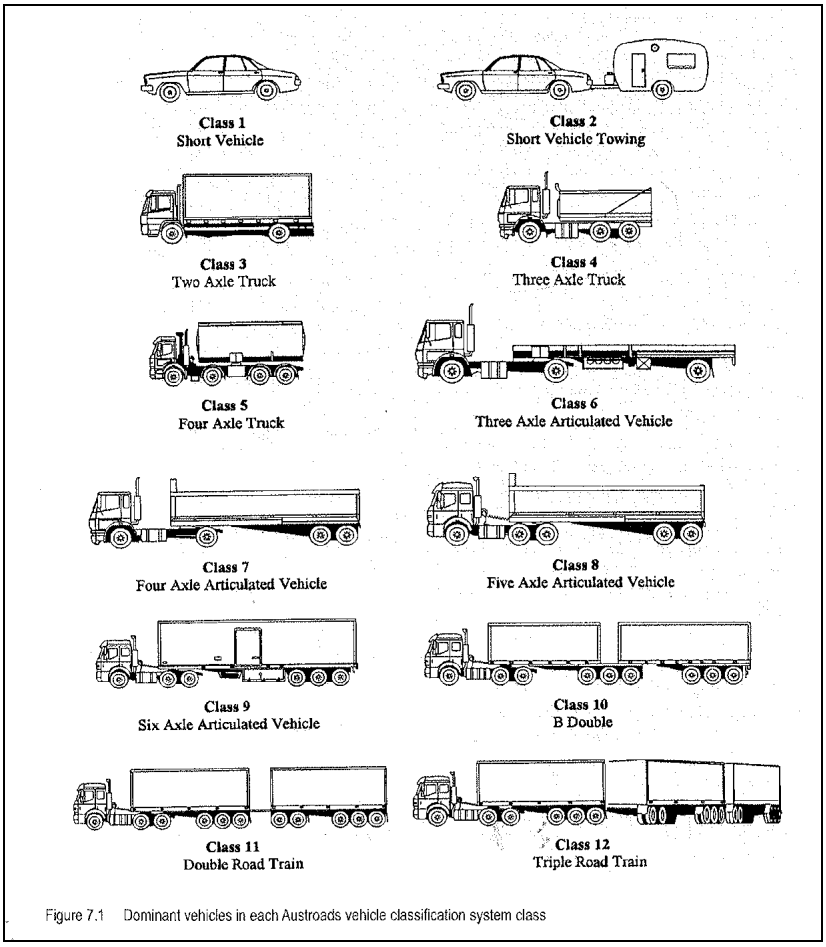


Figure 1: Austroads 2004 Vehicle Classifications

The number of axles, (by type) per vehicle class are

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
SAST	2	3	1	0	0	0	0	0	0	0	0	0
SADT	0	0	1	1	2	3	2	1	1	1	1	1
TADT	0	0	0	1	1	0	1	2	1	1	2	3
TRDT	0	0	0	0	0	0	0	0	1	2	2	3
Groups	2	3	2	2	3	3	3	3	3	4	5	7
Axles	2	3	2	3	4	3	4	5	6	9	11	16

Table 1: Austroads 2004 Vehicle Classifications by axle group

Where

SAST = single axle single tyre
SADT = single axle dual tyre
TADT = tandem axle dual tyre
TRDT = tri axle dual tyre

Austroads table E4 describes the 'generic' value for ESA per axle group for a number of regional locations. The following values are taken from this table for northern NSW.

SAST = 0.6 ESA per axle group = F_1
SADT = 0.6 ESA per axle group = F_2
TADT = 1.0 ESA per axle group = F_3
TRDT = 0.8 ESA per axle group = F_4

The quarry haulage vehicle of choice is AUSTROADS class 4 or AUSTROADS class 4 with a dog trailer. The table below summarises the generic ESA per vehicle using the above data.

	C4	ESA/axle group	ESA/vehicle	C4+dog	ESA/axle group	ESA/vehicle
SAST	0	0.6	0	0	0.6	0
SADT	1	0.6	0.6	1	0.6	0.6
TADT	1	1.0	1.0	2	1.0	2.0
TRDT	0	0.8	0	0	0.8	0
TOTAL			**1.6**			**2.6**

Hence a class 4 vehicle is expected to load pavement by 1.6 ESA and a class 4 vehicle with a dog trailer is expecetd to load pavement by 2.6 ESA

AUSTROADS Vehicle class 4 + dog trailer is the most common vehicle used.

The design traffic loading is calculated using

$$DTL = 365 \times \left[\sum_{i=1}^{4} \left(\sum_{class3}^{class12} N_j \times A_j \right) \times F_i \right] \times \left[\frac{(1+r)^{DL} - 1}{r} \right]$$

Where

N_j = Number of vehicles per day per AUSTROADS Class
A_j = Number of Axle Groups type 'i' per AUSTROADS Class
F_i = ESA per Axle Group type (table E4)
r = annual growth rate in traffic (taken as 1%)
DL = design life (years)
i = Axle Group Type (SAST, SADT, TADT, TRDT)
j = Vehicle Class 3 to 12

Traffic Composition & Volumes

Typical breakup of traffic volumes by vehicle class (sealed rural)

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
93.652%	1.242%	4.144%	0.426%	0.0073%	0.134%	0.057%	0.012%	0.232%	0.014%	0.010%	0.004%

This results in approximately 5.1% heavy vehicles (class 3 to class12)

Typical breakup of traffic volumes by vehicle class (unsealed rural)

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
66.964%	2.679%	8.929%	8.929%	2.679%	1.786%	4.464%	0.893%	0.893%	1.786%	0.000%	0.000%

This results in approximately 30.59% heavy vehicles (class 3 to class12)

Sealed Roads (low traffic)

AADT = 833 vehicles per day per lane
Growth rate = 1% pa
ESA $_{10\ years}$ = 218,996 ESA
ESA $_{20\ years}$ = 460,903 ESA
ESA $_{30\ years}$ = 728,119 ESA

Sealed Roads (medium traffic)

AADT = 1,000 vehicles per day per lane
Growth rate = 1% pa
ESA $_{10\ years}$ = 262,795 ESA
ESA $_{20\ years}$ = 553,083 ESA
ESA $_{30\ years}$ = 873,743 ESA

Sealed Roads (high traffic)

AADT = 1,250 vehicles per day per lane
Growth rate = 1% pa
ESA $_{10\ years}$ = 328,493 ESA
ESA $_{20\ years}$ = 691,354 ESA
ESA $_{30\ years}$ = 1,092,178 ESA

Unsealed Roads

AADT = 112 vehicles per day
Growth rate = 1% pa
ESA $_{2\ years}$ = 45,174 ESA
ESA $_{3\ years}$ = 68,101 ESA

Unit Costs & Design Lives

Sealed Roads

Pavement (low traffic)

Reconstruct = $175,000 per lane per km

Design Life = 30 years

Pavement (medium traffic)

Reconstruct = $200,000 per lane per km

Design Life = 30 years

Pavement (high traffic)

Reconstruct = $225,000 per lane per km

Design Life = 30 years

Surfacing (spray seal)

Placement = $20,000 per lane per km

Design Life = 10 years

Surfacing (Asphalt -50mm)

Construct = $80,000 per lane per km

Design Life = 20 years

Unsealed Roads

Pavement

Gravel Resheet = $25,000 per km

Design Life = 3 years

Summary Tables

Sealed Rural – Low Traffic

Item	Design Life (years)	Design Life (ESA)	Replace Cos ($)	$ / ESA	$ / C4+Dog	$ / tonne / km
Pavement	30	728,119	$175,000	$0.24	$0.62	$0.042
Spray Seal	10	218,996	$20,000	$0.09	$0.24	$0.016
Asphalt	20	460,903	$80,000	$0.17	$0.45	$0.030

Sealed Rural – Medium Traffic

Item	Design Life (years)	Design Life (ESA)	Replace Cos ($)	$ / ESA	$ / C4+Dog	$ / tonne / km
Pavement	30	873,743	$200,000	$0.23	$0.60	$0.040
Spray Seal	10	262,795	$20,000	$0.08	$0.20	$0.013
Asphalt	20	553,083	$80,000	$0.14	$0.38	$0.025

Sealed Rural – High Traffic

Item	Design Life (years)	Design Life (ESA)	Replace Cos ($)	$ / ESA	$ / C4+Dog	$ / tonne / km
Pavement	30	1,092,178	$225,000	$0.21	$0.54	$0.036
Spray Seal	10	328,493	$20,000	$0.06	$0.16	$0.011
Asphalt	20	691,354	$80,000	$0.12	$0.30	$0.020

Unsealed Rural – Very Low Traffic

Item	Design Life (years)	Design Life (ESA)	Replace Cos ($)	$ / ESA	$ / C4+Dog	$ / tonne / km
Pavement	3	68,101	$25,000	$0.37	$0.95	$0.064
Pavement	2	45,174	$25,000	$0.55	$1.44	$0.096
Spray Seal	N / A	N / A	N / A	N / A	N / A	N / A
Asphalt	N / A	N / A	N / A	N / A	N / A	N / A

Conclusion

While assumptions have been made about the type of heavy haulage vehicle for the purpose of estimating the damage to the life of roads, clearly the findings have application to some degree to all heavy haulage vehicles because the impacts have been resolved down to axles for which there are maximum load limits.

The analysis in this report indicates that heavy haulage vehicles have an impact on the life of the roads that varies according to the type of road, the traffic volumes and road surface.

Heavy haulage vehicle causes the greatest impact on unsealed roads because of the lower design life for such roads, which is not sufficiently offset by the lower reconstruction costs. The cost is varies between $0.096 and $0.064 depending whether a 2 or 3 year design life is assumed.

The damage to sealed roads by heavy haulage vehicle reduces slightly as the traffic volumes increase. The cost of damage is about 20% less for a high volume road (more that 1500 vehicle per day per lane) with the same surface compared a low traffic volume road (less than 800 vehicles per day per lane). The cost difference for spray sealed roads range from $0.57 to $0.46 (a difference of $0.011) and $0.072 to $0.056 for asphalt roads (a difference of $0.016).

It is reasonable to assume that the average cost of the damage by heavy haulage vehicles is $0.053 per tonne per kilometre, which applies to a medium traffic road with a spray seal surface. This assumption is arguably conservative as the "average" road in the shire is likely to be at the lower end of traffic volumes with a commensurately higher reconstruction cost.

Appendix 2 - Typical Travel Distance

Background

A review of all existing approved quarries in Ballina Shire has been undertaken. The purpose of the review is to estimate the average trip length for each tonne of material hauled. Such an estimate is by its nature difficult to ascertain with any precision.

The destination and travel routes of heavy haulage vehicles varies widely depending on the major projects being serviced, price competition, substitution, product quality, processing capacities, fuel prices, end use of products etc.

Methodology

The methodology for determining trip lengths per tonne of material haul requires assumptions to be made about the destination of material, which in most instances will determine the route within the local road network that will be taken.

The major destinations include existing population centres and growth areas as well as unspecified destinations beyond the Shire both north and south.

Trip Destination Scenarios

A range of scenarios have been developed for the percentage of the annual approved extraction that is hauled to the assumed major destinations (See Table 1). These Scenarios include:

Scenario 1 - This scenario provides a weighting for destination based on the areas for population growth.

Scenario 2 - This scenario provides a weighting based on existing population growth, which will generate the need for materials to maintain and replace existing infrastructure. The momentum of existing population is also likely to generate building activity for commercial and industrial services.

Scenario 3 - This scenario provides additional weighting for sand to be used for fill in flood prone areas of the Shire.

Scenario 4 - This scenario provides weighting for the use of road base aggregate within the growth areas of the Shire, but also recognises that significant quantities are material used outside the Shire.

Scenario 5 - provides a weighting for materials used to produce concrete in batching plants and the secondary trips for concrete use in the growth areas.

These five scenarios have then been averaged.

TABLE 1 - Destination Scenarios for Quarried Materials.

	Population projections to 2026	Equivalent Dwellings	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Average of all scenarios
			Population growth	Existing Ballina Shire populaton ratio (excl rural & Wardell)	Sand	Road Base Aggragate	Aggragate for or in concrete	
			to account for residential development	to account for commercial & industrial usage	estimated additional weighing for flood prone areas	estimated additional weighting for external use	estimated weighting for concrete use	Scenario link
Pacific Hwy North					10%	20%	10%	8%
To Ballina	2,010	744	8%	36%	35%	15%	25%	24%
to Cumbalum	7,770	2,878	30%	0%	20%	25%	25%	20%
To Lennox Head	3,930	1,456	15%	42%	10%	15%	15%	19%
To Byron	3,250	1,204	12%	0%	7%	5%	7%	6%
To Wollongbar	2,500	926	10%	21%	8%	5%	10%	11%
To Lismore	6,576	2,435	25%		5%	5%	5%	8%
Pacific Hwy South					5%	10%	3%	4%
TOTAL	26,036	9,643	100%	99%	100%	100%	100%	100%

Trip Lengths

To determine the impact of heavy haulage trips on local area roads it is necessary to establish the average trip length of each tonne of hauled material rather than the average trip length of each truck. This will account for the different approved extraction rates for each quarry.

Table 2 provides an inventory of existing quarry approvals with DA numbers, quarry name, property description and the approved annual extracted rate. The number of tonnes per annual that is hauled from each quarry to the assumed destinations has been determined in accordance with the percentage breakdown for the average scenario in ***Table 1***.

The trip length for each travel route to each of the assumed destinations for each quarry has been determined in accordance with ***Map 1*** and shown in ***Table 2***.

The tonnage of material is multiplied by the corresponding trip length to establish the kilometre tonnes per trip for each destination from each quarry. The average kilometres per tonne of material can then be calculated for each quarry. The average kilometres per tonne of material haul from existing quarries varies from between 10 and 17 kilometres, with an average of 12.89 kilometres and a medium of 11.87 Kilometres.

Thus, it is a reasonable proposition having regard to the vagaries of resource usage and transport that new quarries pay for the pavement damage associated with each tonne of material travelling approximate 12 kilometres with the local road network.

Contribution Rate

The methodology outlined in Appendix 1 indicates that the cost of road pavement damage by one tonne of material hauled one kilometre by a typical haulage vehicle is approximately $0.053.

This figure of $0.053 per tonne per kilometre multiplied by the average trip length of approximately 12 kilometres indicates that a reasonable contribution for the reconstruction of roads damaged by heavy haulage vehicles from new quarries is $0.636 per tonne of material extracted.

Map 1 - Quarry Locations and Travel Routes

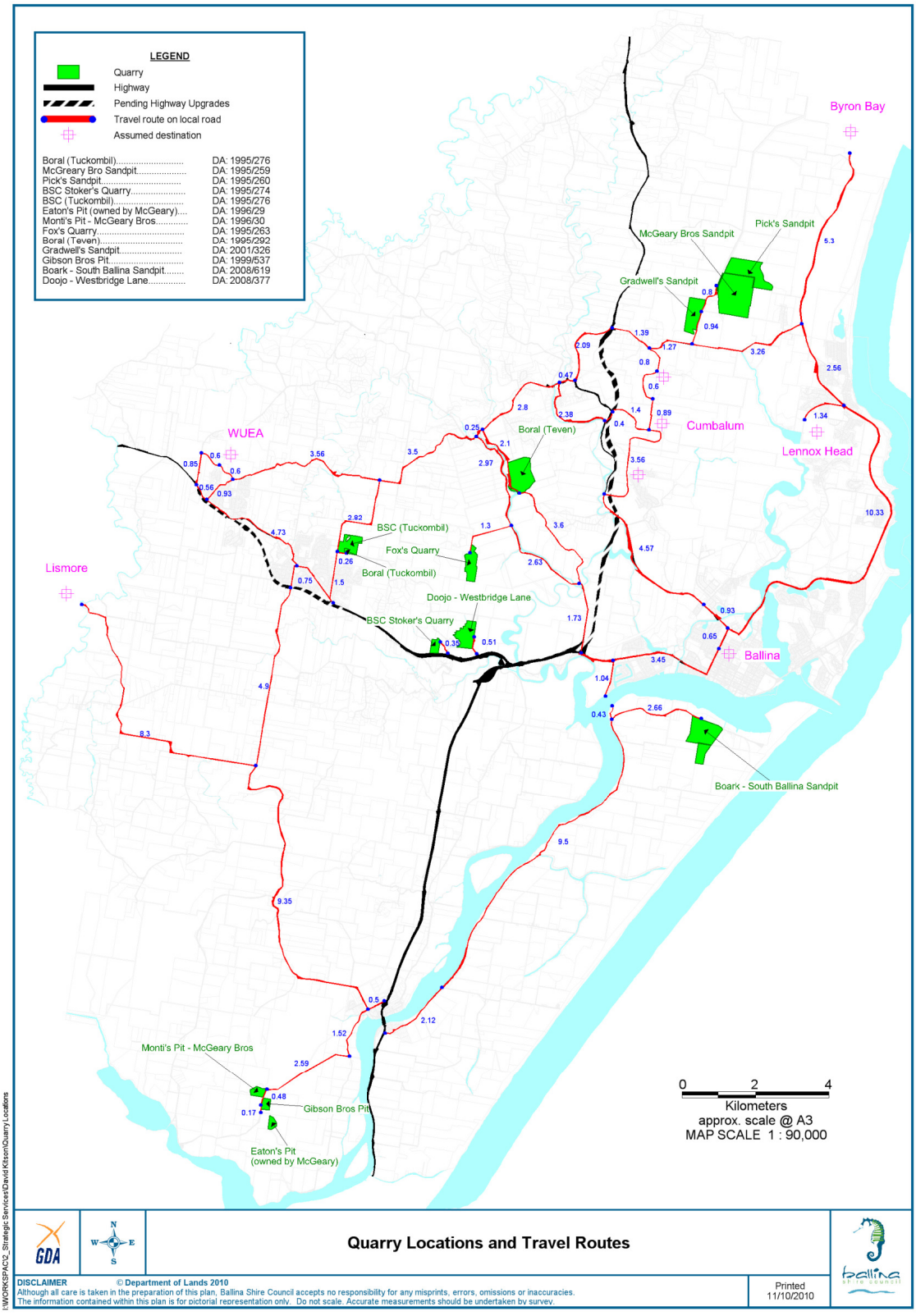


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TABLE 1 - Destination Scenarios for Quarried Materials.

DA No.	Quarry Name	LOCATION	Material	Tonnes	Travel Route Segments on Council Roads (Distances travelled on State Highways are not included)												Trip Length (kilometres)	weighting based on average of Scenarios	tonnes	Kilometre tonnes	Average km each tonne travels
DA 1995/276	BSC (Tuckombil).	Lot 4 DP 588893, crn Gap Road & Teven Road, Alstonville. (now run by LCC)	Asphalt	**23,000**	To Pacific Hw y then north	0.26	1.5										1.76	8%	1,840	3,238	
					To Ballina	0.26	1.5	1.1	3.45								6.31	24%	5,445	34,359	
					to Cumbalum	0.26	1.5	1.1	3.45	0.65	0.93	4.57	1.04	0.6			14.1	20%	4,593	64,758	
					To Lennox Head	0.26	1.5	1.1	3.45	0.65	10.3	1.34					18.63	19%	4,452	82,932	
					To Byron	0.26	1.5	1.1	3.45	0.65	10.3	2.56	5.3				25.15	6%	1,448	36,422	
					To Wollongbar	0.26	1.5	0.56	0.93	0.6							3.85	11%	2,482	9,555	
					To Lismore	0.26	1.5										1.76	8%	1,852	3,259	
					To Pacfic Highw ay then south	0.26	1.5										1.76	4%	828	1,457	
					TOTAL													100%	20,271	231,285	11.41
DA 1995/259	McGeary Bros Sandpit	Lot 3 DP 817914, off Newry bar Swamp Rd, Newry bar	Sand	17,500	To Pacific Hw y then north	0.8	0.94	1.27	1.39								4.4	8%	2,800	12,320	
					To Ballina	0.8	0.94	1.27	1.39	4.57	0.93	0.65					10.55	24%	8,286	87,418	
					to Cumbalum	0.8	0.94	1.27	0.8	0.6							4.41	20%	6,989	30,822	
DA 1995/260	Pick's Sandpit	Lot 3 DP 803962 & Crown Rd off Newry bar Swamp Rd, Newry bar	Sand	17,500	To Lennox Head	0.8	0.94	3.26	2.56	1.34							8.9	19%	6,774	60,289	
					To Byron	0.8	0.94	3.26	5.3								10.3	6%	2,204	22,699	
					To Wollongbar	0.8	0.94	1.27	1.39	2.09	0.47	2.8	0.25	3.5	3.56	0.6	17.67	11%	3,777	66,732	
		total		**35,000**	To Lismore	0.8	0.94	1.27	1.39	2.09	0.47	2.8	0.25	3.5	3.56	0.93	18	8%	2,818	50,724	
					To Pacfic Highw ay then south	0.8	0.94	1.27	1.39								4.4	4%			
					TOTAL													100%	30,847	318,683	10.33
DA 1995/274	Stocker's Quarry	Lot 10 DP 712025 off Gap Road, Uralba	shale	**14,000**	To Pacific Hw y then north	0.35											0.35	8%			
					To Ballina	0.35	1.1	3.45									4.9	24%	3,314	16,241	
					to Cumbalum	0.35	1.1	3.45	0.65	0.93	4.57	1.04	0.6				12.69	20%	2,796	35,476	
					To Lennox Head	0.35	1.1	3.45	0.65	10.3	1.34						17.22	19%	2,710	46,660	
					To Byron	0.35	1.1	3.45	0.65	10.3	2.56	5.3					23.74	6%	882	20,927	
					To Wollongbar	0.35	0.56	0.93	0.6								2.44	11%	1,511	3,686	
					To Lismore	0.35											0.35	8%	1,127	395	
					To Pacfic Highw ay then south	0.35											0.35	4%			
					TOTAL													100%	12,339	123,384	10.00
DA 1995/276	Boral (Tuckombil)	Lot 1 DP 186865 & Lot 1 DP 575192, Gap Road, Alstonville.	aggregate	**100,000**	To Pacific Hw y then north	0.26	1.5										1.76	8%			
					To Ballina	0.26	1.5	1.1	3.45								6.31	24%	23,674	149,386	
					to Cumbalum	0.26	1.5	1.1	3.45	0.65	0.93	4.57	1.04	0.6			14.1	20%	19,969	281,559	
					To Lennox Head	0.26	1.5	1.1	3.45	0.65	10.3	1.34					18.63	19%	19,354	360,572	
					To Byron	0.26	1.5	1.1	3.45	0.65	10.3	2.56	5.3				25.15	6%	6,297	158,358	
					To Wollongbar	0.26	1.5	0.56	0.93	0.6							3.85	11%	10,790	41,542	
					To Lismore	0.26	1.5										1.76	8%	8,051	14,170	
					To Pacfic Highw ay then south	0.26	1.5										1.76	4%			
					TOTAL													100%	88,136	1,005,588	11.41

DA No.	Quarry Name	LOCATION	Material	Tonnes	Travel Route Segments on Council Roads (Distances travelled on State Highways are not included)												Trip Length (kilometres)	weighting based on average of Scenarios	tonnes	Kilometre tonnes	Average km each tonne travels
DA 1996/29	Eaton's Pit	Lot 3 DP 619233, Old Bagotville Road, Wardell	shale	**50,000**	To Pacific Hwy then north	0.17	0.48	2.59	1.52	0.5							5.257	8%			
					To Ballina	0.17	0.48	2.59	1.52	0.5	1.1	3.45					9.807	24%	11,837	116,088	
					to Cumbalum	0.17	0.48	2.59	1.52	0.5	1.1	3.45	0.65	0.93	4.57	1.04	0.6	17.597	20%	9,984	175,695	
					To Lennox Head	0.17	0.48	2.59	1.52	0.5	1.1	3.45	0.65	10.3	1.34			22.127	19%	9,677	214,127	
					To Byron	0.17	0.48	2.59	1.52	0.5	1.1	3.45	10.3	2.56	5.3			27.997	6%	3,148	88,142	
					To Wollongbar	0.17	0.48	2.59	1.52	9.35	4.9							19.007	11%	5,395	102,544	
					To Lismore	0.17	0.48	2.59	1.52	8.3								13.057	8%	4,026	52,563	
					To Pacfic Highway then south	0.17	0.48	2.59	1.52	0.5								5.257	4%			
					TOTAL														100%	44,068	749,160	17.00
DA 1996/30	Monti's Pit - McGeary Bros	Lot 1 DP 787102 Old Bagotville Road, Wardell.	shale	**56,000**	To Pacific Hwy then north			2.59	1.52	0.5							4.61	8%			
					To Ballina			2.59	1.52	0.5	1.1	3.45					9.16	24%	13,258	121,441	
					to Cumbalum			2.59	1.52	0.5	1.1	3.45	0.65	0.93	4.57	1.04	0.6	16.95	20%	11,182	189,543	
					To Lennox Head			2.59	1.52	0.5	1.1	3.45	0.65	10.3	1.34			21.48	19%	10,838	232,810	
					To Byron			2.59	1.52	0.5	1.1	3.45	10.3	2.56	5.3			27.35	6%	3,526	96,438	
					To Wollongbar			2.59	1.52	9.35	4.9							18.36	11%	6,042	110,940	
					To Lismore			2.59	1.52	8.3								12.41	8%	4,509	55,954	
					To Pacfic Highway then south			2.59	1.52	0.5								4.61	4%			
					TOTAL														100%	49,356	807,125	16.35
DA 1995/263	Fox's Quarry	Lot 2 & 3 DP 732288, Stokers Lane , Teven.	aggregate	**200,000**	To Pacific Hwy then north	1.3	2.63	1.78									5.71	8%			
					To Ballina	1.3	2.63	1.78	1.1	3.45							10.26	24%	3,157	32,387	
					to Cumbalum	1.3	2.63	1.78	1.1	3.45	0.65	0.93	4.57	1.04	0.6		18.05	20%	2,662	48,058	
					To Lennox Head	1.3	2.63	1.78	1.1	3.45	0.65	10.3	1.34				22.58	19%	2,581	58,270	
					To Byron	1.3	2.63	1.78	1.1	3.45	0.65	10.3	2.56	5.3			29.1	6%	840	24,431	
					To Wollongbar via Tintenbar Road	1.3	2.97	3.5	3.56	0.6							11.93	5%	719	8,582	
					To Wollongbar via Bruxner Hwy	1.3	2.63	2	0.56	0.93	0.6						8.02	5%	719	5,769	
					To Lismore via Tintenbar Rd	1.3	2.97	3.5	3.56								11.33	4%	537	6,081	
					To Lismore via Bruxner Hwy	1.3	2.63	2									5.93	4%	537	3,183	
					To Pacfic Highway then south	1.3	2.63	1.78									5.71	2%			
					TOTAL														98%	11,751	186,760	15.89
DA 1995/292	Boral (Teven)	Lots 8 & 9 DP 719619, Lot 1 DP 558525, Lot 5 DP 713672, Lots 22, 23,24& 27 DP 713672 North Teven Road, Teven .	aggregate	**277,778**	To Pacific Hwy then north	2.1	2.8	0.47	2.09								7.46	8%			
					To Ballina	3.6	1.78	1.1	3.45								9.93	24%	65,763	653,022	
					to Cumbalum	2.1	2.8	2.38	0.4	1.4							9.08	20%	55,469	503,655	
					To Lennox Head	2.1	2.8	0.47	2.09	1.39	1.27	3.26	2.56	1.34			17.28	19%	53,762	929,010	
					To Byron	2.1	2.8	0.47	2.09	1.39	1.27	3.26	5.3				18.68	6%	17,490	326,722	
					To Wollongbar via Tintenbar Road	2.1	0.25	3.5	3.56	0.6							10.01	11%	29,973	300,027	
					To Lismore via Tintenbar Rd	2.1	2.97	3.5	3.56	0.93	0.56						13.62	8%	22,365	304,610	
					To Pacfic Highway then south	3.6	1.78										5.38	4%			
					TOTAL														100%	244,821	3,017,046	12.32

DA No.	Quarry Name	LOCATION	Material	Tonnes	Travel Route Segments on Council Roads (Distances travelled on State Highways are not included)												Trip Length (kilometres)	weighting based on average of Scenarios	tonnes	Kilometre tonnes	Average km each tonne travels	Mainten. Cost per tonne /kilometre	Total cost per tonne based on average trip
2001/326	Gradwell's Sandpit	Lot 3 DP 1032658 (resub Lot 8 DP 734573) Newrybar Swamp Road, Lennox Head	sand	22,700	To Pacific Hwy then north		0.94	1.27	1.39								3.6	8%					
					To Ballina		0.94	1.27	1.39	4.57	0.93	0.65					9.75	24%	5,374	52,398			
					to Cumbalum		0.94	1.27	0.8	0.6							3.61	20%	4,533	16,364			
					To Lennox Head		0.94	3.26	2.56	1.34							8.1	19%	4,393	35,587			
					To Byron		0.94	3.26	5.3								9.5	6%	1,429	13,579			
					To Wollongbar		0.94	1.27	1.39	2.09	0.47	2.8	0.25	3.5	3.56	0.6	16.87	11%	2,449	41,321			
					To Lismore		0.94	1.27	1.39	2.09	0.47	2.8	0.25	3.5	3.56	0.93	17.2	8%	1,828	31,436			
					To Pacfic Highway then south		0.94	1.27	1.39								3.6	4%					
					TOTAL													100%	20,007	190,683	9.53	0.0530	0.5051
DA 1999/537	Gibson Bros Pit	Lot 2 DP 585377 Old Bagotville Road, Bagotville.	shale	50,000	To Pacific Hwy then north		0.48	2.59	1.52	0.5							5.09	8%					
					To Ballina		0.48	2.59	1.52	0.5	1.1	3.45					9.64	24%	11,837	114,111			
					to Cumbalum		0.48	2.59	1.52	0.5	1.1	3.45	0.65	0.93	4.57	1.04	0.6	17.43	20%	9,984	174,027			
					To Lennox Head		0.48	2.59	1.52	0.5	1.1	3.45	0.65	10.3	1.34			21.96	19%	9,677	212,511			
					To Byron		0.48	2.59	1.52	0.5	1.1	3.45	10.3	2.56	5.3			27.83	6%	3,148	87,617			
					To Wollongbar		0.48	2.59	1.52	9.35	4.9							18.84	11%	5,395	101,643			
					To Lismore		0.48	2.59	1.52	8.3								12.89	8%	4,026	51,891			
					To Pacfic Highway then south		0.48	2.59	1.52	0.5								5.09	4%					
					TOTAL													100%	44,068	741,800	16.83	0.0530	0.8922
DA2008/619	Borak - South Ballina Sandpit	Lot 4 DP 263643, & Lot 4 DP 813112, South Ballina Beach Road, South Ballina.	sand	30,000	To Pacific Hwy then north	2.66	0.43	1.04	1.1								5.23	8%					
					To Ballina	2.66	0.43	1.04	3.45								7.58	24%	7,102	53,836			
					to Cumbalum	2.66	0.43	1.04	3.45	0.65	0.93	4.57	1.04	0.6			15.37	20%	5,991	92,076			
					To Lennox Head	2.66	0.43	1.04	3.45	0.65	10.3	1.34					19.9	19%	5,806	115,546			
					To Byron	2.66	0.43	1.04	3.45	0.65	10.3	2.56	5.3				26.42	6%	1,889	49,907			
					To Wollongbar	2.66	0.43	1.04	1.1	0.56	0.93	0.6					7.32	11%	3,237	23,695			
					To Lismore	2.66	0.43	1.04	1.1								5.23	8%	2,415	12,633			
					To Pacfic Highway then south	2.66	9.5	2.12									14.28	4%					
					TOTAL													100%	26,441	347,691	13.15	0.0530	0.6969
DA 2008/377	Doojo	Lot 2 DP 830884, No. 23 Westbridge Lane & Lot 21 DP 712028, Gap Road, Uralba	shale	200,000	To Pacific Hwy then north	0.45											0.45	8%					
					To Ballina	0.45	1.1	3.45									5	24%	47,349	236,745			
					to Cumbalum	0.45	1.1	3.45	0.65	0.93	4.57	1.04	0.6				12.79	20%	39,937	510,799			
					To Lennox Head	0.45	1.1	3.45	0.65	10.3	1.34						17.32	19%	38,709	670,435			
					To Byron	0.45	1.1	3.45	0.65	10.3	2.56	5.3					23.84	6%	12,593	300,220			
					To Wollongbar	0.45	0.56	0.93	0.6								2.54	11%	21,580	54,814			
					To Lismore	0.45											0.45	8%	16,103	7,246			
					To Pacfic Highway then south	0.45											0.45	4%					
					TOTAL													100%	176,271	1,780,260	10.10	0.0530	0.5353
																			Average travel distance per tonne hauled		12.86	0.0530	0.6816
																			Medium distance per tonne hauled		11.87	0.0530	0.6289

Appendix 3 - Standard Conditions of Consent

Deferred Commencement Conditions

- A quantitative/volumetric survey of the site shall be undertaken by a practicing registered surveyor at the cost of the applicant/operator prior to the commencement of any site works or excavations. The survey shall be undertaken and submitted to the requirements and satisfaction of Council. An electronic copy of the survey data shall be provided in a format that can be used with subsequently surveys to determine the volume of material extracted.

Other Conditions

- A contribution shall be paid in accordance with the Ballina Shire Heavy Haulage Contributions Plan current at the time of payment on a quarterly basis within one month of the end of the quarter. The quarters shall comprise 1 January - 31 March, 1 April - 30 June, 1 July -30 September, 1 October - 31 December unless otherwise notified by Council. NOTE: At the time of the consent this requires a payment of <***insert rate applicable at time of consent***> per tonne of material hauled from the site. This rate is subject to indexing and amendment in accordance with a subsequently adopted heavy haulage contribution plan.
- A "remittance form" as issued by Council shall be submitted to Council for each quarter either accompanying the required payment or as a "nil" return. The information required includes applicable quarter, quantities of material, tonnage rate, contribution payment and the like and be certified by a company officer.
- A quantitative/volumetric survey shall be undertaken by a practicing registered of the surveyor prior to the commencement of the quarry and stoke piles on an annual basis and submitted to Council that provides an estimate of material removed from the site. The annual cycle shall be the financial year unless otherwise notified Council.
- An annual audit of quarry sales by volume and weight shall be undertaken by an independent auditor and submitted to Council on an annual basis. This audit shall also provide a reconciliation between the sales and the contributions that were payable under the *Ballina Shire Heavy Haulage Contributions Plan* to demonstrate compliance with the terms of the Consent. The annual cycle shall be the financial year unless otherwise notified Council.
- Quantitative/volumetric surveys of the site shall be undertaken periodically by a practicing registered surveyor at the cost of the applicant/operator upon written request by Council. The surveyor shall use the methodology supplied by Council to determine the weight of the extracted material and reconcile such with quarterly and annual returns. Where the survey indicates that more material has been extracted that indicated by returns, the applicant/operator shall pay a contribution in respect of the outstanding amount.

Appendix 4 - Volume - Weight Conversions

Adopted volume to weight conversions for quarry materials

Road Base - basalt	1.75 tonnes/metre^3
Aggregate - basalt	1.5 tonnes/metre^3
Road Base - chert	1.7 tonnes/metre^3
Sand - siliceous	1.3 tonnes/metre^3
Sand - inderated	1.4 tonnes/metre^3