Roadstone JNWOOD

The Right Choice

EIS APPENDICES

WASTE LICENCE APPPLICATION, MULLAGHCRONE, DONORE, CO. MEATH.

APPENDIX 5.1
Ecology Bibliography

Appendix 5.1 Bibliography

Curtis, T. & McGough, H. 1988. *The Irish Red Data Book: 1 Vascular Plants*. Wildlife Service Ireland, Dublin. The Stationary Office.

Environmental Protection Agency. 2002. *Guidelines on the information to be contained in Environmental Impact Statements*.

Environmental Protection Agency. 2003. *Advice Notes on Current Practice (in the preparation of Environmental Impact Statements).* Prepared on behalf of the EPA by CAAS Environmental Services Ltd.

Fossitt, J.A. 2000. *A Guide to Habitats in Ireland*. The Heritage Council, Kilkenny, Ireland.

Hayden, T. and Harrington, R. 2000. *Exploring Irish Mammals*. Dúchas The Heritage Service. Town House and Country House Ltd, Dublin.

Institute of Ecology and Environmental Management (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom* (Version 7 July 2006). http://www.ieem.org.uk/ecia/index.html

Lynas P., Newton S.F. & Robinson J.A. 2007. The status of birds in Ireland: an analysis of conservation concern 2008-2013. *Irish Birds* 8 :149-166

Murnane E, Heap A and Swain A (2006). Control of water pollution from linear construction projects. Technical guidance (C648). CIRIA

Natura Environmental Consultants. 2002. *A Standard Methodology for Habitat Survey and Mapping in Ireland*. The Heritage Council. Draft.

Newton, S., Donaghy, A., Allen, D. & D. Gibbons. 1999. Birds of Conservation Concern in Ireland. *Irish Birds* 6(3) 333-344.

NRA. 2005. *Guidelines for the Treatment of Bats during the Construction of National Road Schemes*

NRA 2005. Guidelines for the crossing of watercourses during the construction of national road schemes. National Roads Authority (NRA), Dublin.

NRA. 2006. *Guidelines for Assessment of Ecological Impacts of National Road Schemes.* Revision 1, 1st March 2006.

Natura Environmental Consultants. 2002. *A Standard Methodology for Habitat Survey and Mapping in Ireland.* The Heritage Council. Draft.

Newton, S, Donaghy, A, Allen, D & Gibbons, D. 1999. *Birds of Conservation Concern in Ireland* Irish Birds 6 (3) pp 333-344.

Preston, C.D, Pearman, D.A. & Dines, T.D. 2002. *New Atlas of the British and Irish Flora.* Oxford University Press, Oxford.

O Reilly. P. 2004. Rivers of Ireland. Merlin Unwin Books.

Rose, F. 1989. *Colour Identification Guide to the Grasses, Sedges, Rushes and Ferns of the British Isles and north-western Europe.* Viking

Webb, D.A., Parnell, J., & Doogue, D. 1996. *An Irish Flora.* Dundalgan Press (W. Tempest) Ltd., Dundalk.

Whilde, A. 1993 Threatened mammals, birds, amphibians and fish in Ireland. *Irish Red Data Book 2: Vertebrates. HMSO, Belfast.*

APPENDIX 5.2
Criteria for assessing Site Evaluation

APPENDIX 5.2 CRITERIA FOR ASSESSING SITE EVALUATION

RATING QUALIFYING CRITERIA

International Importance

- 'European Site' including Special Area of Conservation (SAC), Site of Community Importance
- (SCI), Special Protection Area (SPA) or proposed Special Area of Conservation.
- Proposed Special Protection Area (pSPA).
- Site that fulfills the criteria for designation as a 'European Site' (see Annex III of the Habitats
- Directive, as amended).
- Features essential to maintaining the coherence of the Natura 2000 Network.[4]
- Site containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive.
- Resident or regularly occurring populations (assessed to be important at the national level)[5] of
- the following:
- Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
- and/or
- Species of animal and plants listed in Annex II and/or IV of the Habitats Directive.
- Ramsar Site (Convention on Wetlands of International Importance Especially Waterfowl
- Habitat 1971).
- World Heritage Site (Convention for the Protection ofWorld Cultural&Natural Heritage, 1972).
- Biosphere Reserve (UNESCO Man & The Biosphere Programme).
- Site hosting significant species populations under the Bonn Convention (Convention on the
- Conservation of Migratory Species ofWild Animals, 1979).
- Site hosting significant populations under the Berne Convention (Convention on the
- Conservation of European Wildlife and Natural Habitats, 1979).
- Biogenetic Reserve under the Council of Europe.
- European Diploma Site under the Council of Europe.
- Salmonid water designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988, (S.I. No. 293 of 1988).[6]

National Importance

- Site designated or proposed as a Natural Heritage Area (NHA).
- Statutory Nature Reserve.
- Refuge for Fauna and Flora protected under the Wildlife Acts.
- National Park.
- Undesignated site fulfilling the criteria for designation as a Natural Heritage Area (NHA);
- Statutory Nature Reserve; Refuge for Fauna and Flora protected under the WildlifeAct; and/or
- a National Park.
- Resident or regularly occurring populations (assessed to be important at the national level)[7] of
- the following:
- Species protected under the Wildlife Acts; and/or
- Species listed on the relevant Red Data list.
- Site containing 'viable areas of the habitat types listed in Annex I of the Habitats Directive.

County Importance

- Area of Special Amenity.[9]
- Area subject to a Tree Preservation Order.
- Area of High Amenity, or equivalent, designated under the County Development Plan.
- Resident or regularly occurring populations (assessed to be important at the County level)of the following:
- Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
- Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
- Species protected under the Wildlife Acts; and/or
- Species listed on the relevant Red Data list.
- Site containing area or areas of the habitat types listed in Annex I of the Habitats Directive
- that do not fulfil the criteria for valuation as of International or National importance.
- County important populations of species, or viable areas of semi-natural habitats or natural
- heritage features identified in the National or Local BAP,[11] if this has been prepared.

- Sites containing semi-natural habitat types with high biodiversity in a county context and a
- high degree of naturalness, or populations of species that are uncommon within the county.
- Sites containing habitats and species that are rare or are undergoing a decline in quality or extent at a national level.

Local Importance (Higher Value)

- Locally important populations of priority species or habitats or natural heritage features
- identified in the Local BAP, if this has been prepared;
- Resident or regularly occurring populations (assessed to be important at the Local level)[12] of
- the following:
- Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive;
- Species of animal and plants listed in Annex II and/or IV of the Habitats Directive;
- Species protected under theWildlife Acts; and/or
- Species listed on the relevant Red Data list.
- Sites containing semi-natural habitat types with high biodiversity in a local context and a high
- degree of naturalness, or populations of species that are uncommon in the locality;
- Sites or features containing common or lower value habitats, including naturalised species that
- are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.

Local Importance (Lower Value)

- Sites containing small areas of semi-natural habitat that are of some local importance for
- wildlife;
- Sites or features containing non-native species that are of some importance in maintaining
- habitat links.

Roadstone Ltd.

Mullaghcrone Quarry Waste Licence Application

Appropriate Assessment - Screening

June 2014

TOBIN CONSULTING ENGINEERS

TOBIN
Patrick J. Tobin & Co. Ltd.

Appropriate Assessment - Screening

PROJECT: **Mullaghcrone Quarry Waste Licence Application**

CLIENT: **Roadstone Ltd**

COMPANY: **TOBIN Consulting Engineers**
Block 10-4
Blanchardstown Corporate Park
Dublin 15

www.tobin.ie

DOCUMENT AMENDMENT RECORD

Client:	**Roadstone Ltd**
Project:	**Mullaghcrone Quarry Waste Licence Application**
Title:	**Appropriate Assessment - Screening**

PROJECT NUMBER: 6222				DOCUMENT REF: Mullaghcrone AA			
B	FINAL	RM	22/04/14	JD	22/04/14	DG	22/04/14
A	DRAFT	RM	28/03/14	JD	28/03/14	DG	31/03/14
Revision	**Description & Rationale**	**Originated**	**Date**	**Checked**	**Date**	**Authorised**	**Date**
TOBIN Consulting Engineers							

TABLE OF CONTENTS

1 INTRODUCTION

This report details an Appropriate Assessment Screening Report for a proposed waste licence facility at Roadstone's Mullaghcrone Quarry, Donore Road, Drogehda, Co. Meath site. The screening for Appropriate Assessment is required to comply with Article 12 of the waste Management (Licensing) Regulations as outlined in the EPA's letter of 28 February 2014 – copy attached.

The report considers potential adverse effects alone and in-combination with other projects on relevant European Sites (Special Areas for Conservation and Special Protection Areas for Birds) which require consideration.

This report determines if effects (of waste management activities) are or could potentially affect European sites qualifying interests and their "favourable conservation status". The proposed Waste Licence area has acted as a waste permitted area for over 10 years.

The report was drafted by an experienced trained ecologist (>18 years experience) from TOBIN Consulting Engineers with input from hydro-geologists regarding potential hydrological pathways to European sites.

1.1 LEGISLATIVE CONTEXT

The Appropriate Assessment process (AA) is an assessment of the potential adverse or negative effects of a plan or project, in combination with other plans or projects, on a European Site (Natura 2000 site). These sites consist of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) and provide for the protection and long-term survival of Europe's most valuable and threatened species and habitats. Although not specifically required, it would be considered best practice to include Ramsar sites (classified under the Ramsar Convention 1971) in the assessment process.

The requirement of AA is outlined in Article 6(3) and 6(4) of the European Union Habitats Directive.

Article 6(3) of the Habitats Directive requires that:-

> *"Any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. In the light of the conclusions of the assessment of the implications for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."*

And Article 6(4) of the Habitats Directive requires that:-

> *"If, in spite of a negative assessment of the implications for the site and in the absence of alternative solutions, a plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature, the Member State shall take all compensatory measures necessary to ensure that the overall coherence of Natura 2000 is protected. It shall inform the Commission of the compensatory measures adopted."*

1.2 GUIDANCE

This report has been carried out using the following guidance:

- Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities, Department of the Environment, Heritage and Local Government DEHLG (2009);
- EPA Ireland guidelines[1];
- Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (EC 2000);
- Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg (EC 2001); and
- Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. Office for Official Publications of the European Communities, Luxembourg (EC 2007).

2 METHODOLOGY

There are four main stages in the AA process; the requirements for each depending on likely effects to Natura 2000 sites (SAC/ SPA).

Stage 1 –Screening - / Test of Significance - the process which identifies the likely impacts upon a Natura 2000 site of a project or plan, either alone or in combination with other projects or plans, and considers whether these impacts are likely to be significant, if there is uncertainty regarding effects or no effects are likely; If no effects are determined based on reasoned

[1] http://www.epa.ie/downloads/forms/lic/wwda

consideration and best scientific knowledge than the AA process is finalised at this stage subject to review from the consenting authority.

Stage Two: Appropriate Assessment - the consideration of the impact of the project or plan on the integrity of the Natura 2000 site, either alone or in combination with other projects or plans, with respect to the site's structure and function and its conservation objectives. Additionally, where there are adverse impacts, an assessment of the potential mitigation of those impacts; and mitigation to rule out these impacts is required.

The Appropriate Assessment is informed by a Natura Impact Statement. This stage is required where uncertainty of effect or a potential impact has been defined which requires further procedures/ mitigation to remove uncertainty or a defined impact.

Stage Three: Assessment of Alternative Solutions – the process which examines alternative ways of achieving the objectives of the project or plan that avoid adverse impacts on the integrity of the Natura 2000 site.

Stage Four: Assessment Where Adverse Impacts Remain - an assessment of compensatory measures where, in the light of an assessment of Imperative Reasons of Overriding Public Interest (IROPI), it is deemed that the project or plan should proceed.

3 SCREENING ASSESSMENT

Ecological impact assessment of potential impacts on Natura 2000 sites is conducted utilising a standard SOURCE-RECEPTOR-PATHWAY model, where, in order for an impact to be established all three elements of this mechanism must be in place. The absence or removal of one of the elements of the mechanism is sufficient to conclude that a potential effect is not of any relevance or significance. The primary information source for informing the screening assessment is the SLR Consulting Hydrogeological Assessment of the existing area (May 2009) and the Environmental Impact Statement (March 2011) submitted for the waste licence application at Mullaghcrone Quarry, Co Meath.

Source – No impact source is determined as the material on site is / will be inert stones and soil and building waste located at a significant distance from European sites or stream drainage features which could link this material to European sites. The site has acted as a waste permit area for over 10 years without impacting on the groundwater quality or surrounding environment. No groundwater de-watering occurs at the site. There are no surface water streams that connect the proposed Mullaghcrone Waste Licence application area to the River Boyne and Blackwater SAC/SPA (which is the only Natura 2000 site in the vicinity of the proposed application area). The proposed Mullaghcrone waste licence application area is not located within the surface water catchment of the River Boyne and Blackwater SAC/ SPA. The site is located within the water catchment of the River Nanny, which is not a SAC / SPA.

Pathway – No pathway is identified. No significant surface water features exist on the site. Surface water that accumulates in the quarry is stored on site for the purpose of dust suppression. Groundwater flow is towards the Irish Cement Platin Quarry area to the southeast of the proposed waste licence area. All Platin Quarry groundwater is subject to IPPC licensing requirements under Reg No. P0030-04. The final discharge is to the River Nanny. The River Nanny eventually flows in the Irish Sea at Laytown, Co Meath, and discharges into the River Nanny Estuary and Shore SPA (004158). The River Nanny Estuary and Shore SPA is located >11km downgradient of the proposed facility. The River Nanny Estuary and Shore SPA is designated for wintering birds.

Receptor – No linkages are identified to any European sites. All European Sites in the wider region were considered including potentially sensitive qualifying interests e.g. aquatic species (such as Atlantic Salmon) sensitive to water pollution. The River Boyne and Blackwater SAC / SPA exists to the north of the site and no *hydrological* link exists to the application area. The Duleek Commons proposed National Heritage Areas (non European site) was surveyed by the author and is currently not measurably affected by any quarrying activities such as dewatering. Given the qualifying interest of the River Nanny Estuary and Shore SPA (wintering birds),

there are no measureable adverse impacts immediately downgradient of the proposed facility; therefore, there are not potential impacts on the River Nanny Estuary and Shore SPA.

Based on the source-receptor-pathway model and the screening for appropriate assessment exercise, it is considered certain that no potential effects (alone and in-combination) will arise to Natura 2000 sites from any existing or proposed waste management activities (inert materials) at Mullaghcrone Quarry, Co Meath.

4 CONCLUSION

It is considered that no significant adverse effects (including alone and in-combination) will arise to Natura 2000 sites as a result the existing or proposed waste management activities (inert materials) at Mullaghcrone Quarry, Co Meath.

In this regard it is considered certain that the project can be screened “out” of requirement for Appropriate Assessment.

Signed off by:

Mr. Roger Macnaughton
Senior Ecologist

APPENDIX 7.1
Groundwater monitoring results

TEST REPORT

Analysing
Testing
Consulting
Calibrating

BHP
New Road
Thomondgate
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Tel +353 61 455399
Fax + 353 61 455447
E Mail bhpcem2@bhp.ie

Client: **Roadstone Wood Ltd**
Fortunestown
Tallaght
Dublin 24

FTAO: Colin Doyle

BHP Ref. No.: 96660
Order No.:
Date Received: 26/01/11
Date Completed: 09/02/11
Test Specification: Nil
Item :See below

Test	Client Reference	Units	Results	Standard Reference
	Borehole at Mullaghcrone (BH3)			
pH		-	7.15	APHA-4500-H^+-B
Electrical Conductivity		μScm^{-1}	466	APHA - 2510 - B
Sodium		mg/l	7.12	APHA - 3120 - B
Potassium		mg/l	0.98	APHA - 3120 - B
Calcium		mg/l	32.4	APHA - 3120 - B
Magnesium		mg/l	5.62	APHA - 3120 - B
Chloride		mg/l	34.7	APHA - 4110 - B
Sulphate (as SO_4)		mg/l	54.1	APHA - 4110 - B
Total Alkalinity (as $CaCO_3$)		mg/l	114	APHA - 2320 -B
OrthoPhosphate (PO_4)		mg/l	0.03	APHA - 4110 - B
Nitrate (as NO_3)		mg/l	12.4	APHA - 4110 - B
Nitrite (as NO_2)		mg/l	<0.05	APHA - 4110 - B
Total Coliforms		cfu/100mls	4	APHA - 9223 - B
Faecal Coliforms		cfu/100mls	None Found	APHA - 9223 - B
Dissolved Oxygen		% O_2	76.3	APHA - 4500-O-G
Ammoniacal Nitrogen (as NH_4-N)		mg/l	0.08	APHA -4500- NH_3-D

Additional information : All methods are from Standard Methods for the Examination of Water and Wastewater 20th Edition.

For and on behalf of BHP laboratories :

Pat O'Sullivan
Issue Date : 09/02/2011

TEST REPORT

Analysing
Testing
Consulting
Calibrating

BHP
New Road
Thomondgate
Limerick
Ireland
Tel +353 61 455399
Fax + 353 61 455447
E Mail bhpcem2@bhp.ie

Client: **Roadstone Wood Ltd**
Fortunestown
Tallaght
Dublin 24

FTAO: Colin Doyle

BHP Ref. No.: 96660
Order No.:
Date Received: 26/01/11
Date Completed: 09/02/11
Test Specification: Nil
Item :See below

Test	Client Reference	Units	Results	Standard Reference
	Borehole at Mullaghcrone (BH3)			
Iron		mg/l	0.005	APHA - 3120 - B
Manganese		mg/l	0.006	APHA - 3120 - B
Total Phosphorus (as P)		mg/l	0.04	APHA - 4500 - P
Total Petroleum Hydrocarbons				
$>C_6-C_{40}$		mg/l	<0.001	GC-FID
$>C_6-C_8$		mg/l	<0.001	GC-FID
$>C_8-C_{10}$		mg/l	<0.001	GC-FID
$>C_{10}-C_{12}$		mg/l	<0.001	GC-FID
$>C_{12}-C_{16}$		mg/l	<0.001	GC-FID
$>C_{16}-C_{21}$		mg/l	<0.001	GC-FID
$>C_{21}-C_{40}$		mg/l	<0.001	GC-FID
Petroleum Range Organics		mg/l	<0.001	GC-FID
Diesel Range Organics		mg/l	<0.001	GC-FID
BTEX Compounds		mg/l	<0.001	GC-FID
Water Level (from top of casing)		M	>50	ISO 5667 - 11

Additional information : All methods are from Standard Methods for the Examination of Water and Wastewater 20th Edition.

For and on behalf of BHP laboratories :

Pat O'Sullivan
Issue Date : 09/02/2011

TEST REPORT

Analysing
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Consulting
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Client: **Roadstone Wood Ltd**
Fortunestown
Tallaght
Dublin 24

FTAO: Colin Doyle

BHP Ref. No.: 96660
Order No.:
Date Received: 26/01/11
Date Completed: 09/02/11
Test Specification: Nil
Item :See below

Test	Client Reference	Units	Results	Standard Reference
	Borehole at Mullaghcrone (BH3)			
Cadmium		mg/l	<0.001	APHA - 3120 - B
Chromium		mg/l	0.002	APHA - 3120 - B
Copper		mg/l	<0.001	APHA - 3120 - B
Lead		mg/l	<0.001	APHA - 3120 - B
Mercury		mg/l	<0.0002	APHA - 3120 - B
Nickel		mg/l	0.001	APHA - 3120 - B
Zinc		mg/l	<0.001	APHA - 3120 - B
Arsenic		mg/l	<0.001	APHA - 3120 - B
Barium		mg/l	0.006	APHA - 3120 - B
Boron		mg/l	0.012	APHA - 3120 - B
Selenium		mg/l	<0.001	APHA - 3120 - B
Silver		mg/l	<0.001	APHA - 3120 - B
Fluoride		mg/l	0.16	APHA - 4110 - B
Total Cyanide		mg/l	<0.001	APHA - 4500-CN - E
Total Organic Carbon		mg/l	4.6	APHA - 5310 - C
Phenol		mg/l	0.007	APHA- 5530- D

Additional information : All methods are from Standard Methods for the Examination of Water and Wastewater 20th Edition.

For and on behalf of BHP laboratories :

Pat O'Sullivan
Issue Date : 09/02/2011

EURO environmental services

Environmental Science & Management
Water,Soil & Air Testing

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Drogheda,
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email info@euroenv.ie

Customer	Elaine Higgins Irish Cement Platin Works Drogheda Co Louth Ireland	*Lab Report Ref. No.*	0090/507/04
		Date of Receipt	02/12/2010
		Date Testing Commenced	02/12/2010
		Received or Collected	Collected by Euro
		Condition on Receipt	Acceptable
Customer PO	15/66421	*Date of Report*	15/12/2010
Customer Ref	GW1 Bi-annual 01/12/10	*Sample Type*	Groundwater

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
Ammonia (Ground Water)	114	Colorimetry	0.011	mg/L as N	UKAS
Bicarbonate	102	Colorimetry	312.29	mg/L HCO3	
Cadmium (Ground Water)	177	ICPMS	<0.09	ug/L	UKAS
Calcium (Ground water)	184	ICPMS	103.80	mg/L	
Chloride (Ground Water)	100	Colorimetry	29.24	mg/L	UKAS
Cobalt (Ground Water)	177	ICPMS	0.04	ug/L	UKAS
Copper (Ground Water)	177	ICPMS	0.6	ug/L	UKAS
Hardness Total (Ground Water)	111	Colorimetry	296	mg/L CaCO3	UKAS
Iron (Ground Water)	177	ICPMS	10.4	ug/L	UKAS
Lead (Ground Water)	177	ICPMS	0.1	ug/L	UKAS
Manganese (Ground Water)	177	ICPMS	2.2	ug/L	UKAS
Nickel (Ground Water)	177	ICPMS	0.2	ug/L	UKAS
Nitrate (Ground Water)	103	Colorimetry	4.750	mg/L as N	UKAS
Nitrite (Ground Water)	118	Colorimetry	<0.002	mg/L as N	UKAS
Potassium (Ground water)	184	ICPMS	5.33	mg/L	UKAS
Sodium (Ground water)	184	ICPMS	16.85	mg/L	UKAS
Sulphate (Ground Water)	119	Colorimetry	24.68	mg/L	UKAS
Tin	177	ICPMS	<2.8	ug/L	

Signed : Katherine McQuillan

Katherine McQuillan - Technical Manager

Date : 15/12/10

Acc. : Accredited Parameters by ISO 17025:2005

All organic results are analysed as received and all results are corrected for dry weight at 104 C
Results shall not be reproduced, except in full, without the approval of EURO environmental services
Results contained in this report relate only to the samples tested

EURO
environmental
services

Environmental Science & Management
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Web: www.euroenv.ie
email info@euroenv.ie

Customer	Elaine Higgins Irish Cement Platin Works Drogheda Co Louth Ireland	*Lab Report Ref. No.*	0090/507/04
		Date of Receipt	02/12/2010
		Date Testing Commenced	02/12/2010
		Received or Collected	Collected by Euro
		Condition on Receipt	Acceptable
Customer PO	15/66421	*Date of Report*	15/12/2010
Customer Ref	GW1 Bi-annual 01/12/10	*Sample Type*	Groundwater

CERTIFICATE OF ANALYSIS

Test Parameter	SOP	Analytical Technique	Result	Units	Acc.
Ammonia (Ground Water)	114	Colorimetry	0.011	mg/L as N	UKAS
Bicarbonate	102	Colorimetry	312.29	mg/L HCO3	
Cadmium (Ground Water)	177	ICPMS	<0.09	ug/L	UKAS
Calcium (Ground water)	184	ICPMS	103.80	mg/L	
Chloride (Ground Water)	100	Colorimetry	29.24	mg/L	UKAS
Cobalt (Ground Water)	177	ICPMS	0.04	ug/L	UKAS
Copper (Ground Water)	177	ICPMS	0.6	ug/L	UKAS
Hardness Total (Ground Water)	111	Colorimetry	296	mg/L CaCO3	UKAS
Iron (Ground Water)	177	ICPMS	10.4	ug/L	UKAS
Lead (Ground Water)	177	ICPMS	0.1	ug/L	UKAS
Manganese (Ground Water)	177	ICPMS	2.2	ug/L	UKAS
Nickel (Ground Water)	177	ICPMS	0.2	ug/L	UKAS
Nitrate (Ground Water)	103	Colorimetry	4.750	mg/L as N	UKAS
Nitrite (Ground Water)	118	Colorimetry	<0.002	mg/L as N	UKAS
Potassium (Ground water)	184	ICPMS	5.33	mg/L	UKAS
Sodium (Ground water)	184	ICPMS	16.85	mg/L	UKAS
Sulphate (Ground Water)	119	Colorimetry	24.68	mg/L	UKAS
Tin	177	ICPMS	<2.8	ug/L	

Signed : Katherine McQuillan **Date :** 15/12/10

Katherine McQuillan - Technical Manager

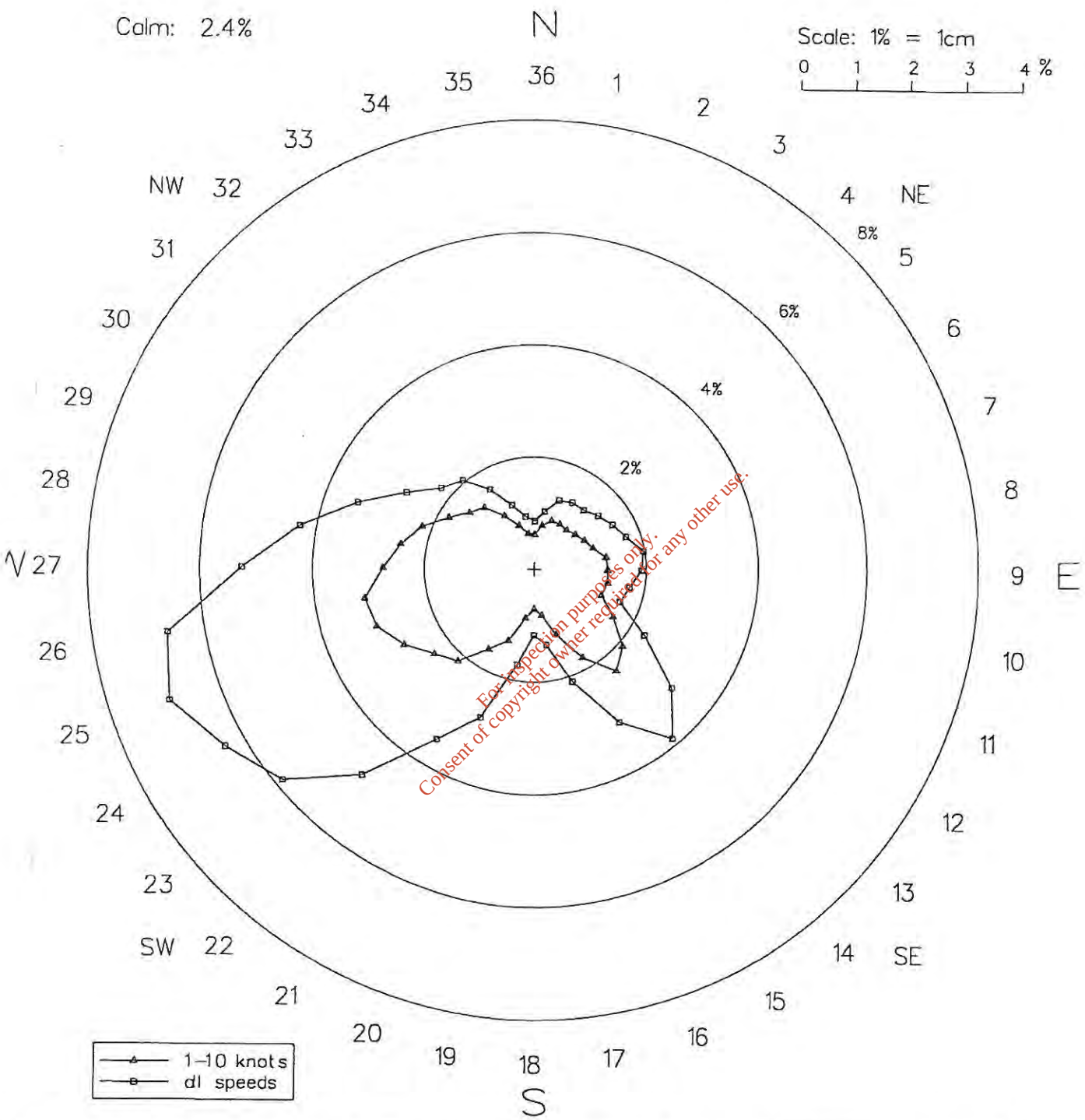
Acc. : Accredited Parameters by ISO 17025:2005

All organic results are analysed as received and all results are corrected for dry weight at 104 C
Results shall not be reproduced, except in full, without the approval of EURO environmental services
Results contained in this report relate only to the samples tested

APPENDIX 8.1
Dublin Airport Wind Rose

DUBLIN AIRPORT 1970–1999

Percentage Frequency of Occurrence of Wind Directions



Percentage Frequency of Occurrence of Wind Speeds

+ less than 0.1

0	1–3	4–6	7–10	11–16	17–21	22–27	28–33	34–40	41–47	over 48	knots
2.4	10.3	17.7	27.1	28.3	9.9	3.5	0.6	+	+	0.0	%

mean wind speed: 10.0 knots
standard deviation: 5.9 knots
anemometer height: 12m

Meteorological Service, Glasnevin Hill, Dublin 9.

APPENDIX 11.1
Archaeological References

List of References Consulted

Byrne, F.J. 2001. *Irish Kings and High Kings.* Dublin.

Clarke, A. 2000. *The Old English in Ireland, 1625-42.* Dublin.

DAHGI 1996. Recorded Monuments Protected under Section 12 of the National Monuments (Amendment) Act, 1994. County Meath.

DAHGI 2009. Code of Practice between the Irish Concrete Federation & the Minister for the Environment, heritage and Local Government.

Eogan, G. 1965. *Catalogue of Irish Bronze Swords.* Dublin.

Eogan, G. 1983. *Hoards of the Irish Later Bronze Age*. Dublin.

Eogan, G. 2000. *The Socketed Bronze Axes in Ireland.* Prähistorische Bronzefunde, abteilung IX, band 22.

EPA 2002. *Guidelines on the information to be contained in Environmental Impact Statements.*

EPA 2003. *Advice Notes on Current Practice in the preparation of Environmental Impact Statements.*

Gardiner, M.J. and Radford, T. 1980. *Soil Associations of Ireland and Their Land Use Potential. Soil Survey Bulletin No. 36.* Dublin. An Foras Taluntais.

Harbison, P. 1969. *The axes of the Early Bronze Age in Ireland.* Prähistorische Bronzefunde, abteilung IX, band 1.

Heritage Council 1999. *The role of the Heritage Council in the Planning Process.* Kilkenny.

Joyce, P.W. 1870. *Irish Local Names Explained.* Dublin.

Kavanagh, R.M. 1991. A reconsideration of razors in the Irish earlier Bronze Age. *Journal of the Royal Society of Antiquaries* 121, 77-104.

MacNiocaill, G. 1992. *Crown Surveys of lands 1540-41.* Dublin.

Meath County Council 2007. *Meath County Development Plan 2007-13.* Meath.

Moore, M. 1987. *Archaeological Inventory of County Meath.* Dublin.

Morrin, J. 1861. *Calendar of Patent and Close Rolls, Vol I -II*. London.

O'Flaherty, R. 1995. "An analysis of Irish Early Bronze Hoards containing copper or bronze objects." *Journal of the Royal Society of Antiquaries* 125, 10-45.

O'Riordain, B and Waddell J. 1993. *The Funerary Bowls and vases of the Irish Bronze Age*. Galway.

Orpen, G.H. 1911-20. *Ireland under the Normans*. 4 Vols. Oxford.

Otway-Ruthven, A.J. 1980. *A History of Medieval Ireland*. London.

Raftery, B. 1984. *La Tene in Ireland*. Marburg.

Simpson, D.D.A. 1990, The stone battle axes of Ireland, *Journal of the Royal Society of Antiquaries* 120, 5-40.

Simington, R.C. 1940. The Civil Survey A.D. 1654-56 County of Meath Vol. V, Dublin.

Sweetman, H.S. 1875. *Calendar of Documents Relating to Ireland in her majesty's Public Record Office, London, 1171-1251*. London.

Sweetman, D. 1999. *The Medieval Castles of Ireland*. Dublin.

Topographical Files, Co. Meath. National Museum of Ireland.

Waddell, J. 1990. *The Bronze Age burials of Ireland*. Galway

Waddell, J. 1998. *The Prehistoric Archaeology of Ireland*. Galway.

White. N.B. 1943. *Extents of Irish Monastic Possessions 1540-41*. Dublin.

APPENDIX 11.2
RMP sites

Appendix 11.2
Sites in the study area listed in the Record of Monuments and Places listed in the Sites and Monuments Database

ME027-002--- Cruicerath Earthwork
Described in the Archaeological Survey of County Meath as earthwork situated on rock outcrop. Quarry to the west. High embankment with berm at base on east (diameter 29m northwest-south-east. Possible entrance at southeast. Moore 1987, No. 1132.

Fig. Captions

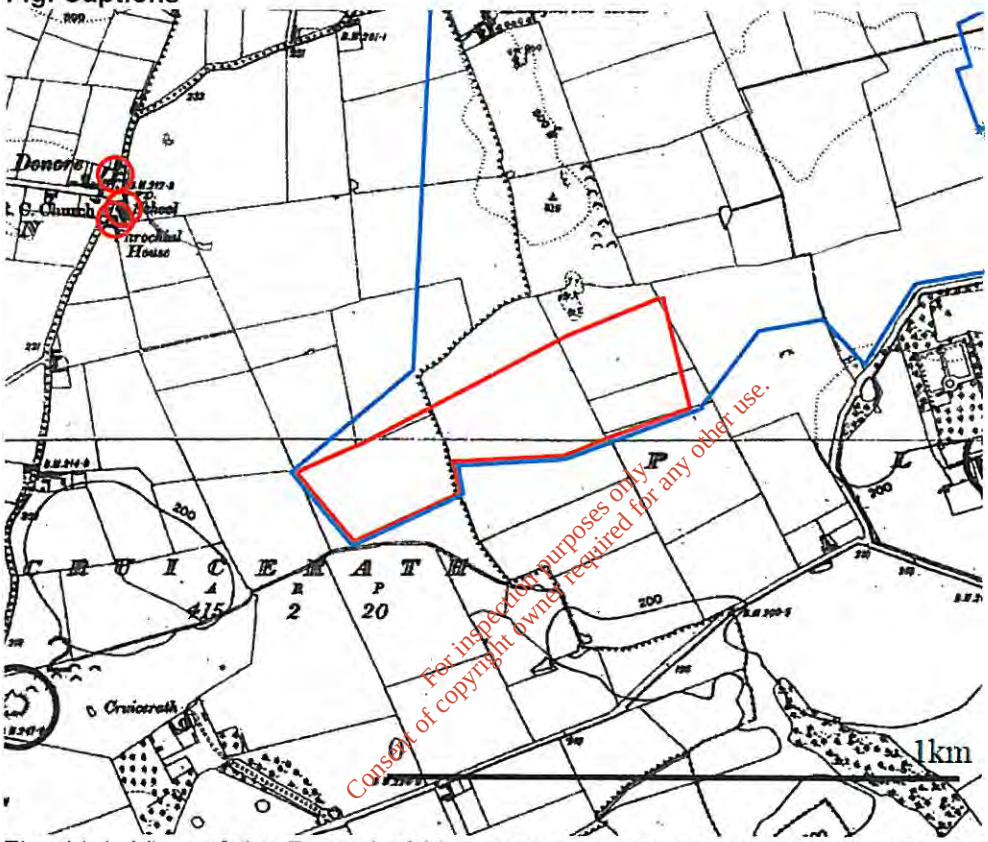


Fig. 11.1. View of the Record of Monuments and Places map for Co. Meath sheets 20 and 27 indicating the proposed application area (in red) situated within the Mullaghcrone quarry (blue line) and the full extent of the square study area. Protected structures are circled in red. There are no structures on the 1901-5 edition of the OS six inch map within 100m of the application area.

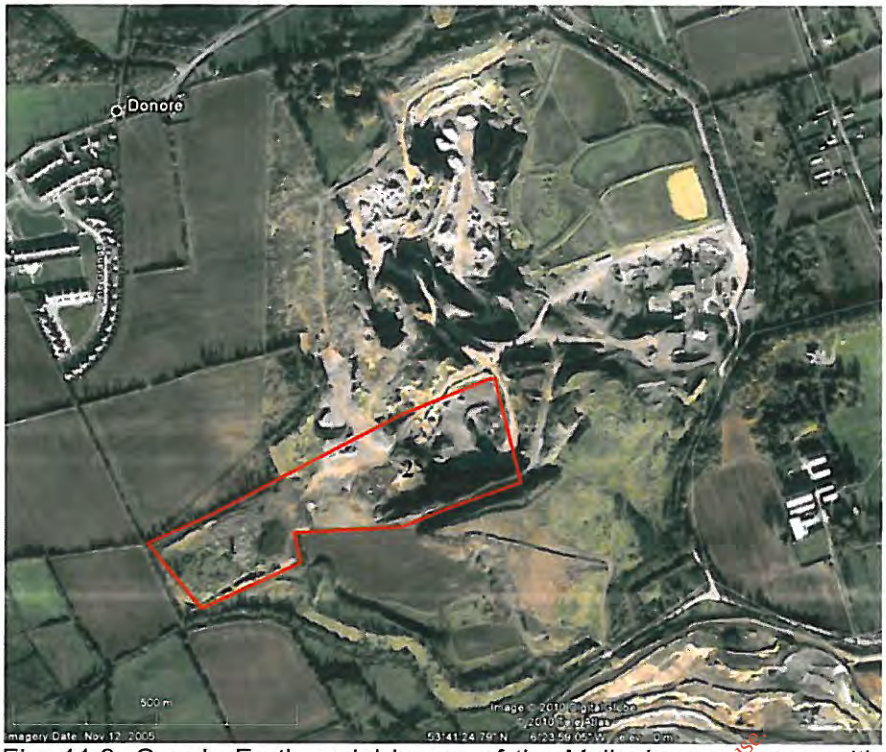


Fig. 11.2. Google Earth aerial image of the Mullaghcrone quarry with the development outline indicated in red. Note that most of the application area has been quarried removing the top and subsoil.

Fig. 11.3. The red line indicates the northern haul route from the quarry entrance to the M1 Rathmullan interchange superimposed on the 1909 OS map. Non-designated structures are numbered. Note the remaining structures indicated along the route have been levelled.

Fig. 11.4. View of structure 1 on Donore Road.

Fig. 11.5. View of structure 2 on Donore Road.

Fig. 11.6. View of structure 3 on Donore Road.

Fig. 11.7. View of structure 4 on Donore Road.

Fig. 11.8. Area 1 looking south-west across its length.

Fig. 11.9. Area 1 looking north-east across its length.

Fig. 11.10. Area 2 looking south-west.

Fig. 11.11. Area 2 looking north-east across it length across its length.

APPENDIX 13.1
Traffic Survey Results

TRL LIMITED

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

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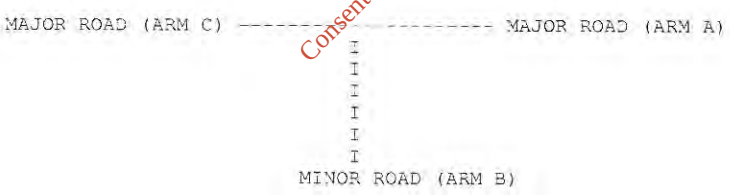
Run with file:-
"W:\Projects\6222pp Roadstone Wood Waste Permits\05 Design\01 Calculations\Traffic\Picady\Mullaghcrone\
pre Road Access AM.vpi"
(c e on-the-left) at 15:08:15 on Friday, 10 September 2010

RUN INFORMATION
****

RUN TITLE: Donore Road Quarry Access
LOCATION: Mullaghcrone Quarry
DATE: 10/09/10
CLIENT: Roadstone
ENUMERATOR: Brendan Ward [DUB-35LJ52J-BW]
JOB NUMBER: 6222
STATUS:
DESCRIPTION:

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS Donore Road East
ARM B IS Quarry Access
ARM C IS Donore Road West

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: Baseline 2010

TIME PERIOD BEGINS 08.15 AND ENDS 09.45

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	1.09	1.63	1.09
ARM B	15.00	45.00	75.00	0.09	0.13	0.09
ARM C	15.00	45.00	75.00	1.59	2.38	1.59

TIME	FROM/TO	TURNING PROPORTIONS TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
08.15 - 09.45	ARM A	0.000	0.103	0.897
		0.0	9.0	78.0
		(0.0)	(100.0)	(5.1)
	ARM B	0.857	0.000	0.143
		6.0	0.0	1.0
		(100.0)	(0.0)	(100.0)
	ARM C	0.992	0.008	0.000
		126.0	1.0	0.0
		(3.6)	(100.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET Baseline 2010
AND FOR TIME PERIOD 1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.15-08.30									
B-C	0.01	5.70	0.002		0.00	0.00	0.0		0.18
B-A	0.08	4.70	0.016		0.00	0.02	0.2		0.22
C-AB	0.02	6.97	0.002		0.00	0.00	0.0		0.14
C-A	1.58								
A-B	0.11								
A-C	0.98								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
8.30-08.45									
B-C	0.01	5.67	0.003		0.00	0.00	0.0		0.18
B-A	0.09	4.65	0.019		0.02	0.02	0.3		0.22
C-AB	0.02	7.18	0.003		0.00	0.00	0.0		0.14
C-A	1.88								
A-B	0.13								
A-C	1.17								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.45-09.00									
B-C	0.02	5.62	0.003		0.00	0.00	0.0		0.18
B-A	0.11	4.57	0.024		0.02	0.02	0.4		0.22
C-AB	0.03	7.47	0.004		0.00	0.00	0.1		0.13
C-A	2.30								
A-B	0.17								
A-C	1.43								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
09.00-09.15									
B-C	0.02	5.62	0.003		0.00	0.00	0.0		0.18
B-A	0.11	4.57	0.024		0.02	0.02	0.4		0.22
C-AB	0.03	7.47	0.004		0.00	0.00	0.1		0.13
C-A	2.30								
A-B	0.17								
A-C	1.43								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
09.15-09.30									
B-C	0.01	5.67	0.003		0.00	0.00	0.0		0.18
B-A	0.09	4.65	0.019		0.02	0.02	0.3		0.22
C-AB	0.02	7.18	0.003		0.00	0.00	0.0		0.14
C-A	1.88								
A-B	0.13								
A-C	1.17								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
9.30-09.45									
B-C	0.01	5.70	0.002		0.00	0.00	0.0		0.18
B-A	0.08	4.70	0.016		0.02	0.02	0.3		0.22
C-AB	0.02	6.97	0.002		0.00	0.00	0.0		0.14
C-A	1.58								
A-B	0.11								
A-C	0.98								

WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0
09.30	0.0
09.45	0.0

FIC DEMAND DATA

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: 2010 + gen

TIME PERIOD BEGINS 08.15 AND ENDS 09.45

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
M A	15.00	45.00	75.00	1.10	1.65	1.10
ARM B	15.00	45.00	75.00	0.10	0.15	0.10
ARM C	15.00	45.00	75.00	1.59	2.38	1.59

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C
08.15 09.45	ARM A	0.000	0.114	0.886
		0.0	10.0	78.0
		(0.0)	(100.0)	(1..
	ARM B	0.875	0.000	0.125
		7.0	0.0	1.0
		(100.0)	(0.0)	(100.0)
	ARM C	0.992	0.008	0.000
		126.0	1.0	0.0
		(1.6)	(100.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET 2010 + gen
AND FOR TIME PERIOD 1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.15-08.30									
B-C	0.01	5.68	0.002		0.00	0.00	0.0		0.18
B-A	0.09	4.71	0.019		0.00	0.02	0.3		0.22
C-AB	0.02	6.96	0.002		0.00	0.00	0.0		0.14
C-A	1.58								
A-B	0.13								
A-C	0.98								

QUEUE FOR STREAM B C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0
09.30	0.0
09.45	0.0

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0
09.30	0.0
09.45	0.0

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0
09.30	0.0
09.45	0.0

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: 2015 + gen

TIME PERIOD BEGINS 08.15 AND ENDS 09.45

LENGTH OF TIME PERIOD = 90 MINUTES.
LENGTH OF TIME SEGMENT = 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
ARM A	15.00	45.00	75.00	1.16	1.74	1.16
ARM B	15.00	45.00	75.00	0.10	0.15	0.10
ARM C	15.00	45.00	75.00	1.67	2.51	1.67

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
08.15 - 09.45	ARM A	0.000	0.118	0.882
		0.0	11.0	82.0
		(0.0)	(100.0)	(4.9)
	ARM B	0.875	0.000	0.125
		7.0	0.0	1.0
		(100.0)	(0.0)	(100.0)
	ARM C	0.993	0.007	0.000
		133.0	1.0	0.0
		(1.5)	(100.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET 2015 + gen
AND FOR TIME PERIOD 1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.15-08.30									
B-C	0.01	5.68	0.002		0.00	0.00	0.0		0.18
B-A	0.09	4.69	0.019		0.00	0.02	0.3		0.22
C-AB	0.02	7.02	0.002		0.00	0.00	0.0		0.14
C-A	1.67								
A-B	0.14								
A-C	1.03								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
B-C	0.01	5.64	0.003		0.00	0.00	0.0		0.18
B-A	0.10	4.63	0.023		0.02	0.02	0.3		0.22
C-AB	0.02	7.24	0.003		0.00	0.00	0.0		0.14
C-A	1.99								
A-B	0.16								
A-C	1.23								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.45-09.00									
B-C	0.02	5.59	0.003		0.00	0.00	0.0		0.18
B-A	0.13	4.56	0.028		0.02	0.03	0.4		0.23
C-AB	0.03	7.55	0.004		0.00	0.00	0.1		0.13
C-A	2.43								
A-B	0.20								
A-C	1.50								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
09.00-09.15									
B-C	0.02	5.59	0.003		0.00	0.00	0.0		0.18
B-A	0.13	4.56	0.028		0.03	0.03	0.4		0.23
C-AB	0.03	7.55	0.004		0.00	0.00	0.1		0.13
C-A	2.43								
A-B	0.20								
A-C	1.50								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
09.15-09.30									
B-C	0.01	5.64	0.003		0.00	0.00	0.0		0.18
B-A	0.10	4.63	0.023		0.03	0.03	0.4		0.22
C-AB	0.02	7.24	0.003		0.00	0.00	0.0		0.14
C-A	1.99								
A-B	0.16								
A-C	1.23								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
9.30-09.45									
B-C	0.01	5.67	0.002		0.00	0.00	0.0		0.18
B-A	0.09	4.69	0.019		0.02	0.02	0.3		0.22
C-AB	0.02	7.02	0.002		0.00	0.00	0.0		0.14
C-A	1.66								
A-B	0.14								
A-C	1.03								

WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-C

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0
09.30	0.0
09.45	0.0

TRL LIMITED

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4 ARM MAJOR/MINOR PRIORITY JUNCTIONS

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"W:\Projects\6222pp Roadstone Wood Waste Permits\05 Design\01 Calculations\Traffic\Picady\Mullaghcrone\
" 52 Crossroads AM.vpi"
(c le-on-the-left) at 16:04:07 on Friday, 10 September 2010

RUN INFORMATION
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RUN TITLE: R152 Crossroads
LOCATION: Mullaghcrone Quarry
DATE: 10/09/10
CLIENT: Roadstone
ENUMERATOR: Brendan Ward [DUB-35LJ52J-BW]
JOB NUMBER: 6222
STATUS:
DESCRIPTION:

.MAJOR/MINOR JUNCTION CAPACITY AND DELAY
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INPUT DATA

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                          MINOR ROAD (ARM D)
                               I
                               I
                               I
                               I
                               I
                               I
MAJOR ROAD (ARM C) -------------------- MAJOR ROAD (ARM A)
                               I
                               I
                               I
                               I
                               I
                               I
                          MINOR ROAD (ARM B)
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ARM A IS R152 North
ARM B IS Gaffney Road
ARM C IS R152 South
ARM D IS Platin Road

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B-AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

ARM	FLOW SCALE(%)
A	100
B	100
C	100
D	100

Demand set: Baseflow 2010

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD = 90 MINUTES.
LENGTH OF TIME SEGMENT = 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
ARM A	15.00	45.00	75.00	5.49	8.23	5.49
ARM B	15.00	45.00	75.00	0.95	1.42	0.95
ARM C	15.00	45.00	75.00	5.61	8.42	5.61
ARM D	15.00	45.00	75.00	0.61	0.92	0.61

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
07.45 - 09.15	ARM A	0.000	0.066	0.902	0.032
		0.0	29.0	396.0	14.0
		(0.0)	(0.0)	(7.5)	(7.1)
	ARM B	0.750	0.000	0.000	0.250
		57.0	0.0	0.0	19.0
		(7.0)	(0.0)	(0.0)	(0.0)
	ARM C	0.955	0.000	0.000	0.045
		429.0	0.0	0.0	20.0
		(7.5)	(0.0)	(0.0)	(20.0)
	ARM D	0.408	0.429	0.163	0.000
		20.0	21.0	8.0	0.0
		(5.0)	(0.0)	(50.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET Baseflow 2010
AND FOR TIME PERIOD 1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.45-08.00									
B-ACD	0.95	5.66	0.169		0.00	0.20	2.8		0.21
A-BCD	0.28	12.90	0.022		0.00	0.03	0.4		0.08
A-B	0.36								
A-C	4.87								
D-AB	0.39	9.05	0.043		0.00	0.04	0.6		0.12
D-BC	0.23	5.97	0.038		0.00	0.04	0.6		0.17
C-ABD	0.00	9.25	0.000		0.00	0.00	0.0		0.00
C-D	0.25								
C-A	5.38								

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-ACD	104.6	69.7	26.3	0.25	26.3	0.25
A-BCD	35.3	23.5	3.5	0.10	3.5	0.10
A-B	38.8	25.9				
A-C	530.1	353.4				
D-AB	42.4	28.3	5.3	0.12	5.3	0.12
D-BC	25.0	16.7	4.8	0.19	4.8	0.19
C-ABD	0.0	0.0	0.0	0.00	0.0	0.00
C-D	27.5	18.4				
C-A	590.5	393.7				
ALL	1394.3	929.5	39.9	0.03	39.9	0.03

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

.SLOPES AND INTERCPET

(NB:Streams may be combined, in which case capacity

will be adjusted)

B-C Stream

Intercept For Stream B-C	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
630.23	0.23	0.09

D-A Stream

Intercept For Stream D-A	Slope For Opposing Stream C-A	Slope For Opposing Stream C-D
763.98	0.28	0.11

B-A Stream

Intercept For Stream B-A	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream D-A	Slope For Opposing Stream D-B
482.67	0.21	0.21	0.21	0.21

Slope For Opposing Stream A-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream D-C
0.08	0.13	0.30	0.11

D-C Stream

Intercept For Stream D-C	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream B-C	Slope For Opposing Stream B-D
592.82	0.26	0.26	0.26	0.26

Slope For Opposing Stream C-D	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream B-A
0.10	0.16	0.37	0.13

C-B Stream

Stream C-B	Stream A-C	Stream A-D
704.26	0.26	0.37

A-D Stream

Intercept For Stream A-D	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B
704.26	0.26	0.37

B-D Stream From Left Hand Lane

Intercept For Stream B-D	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream A-B	Slope For Opposing Stream C-B
482.67	0.21	0.21	0.08	0.30

Slope For Opposing Stream C-A	Slope For Opposing Stream C-D
0.13	0.13

B-D Stream From Right Hand Lane

Intercept For Stream B-D	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream A-B	Slope For Opposing Stream C-B
482.67	0.21	0.21	0.08	0.30

Slope For Opposing Stream C-A	Slope For Opposing Stream C-D
0.13	0.13

D-B Stream From Left Hand Lane

Intercept For Stream D-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream D-C	Slope For Opposing Stream A-D
592.82	0.26	0.26	0.10	0.37

Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
0.16	0.16

D-B Stream From Right Hand Lane

Intercept For Stream D-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream C-D	Slope For Opposing Stream A-D
592.82	0.26	0.26	0.10	0.37

Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
0.16	0.16

TRAFFIC DEMAND DATA

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.00-08.15									
B ACD	1.15	5.21	0.222		0.21	0.28	4.0		0.25
A-BCD	0.37	13.29	0.028		0.03	0.04	0.5		0.08
A-B	0.42								
A-C	5.78								
D AB	0.47	8.37	0.056		0.05	0.06	0.9		0.13
D-BC	0.29	5.28	0.056		0.04	0.06	0.8		0.20
C-ABD	0.00	8.97	0.000		0.00	0.00	0.0		0.00
C-D	0.31								
C A	6.43								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.15-08.30									
B-ACD	1.41	4.68	0.302		0.28	0.42	6.0		0.30
A-BCD	0.52	13.83	0.038		0.04	0.05	0.8		0.08
A B	0.51								
A-C	7.02								
D-AB	0.58	7.73	0.075		0.06	0.08	1.2		0.14
D-BC	0.36	4.72	0.076		0.06	0.08	1.2		0.23
C-ABD	0.00	8.59	0.000		0.00	0.00	0.0		0.00
C-D	0.39								
C-A	7.87								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30 08.45									
B-ACD	1.41	4.68	0.302		0.42	0.43	6.4		0.31
A-BCD	0.52	13.83	0.038		0.05	0.05	0.8		0.08
A-B	0.51								
A-C	7.02								
D-AB	0.58	7.73	0.075		0.08	0.08	1.2		0.14
D-BC	0.36	4.72	0.076		0.08	0.08	1.2		0.23
C-ABD	0.00	8.59	0.000		0.00	0.00	0.0		0.00
C-D	0.39								
C-A	7.87								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.45-09.00									
B-ACD	1.15	5.21	0.222		0.43	0.29	4.6		0.25
A-BCD	0.37	13.29	0.028		0.05	0.04	0.5		0.08
A-B	0.42								
A-C	5.78								
D-AB	0.47	8.36	0.056		0.08	0.06	0.9		0.13
D-BC	0.29	5.28	0.056		0.08	0.06	0.9		0.20
C ABD	0.00	8.97	0.000		0.00	0.00	0.0		0.00
C-D	0.31								
C-A	6.43								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
09.00-09.15									
B-ACD	0.97	5.59	0.173		0.29	0.21	3.3		0.22
A-BCD	0.29	12.89	0.022		0.04	0.03	0.4		0.08
A-B	0.36								
A-C	4.87								
D-AB	0.39	8.82	0.045		0.06	0.05	0.7		0.12
D-BC	0.25	5.68	0.044		0.06	0.05	0.7		0.18
C ABD	0.00	9.25	0.000		0.00	0.00	0.0		0.00
C-D	0.26								
C-A	5.38								

WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B ACD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.2
08.15	0.3
08.30	0.4
08.45	0.4
09.00	0.3
09.15	0.2

QUEUE FOR STREAM A-BCD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.0
08.15	0.0
08.30	0.1
08.45	0.1
09.00	0.0
09.15	0.0

QUEUE FOR STREAM D-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.0
08.15	0.1
08.30	0.1
08.45	0.1
09.00	0.1
09.15	0.0

QUEUE FOR STREAM D-BC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.0
08.15	0.1
08.30	0.1
08.45	0.1
09.00	0.1
09.15	0.0

QUEUE FOR STREAM C-ABD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0

I Intercept For Slope For Opposing Slope For Opposing I

ARM	FLOW SCALE(%)
A	100
B	100
C	100
D	100

Demand set: 2015 + gen

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	5.82	8.74	5.82
ARM B	15.00	45.00	75.00	1.01	1.52	1.01
ARM C	15.00	45.00	75.00	5.96	8.94	5.96
ARM D	15.00	45.00	75.00	0.66	0.99	0.66

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
07.45 - 09.15	ARM A	0.000	0.067	0.901	0.032
		0.0	31.0	420.0	15.0
		(0.0)	(0.0)	(7.8)	(6.7)
	ARM B	0.741	0.000	0.000	0.259
		60.0	0.0	0.0	21.0
		(6.7)	(0.0)	(0.0)	(4.8)
	ARM C	0.954	0.000	0.000	0.046
		455.0	0.0	0.0	22.0
		(7.5)	(0.0)	(0.0)	(22.7)
	ARM D	0.396	0.434	0.170	0.000
		21.0	23.0	9.0	0.0
		(4.8)	(4.3)	(55.6)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET 2015 + gen
AND FOR TIME PERIOD 1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.45-08.00									
B-ACD	1.02	5.48	0.185		0.00	0.22	3.2		0.22
A-BCD	0.31	13.05	0.024		0.00	0.03	0.4		0.08
A-B	0.38								
A-C	5.15								
D-AB	0.41	8.71	0.047		0.00	0.05	0.7		0.12
D-BC	0.25	5.59	0.045		0.00	0.05	0.7		0.19
C-ABD	0.00	9.16	0.000		0.00	0.00	0.0		0.00
C-D	0.28								
C-A	5.71								

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-ACD	111.5	74.3	30.2	0.27	30.2	0.27
A-BCD	39.2	26.1	3.9	0.10	3.9	0.10
A-B	41.4	27.6				
A-C	560.8	373.9				
D-AB	45.3	30.2	6.0	0.13	6.0	0.13
D-BC	27.7	18.4	5.8	0.21	5.8	0.21
C-ABD	0.0	0.0	0.0	0.00	0.0	0.00
C-D	30.3	20.2				
C-A	626.3	417.5				
ALL	1482.4	988.3	45.9	0.03	45.9	0.03

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

========== end of file ==========

[Printed at 16:04:15 on 10/09/2010]

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	6.00 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC B)	2.20 M.
- VISIBILITY	(VC-B)	160.0 M.
- BLOCKS TRAFFIC		YES
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	20.0 M.
- VISIBILITY TO RIGHT	(VB A)	40.0 M.
- LANE 1 WIDTH	(WB-C)	3.30 M.
LANE 2 WIDTH	(WB-A)	0.00 M.

.SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity will be adjusted)

Intercept For Stream B-C	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
668.61	0.26	0.10

Intercept For Stream B-A	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B
518.82	0.24	0.09	0.15	0.34

Intercept For Stream C-B	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
666.62	0.26	0.26

NB These values do not allow for any site specific corrections

TRAFFIC DEMAND DATA

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: Baseline 2010

TIME PERIOD BEGINS 16.30 AND ENDS 18.00

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	TOP OF PEAK IS REACHED	FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	AT TOP OF PEAK	AFTER PEAK
ARM A	15.00	45.00	75.00	0.75	1.13	0.75
ARM B	15.00	45.00	75.00	0.08	0.11	0.08
ARM C	15.00	45.00	75.00	0.63	0.94	0.63

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.30-17.45									
B-AC	0.09	4.16	0.022		0.03	0.02	0.3		0.25
C-AB	0.00	9.86	0.000		0.00	0.00	0.0		0.00
C-A	0.75								
A-B	0.12								
A-C	0.78								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.45-18.00									
B-AC	0.08	4.19	0.018		0.02	0.02	0.3		0.24
C-AB	0.00	9.90	0.000		0.00	0.00	0.0		0.00
C-A	0.63								
A-B	0.10								
A-C	0.65								

WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-AC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0
18.00	0.0

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.0
17.00	0.0
.15	0.0
.30	0.0
17.45	0.0
18.00	0.0

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: 2010 + gen

TIME PERIOD BEGINS 16.30 AND ENDS 18.00

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
ARM A	15.00	45.00	75.00	0.77	1.16	0.77
ARM B	15.00	45.00	75.00	0.10	0.15	0.10
ARM C	15.00	45.00	75.00	0.63	0.94	0.63

TIME	FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
16.30 - 18.00	ARM A	0.000	0.161	0.839
		0.0	10.0	52.0
		(0.0)	(100.0)	(0.0)
	ARM B	1.000	0.000	0.000
		8.0	0.0	0.0
		(100.0)	(0.0)	(0.0)
	ARM C	1.000	0.000	0.000
		50.0	0.0	0.0
		(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

T PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET 2010 + gen
AND FOR TIME PERIOD 1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.30-16.45									
B-AC	0.10	4.19	0.024		0.00	0.02	0.3		0.24
C-AB	0.00	9.89	0.000		0.00	0.00	0.0		0.00
C-A	0.63								
A-B	0.13								
A-C	0.65								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
B-AC	0.12	4.16	0.029		0.02	0.03	0.4		0.25
C-AB	0.00	9.85	0.000		0.00	0.00	0.0		0.00
C-A	0.75								
A-B	0.15								
A-C	0.78								

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-AC	11.0	7.3	2.7	0.24	2.7	0.24
C-AB	0.0	0.0	0.0	0.00	0.0	0.00
C-A	68.8	45.9				
A-B	13.8	9.2				
A-C	71.6	47.7				
ALL	165.2	110.1	2.7	0.02	2.7	0.02

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

. PES AND INTERCEPT

(NB:Streams may be combined, in which case capacity

will be adjusted)

Intercept For Stream B-C	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
668.61	0.26	0.10

Intercept For Stream B-A	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B
518.82	0.24	0.09	0.15	0.34

Intercept For Stream C-B	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
666.62	0.26	0.26

NB These values do not allow for any site specific corrections

TRAFFIC DEMAND DATA

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
B-AC	0.15	4.11	0.036		0.03	0.04	0.5		0.25
C-AB	0.00	9.78	0.000		0.00	0.00	0.0		0.00
C-A	0.97								
A-B	0.18								
A-C	1.01								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.15-17.30									
B-AC	0.15	4.11	0.036		0.04	0.04	0.5		0.25
C-AB	0.00	9.78	0.000		0.00	0.00	0.0		0.00
C-A	0.97								
A-B	0.18								
A-C	1.01								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.30-17.45									
B-AC	0.12	4.15	0.029		0.04	0.03	0.5		0.25
C-AB	0.00	9.84	0.000		0.00	0.00	0.0		0.00
C-A	0.79								
A-B	0.15								
A-C	0.82								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.45-18.00									
B-AC	0.10	4.18	0.024		0.03	0.02	0.4		0.25
C-AB	0.00	9.88	0.000		0.00	0.00	0.0		0.00
C-A	0.67								
A-B	0.13								
A-C	0.69								

WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-AC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0
18.00	0.0

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
.45	0.0
.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0
18.00	0.0

TRL LIMITED

CAPACITIES, QUEUES, AND DELAYS AT 3 OR 4-ARM MAJOR/MINOR PRIORITY JUNCTIONS

PICADY 5.0 ANALYSIS PROGRAM
RELEASE 3.0 (JUNE 2006)

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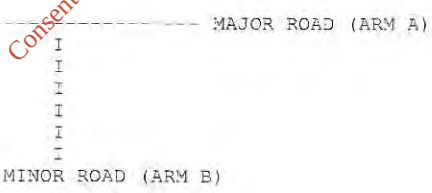
Run with file:-
"W:\Projects\6222pp Roadstone Wood Waste Permits\05 Design\01 Calculations\Traffic\Picady\Mullaghcrone\
Platin Road Access AM.vpi"
(d on-the-left) at 15:18:12 on Friday, 10 September 2010

RUN INFORMATION
****

RUN TITLE: Donore Road Quarry Access
LOCATION: Mullaghcrone Quarry
DATE: 10/09/10
CLIENT: Roadstone
ENUMERATOR: Brendan Ward [DUB-35LJ52J-BW]
JOB NUMBER: 6222
STATUS:
DESCRIPTION:

,MAJOR/MINOR JUNCTION CAPACITY AND DELAY
****

INPUT DATA



ARM A IS Platin Road South
ARM B IS Quarry Access
ARM C IS Platin Road North

STREAM LABELLING CONVENTION

STREAM A-B CONTAINS TRAFFIC GOING FROM ARM A TO ARM B

STREAM B AC CONTAINS TRAFFIC GOING FROM ARM B TO ARM A AND TO ARM C

ETC.

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C
07.45 - 09.15	ARM A	0.000	0.094	0.906
		0.0	5.0	48.0
		(0.0)	(100.0)	(0.0)
	ARM B	1.000	0.000	0.000
		5.0	0.0	0.0
		(100.0)	(0.0)	(0.0)
	ARM C	1.000	0.000	0.000
		44.0	0.0	0.0
		(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET Baseline 2010
AND FOR TIME PERIOD 1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.45-08.00									
B-AC	0.06	4.20	0.015		0.00	0.01	0.2		0.24
C-AB	0.00	9.93	0.000		0.00	0.00	0.0		0.00
C-A	0.55								
A-B	0.06								
A-C	0.60								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.00-08.15									
B-AC	0.07	4.18	0.018		0.01	0.02	0.3		0.24
C-AB	0.00	9.90	0.000		0.00	0.00	0.0		0.00
C-A	0.66								
A-B	0.07								
A-C	0.72								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.15-08.30									
B-AC	0.09	4.15	0.022		0.02	0.02	0.3		0.25
C-AB	0.00	9.85	0.000		0.00	0.00	0.0		0.00
C-A	0.81								
A-B	0.09								
A-C	0.88								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
B-AC	0.09	4.15	0.022		0.02	0.02	0.3		0.25
C-AB	0.00	9.85	0.000		0.00	0.00	0.0		0.00
C-A	0.81								
A-B	0.09								
A-C	0.88								

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-AC	6.9	4.6	1.7	0.24	1.7	0.24
C-AB	0.0	0.0	0.0	0.00	0.0	0.00
C-A	60.6	40.4				
A-B	6.9	4.6				
A-C	66.1	44.0				
ALL	140.4	93.6	1.7	0.01	1.7	0.01

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
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* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

. PES AND INTERCEPT

(NB:Streams may be combined, in which case capacity

will be adjusted)

Intercept For Stream B-C	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
668.61	0.26	0.10

Intercept For Stream B-A	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B
518.82	0.24	0.09	0.15	0.34

Intercept For Stream C-B	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
666.62	0.26	0.26

NB These values do not allow for any site specific corrections

TRAFFIC DEMAND DATA

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.15 08.30									
B-AC	0.13	4.15	0.031		0.03	0.03	0.5		0.25
C-AB	0.00	9.83	0.000		0.00	0.00	0.0		0.00
C-A	0.81								
A-B	0.13								
A-C	0.88								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.30-08.45									
B-AC	0.13	4.15	0.031		0.03	0.03	0.5		0.25
C-AB	0.00	9.83	0.000		0.00	0.00	0.0		0.00
C-A	0.81								
A-B	0.13								
A-C	0.88								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.45-09.00									
B-AC	0.10	4.18	0.025		0.03	0.03	0.4		0.25
C-AB	0.00	9.88	0.000		0.00	0.00	0.0		0.00
C-A	0.66								
A-B	0.10								
A-C	0.72								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
09.00-09.15									
B-AC	0.09	4.20	0.021		0.03	0.02	0.3		0.24
C-AB	0.00	9.92	0.000		0.00	0.00	0.0		0.00
C-A	0.55								
A-B	0.09								
A-C	0.60								

WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-AC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
08.00	0.0
08.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
.00	0.0
.15	0.0
08.30	0.0
08.45	0.0
09.00	0.0
09.15	0.0

ARM	FLOW SCALE(%)
A	100
B	100
C	100

Demand set: 2015 + gen

TIME PERIOD BEGINS 07.45 AND ENDS 09.15

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
ARM A	15.00	45.00	75.00	0.73	1.09	0.73
ARM B	15.00	45.00	75.00	0.09	0.13	0.09
ARM C	15.00	45.00	75.00	0.59	0.88	0.59

TIME		FROM/TO	TURNING PROPORTIONS / TURNING COUNTS (VEH/HR) / (PERCENTAGE OF H.V.S) ARM A	ARM B	ARM C
07.45	09.15	ARM A	0.000	0.121	0.879
			0.0	7.0	51.0
			(0.0)	(100.0)	(0.0)
		ARM B	1.000	0.000	0.000
			7.0	0.0	0.0
			(100.0)	(0.0)	(0.0)
		ARM C	1.000	0.000	0.000
			47.0	0.0	0.0
			(0.0)	(0.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

T PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET 2015 + gen
AND FOR TIME PERIOD 1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
07.45-08.00									
B-AC	0.09	4.19	0.021		0.00	0.02	0.3		0.24
C-AB	0.00	9.91	0.000		0.00	0.00	0.0		0.00
C-A	0.59								
A-B	0.09								
A-C	0.64								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
08.00-08.15									
B-AC	0.10	4.17	0.025		0.02	0.03	0.4		0.25
C-AB	0.00	9.87	0.000		0.00	0.00	0.0		0.00
C-A	0.70								
A-B	0.10								
A-C	0.76								

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-AC	9.6	6.4	2.3	0.24	2.3	0.24
C-AB	0.0	0.0	0.0	0.00	0.0	0.00
C A	64.7	43.1				
A B	9.6	6.4				
A C	70.2	46.8				
ALL	154.2	102.8	2.3	0.02	2.3	0.02

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

== ========== end of file ==========

[Printed at 15:18:21 on 10/09/2010]

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH	(W)	7.40 M.
CENTRAL RESERVE WIDTH	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN - WIDTH	(WC-B)	2.20 M.
- VISIBILITY	(VC B)	225.0 M.
BLOCKS TRAFFIC		YES
MINOR ROAD - VISIBILITY TO LEFT	(VB-C)	30.0 M.
- VISIBILITY TO RIGHT	(VB-A)	25.0 M.
- LANE 1 WIDTH	(WB-C)	-
- LANE 2 WIDTH	(WB-A)	-
- WIDTH AT 0 M FROM JUNC.		10.00 M.
WIDTH AT 5 M FROM JUNC.		10.00 M.
- WIDTH AT 10 M FROM JUNC.		10.00 M.
- WIDTH AT 15 M FROM JUNC.		9.20 M.
- WIDTH AT 20 M FROM JUNC.		5.60 M.
LENGTH OF FLARED SECTION	DERIVED:	3 PCU

TYPES AND INTERCEPT

(NE:Streams may be combined, in which case capacity

will be adjusted)

Intercept For Stream B-C	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
588.44	0.21	0.08

Intercept For Stream B-A	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B
459.58	0.20	0.08	0.13	0.28

Intercept For Stream C-B	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
704.26	0.26	0.26

NB These values do not allow for any site specific corrections

TRAFFIC DEMAND DATA

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
14.45	0.0
15.00	0.0
15.15	0.0
15.30	0.0
15.45	0.0
16.00	0.0

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
14.15	0.0
15.00	0.0
15.15	0.0
15.30	0.0
15.45	0.0
16.00	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-C	2.8	1.8	0.4	0.13	0.4	0.13
B-A	11.0	7.3	2.3	0.21	2.3	0.21
C-AB	1.6	1.1	0.1	0.08	0.1	0.08
C-A	178.7	119.1				
A-B	11.0	7.3				
A-C	172.1	114.7				
ALL	377.1	251.4	2.8	0.01	2.8	0.01

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

.' TYPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity

will be adjusted)

Intercept For Stream B-C	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
588.44	0.21	0.08

Intercept For Stream B-A	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B
459.58	0.20	0.08	0.13	0.28

Intercept For Stream C-B	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
704.26	0.26	0.26

NB These values do not allow for any site specific corrections

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
14.45-15.00									
B-C	0.03	7.45	0.004		0.00	0.00	0.1		0.13
B-A	0.13	4.80	0.028		0.02	0.03	0.4		0.21
C-AB	0.02	12.36	0.001		0.00	0.00	0.0		0.08
C-A	1.95								
A-B	0.13								
A-C	1.87								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
15.00-15.15									
B-C	0.04	7.36	0.005		0.00	0.00	0.1		0.14
B-A	0.17	4.69	0.035		0.03	0.04	0.5		0.22
C-AB	0.02	12.50	0.002		0.00	0.00	0.0		0.08
C-A	2.38								
A-B	0.17								
A-C	2.29								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
15.15-15.30									
B-C	0.04	7.36	0.005		0.00	0.01	0.1		0.14
B-A	0.17	4.69	0.035		0.04	0.04	0.5		0.22
C-AB	0.02	12.50	0.002		0.00	0.00	0.0		0.08
C-A	2.38								
A-B	0.17								
A-C	2.29								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
15.30-15.45									
B-C	0.03	7.45	0.004		0.01	0.00	0.1		0.13
B-A	0.13	4.80	0.028		0.04	0.03	0.5		0.21
C-AB	0.02	12.36	0.001		0.00	0.00	0.0		0.08
C-A	1.95								
A-B	0.13								
A-C	1.87								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
15.45-16.00									
B-C	0.03	7.51	0.003		0.00	0.00	0.1		0.13
B-A	0.11	4.87	0.023		0.03	0.02	0.4		0.21
C-AB	0.01	12.25	0.001		0.00	0.00	0.0		0.08
C-A	1.63								
A-B	0.11								
A-C	1.57								

WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-C	2.8	1.8	0.4	0.13	0.4	0.13
B-A	12.4	8.3	2.6	0.21	2.6	0.21
C-AB	1.6	1.1	0.1	0.08	0.1	0.08
C-A	178.7	119.1				
A-B	12.4	8.3				
A C	172.1	114.7				
ALL	379.9	253.3	3.1	0.01	3.1	0.01

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

EN OF JOB

.SLOPES AND INTERCEPT

(NB:Streams may be combined, in which case capacity

will be adjusted)

Intercept For Stream B-C	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
588.44	0.21	0.08

Intercept For Stream B-A	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B
459.58	0.20	0.08	0.13	0.28

Intercept For Stream C-B	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
704.26	0.26	0.26

NB These values do not allow for any site specific corrections

TRAFFIC DEMAND DATA

QUEUE FOR STREAM B-A

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
14.45	0.0
15.00	0.0
15.15	0.0
15.30	0.0
15.45	0.0
16.00	0.0

QUEUE FOR STREAM C-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
14.45	0.0
15.00	0.0
15.15	0.0
15.30	0.0
15.45	0.0
16.00	0.0

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-C	2.8	1.8	0.4	0.13	0.4	0.13
B-A	12.4	8.3	2.7	0.21	2.7	0.21
C-AB	1.7	1.1	0.1	0.08	0.1	0.08
C-A	188.3	125.5				
A-B	12.4	8.3				
A-C	181.7	121.1				
ALL	399.2	266.1	3.2	0.01	3.2	0.01

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD.
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

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[Printed at 15:11:31 on 10/09/2010]

GEOMETRIC DATA

DATA ITEM		MINOR ROAD B		MINOR ROAD D	
TOTAL MAJOR ROAD CARRIAGEWAY WIDTH		(W)	7.00 M.	(W)	7.00 M.
CENTRAL RESERVE WIDTH		(WCR)	0.00 M.	(WCR)	0.00 M.
MAJOR ROAD RIGHT TURN	- WIDTH	(WC-B)	2.20 M.	(WA-D)	2.20 M.
	- VISIBILITY	(VC-B)	225.0 M.	(VA-D)	225.0 M.
	- BLOCKS TRAFFIC		YES		YES
MINOR ROAD	- VISIBILITY TO LEFT	(VB-C)	0.0 M.	(VD-A)	20.0 M.
	- VISIBILITY TO RIGHT	(VB-A)	10.0 M.	(VD-C)	20.0 M.
	- LANE 1 WIDTH	(WB-C)	3.00 M.	(WD-A)	5.00 M.
	- LANE 2 WIDTH	(WB-A)	0.00 M.	(WD-C)	5.00 M.

.SLOPES AND INTERCPET

(NB:Streams may be combined, in which case capacity

will be adjusted)

B Stream

Intercept For Stream B-C	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
630.23	0.23	0.09

D-A Stream

Intercept For Stream D-A	Slope For Opposing Stream C-A	Slope For Opposing Stream C-D
763.98	0.28	0.11

B-A Stream

Intercept For Stream B-A	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream D-A	Slope For Opposing Stream D-B
482.67	0.21	0.21	0.21	0.21

Slope For Opposing Stream A-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream D-C
0.08	0.13	0.30	0.11

D-C Stream

Intercept For Stream D-C	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream B-C	Slope For Opposing Stream B-D
592.82	0.26	0.26	0.26	0.26

Slope For Opposing Stream C-D	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream B-A
0.10	0.16	0.37	0.13

C-B Stream

Intercept For Stream C-B	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D
704.26	0.26	0.37

A-D Stream

Intercept For Stream A-D	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B

704.26	0.26	0.37	

B-D Stream From Left Hand Lane

Intercept For Stream B-D	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream A-B	Slope For Opposing Stream C-B
482.67	0.21	0.21	0.08	0.30

	Slope For Opposing Stream C-A	Slope For Opposing Stream C-D	Slope For Opposing	Slope For Opposing
	0.13	0.13		

B-D Stream From Right Hand Lane

Intercept For Stream B-D	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream A-B	Slope For Opposing Stream C-B
482.67	0.21	0.21	0.08	0.30

	Slope For Opposing Stream C-A	Slope For Opposing Stream C-D	Slope For Opposing	Slope For Opposing
	0.13	0.13		

D-B Stream From Left Hand Lane

Intercept For Stream D-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D
592.82	0.26	0.26	0.10	0.37

	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B	Slope For Opposing	Slope For Opposing
	0.16	0.16		

D-B Stream From Right Hand Lane

Intercept For Stream D-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream C-D	Slope For Opposing Stream A-D
592.82	0.26	0.26	0.10	0.37

	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B	Slope For Opposing	Slope For Opposing
	0.16	0.16		

TRAFFIC DEMAND DATA

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
B-ACD	0.81	5.31	0.152		0.13	0.18	2.6		0.22
A-BCD	0.29	14.07	0.021		0.02	0.03	0.4		0.07
A-B	1.12								
A-C	5.51								
D-AB	0.48	8.20	0.059		0.05	0.06	0.9		0.13
D-BC	0.35	6.00	0.059		0.05	0.06	0.9		0.18
C-ABD	0.03	14.27	0.002		0.00	0.00	0.0		0.07
C-D	0.39								
C-A	6.66								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
B-ACD	0.99	4.79	0.207		0.18	0.26	3.7		0.26
A-BCD	0.41	14.61	0.028		0.03	0.04	0.5		0.07
A-B	1.36								
A-C	6.71								
D-AB	0.60	7.58	0.079		0.06	0.08	1.2		0.14
D-BC	0.43	5.39	0.080		0.06	0.09	1.2		0.20
C-ABD	0.04	14.85	0.003		0.00	0.00	0.0		0.07
C-D	0.48								
C-A	8.15								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.15-17.30									
B-ACD	0.99	4.79	0.207		0.26	0.26	3.9		0.26
A-BCD	0.41	14.61	0.028		0.04	0.04	0.5		0.07
A-B	1.36								
A-C	6.71								
D-AB	0.60	7.58	0.079		0.08	0.08	1.3		0.14
D-BC	0.43	5.39	0.080		0.09	0.09	1.3		0.20
C-ABD	0.04	14.85	0.003		0.00	0.00	0.0		0.07
C-D	0.48								
C-A	8.15								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.30-17.45									
B-ACD	0.81	5.31	0.152		0.26	0.18	2.9		0.22
A-BCD	0.29	14.07	0.021		0.04	0.03	0.4		0.07
A-B	1.12								
A-C	5.51								
D-AB	0.48	8.20	0.059		0.08	0.06	1.0		0.13
D-BC	0.35	6.00	0.059		0.09	0.06	1.0		0.18
C-ABD	0.03	14.27	0.002		0.00	0.00	0.0		0.07
C-D	0.39								
C-A	6.66								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.45-18.00									
B-ACD	0.68	5.68	0.119		0.18	0.14	2.1		0.20
A-BCD	0.22	13.67	0.016		0.03	0.02	0.3		0.07
A-B	0.94								
A-C	4.63								
D-AB	0.40	8.64	0.047		0.06	0.05	0.8		0.12
D-BC	0.30	6.43	0.046		0.06	0.05	0.8		0.16
C-ABD	0.02	13.84	0.001		0.00	0.00	0.0		0.07
C-D	0.33								
C-A	5.58								

WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B-ACD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.1
17.00	0.2
17.15	0.3
17.30	0.3
17.45	0.2
18.00	0.1

QUEUE FOR STREAM A-BCD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0
18.00	0.0

QUEUE FOR STREAM D-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.0
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.0

QUEUE FOR STREAM D-BC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.0
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.0

QUEUE FOR STREAM C-ABD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0
18.00	0.0

I Intercept For Slope For Opposing Slope For Opposing I

ARM	FLOW SCALE(%)
A	100
B	100
C	100
D	100

Demand set: 2010 + gen

TIME PERIOD BEGINS 16.30 AND ENDS 18.00

LENGTH OF TIME PERIOD - 90 MINUTES.
LENGTH OF TIME SEGMENT - 15 MINUTES.

DEMAND FLOW PROFILES ARE SYNTHESISED FROM TURNING COUNT DATA

ARM	NUMBER OF MINUTES FROM START WHEN FLOW STARTS TO RISE	NUMBER OF MINUTES FROM START WHEN TOP OF PEAK IS REACHED	NUMBER OF MINUTES FROM START WHEN FLOW STOPS FALLING	RATE OF FLOW (VEH/MIN) BEFORE PEAK	RATE OF FLOW (VEH/MIN) AT TOP OF PEAK	RATE OF FLOW (VEH/MIN) AFTER PEAK
ARM A	15.00	45.00	75.00	5.78	8.66	5.78
ARM B	15.00	45.00	75.00	0.69	1.03	0.69
ARM C	15.00	45.00	75.00	5.91	8.87	5.91
ARM D	15.00	45.00	75.00	0.73	1.09	0.73

TURNING PROPORTIONS
TURNING COUNTS (VEH/HR)
(PERCENTAGE OF H.V.S)

TIME	FROM/TO	ARM A	ARM B	ARM C	ARM D
16.30 - 18.00					
	ARM A	0.000	0.165	0.812	0.024
		0.0	76.0	375.0	11.0
		(0.0)	(6.6)	(4.8)	(0.0)
	ARM B	0.564	0.000	0.000	0.436
		31.0	0.0	0.0	24.0
		(3.2)	(0.0)	(0.0)	(12.5)
	ARM C	0.941	0.002	0.000	0.057
		445.0	1.0	0.0	27.0
		(3.4)	(0.0)	(0.0)	(25.9)
	ARM D	0.379	0.362	0.259	0.000
		22.0	21.0	15.0	0.0
		(4.5)	(19.0)	(20.0)	(0.0)

TURNING PROPORTIONS ARE CALCULATED FROM TURNING COUNT DATA

THE PERCENTAGE OF HEAVY VEHICLES VARIES OVER TURNING MOVEMENTS

QUEUE AND DELAY INFORMATION FOR EACH 15 MIN TIME SEGMENT

FOR DEMAND SET 2010 + gen
AND FOR TIME PERIOD 1

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.30-16.45									
B ACD	0.69	5.59	0.123		0.00	0.14	2.0		0.20
A-BCD	0.22	13.67	0.016		0.00	0.02	0.3		0.07
A-B	0.94								
A-C	4.63								
D AB	0.41	8.43	0.049		0.00	0.05	0.7		0.12
D BC	0.32	6.11	0.052		0.00	0.05	0.8		0.17
C-ABD	0.02	13.84	0.001		0.00	0.00	0.0		0.07
C-D	0.34								
C-A	5.58								

QUEUEING DELAY INFORMATION OVER WHOLE PERIOD

STREAM	TOTAL DEMAND (VEH)	TOTAL DEMAND (VEH/H)	* QUEUEING * DELAY * (MIN)	* QUEUEING * DELAY * (MIN/VEH)	* INCLUSIVE QUEUEING * DELAY * (MIN)	* INCLUSIVE QUEUEING * DELAY * (MIN/VEH)
B-ACD	75.7	50.5	17.7	0.23	17.7	0.23
A-BCD	27.7	18.5	2.4	0.09	2.4	0.09
A-B	102.5	68.3				
A-C	505.7	337.1				
D-AB	45.4	30.2	6.2	0.14	6.2	0.14
D-BC	34.5	23.0	6.6	0.19	6.6	0.19
C-ABD	2.6	1.7	0.2	0.07	0.2	0.07
C-D	37.1	24.7				
C-A	611.4	407.6				
ALL	1442.5	961.7	33.1	0.02	33.1	0.02

* DELAY IS THAT OCCURRING ONLY WITHIN THE TIME PERIOD .
* INCLUSIVE DELAY INCLUDES DELAY SUFFERED BY VEHICLES WHICH ARE STILL QUEUEING AFTER THE END OF THE TIME PERIOD.
* THESE WILL ONLY BE SIGNIFICANTLY DIFFERENT IF THERE IS A LARGE QUEUE REMAINING AT THE END OF THE TIME PERIOD.

END OF JOB

.SLOPES AND INTERCPET

(NB:Streams may be combined, in which case capacity

will be adjusted)

B-C Stream

Intercept For Stream B-C	Slope For Opposing Stream A-C	Slope For Opposing Stream A-B
630.23	0.23	0.09

D-A Stream

Intercept For Stream D-A	Slope For Opposing Stream C-A	Slope For Opposing Stream C-D
763.98	0.28	0.11

B-A Stream

Intercept For Stream B-A	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream D-A	Slope For Opposing Stream D-B
482.67	0.21	0.21	0.21	0.21

Slope For Opposing Stream A-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream D-C
0.08	0.13	0.30	0.11

D-C Stream

Intercept For Stream D-C	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream B-C	Slope For Opposing Stream B-D
592.82	0.26	0.26	0.26	0.26

Slope For Opposing Stream C-D	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream B-A
0.10	0.16	0.37	0.13

C-B Stream

Stream C-B	Stream A-C	Stream A-D
704.26	0.26	0.37

A-D Stream

Intercept For Stream A-D	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B
704.26	0.26	0.37

B-D Stream From Left Hand Lane

Intercept For Stream B-D	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream A-B	Slope For Opposing Stream C-B
482.67	0.21	0.21	0.08	0.30

Slope For Opposing Stream C-A	Slope For Opposing Stream C-D	Slope For Opposing	Slope For Opposing
0.13	0.13		

B-D Stream From Right Hand Lane

Intercept For Stream B-D	Slope For Opposing Stream A-C	Slope For Opposing Stream A-D	Slope For Opposing Stream A-B	Slope For Opposing Stream C-B
482.67	0.21	0.21	0.08	0.30

Slope For Opposing Stream C-A	Slope For Opposing Stream C-D	Slope For Opposing	Slope For Opposing
0.13	0.13		

D-B Stream From Left Hand Lane

Intercept For Stream D-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream D-C	Slope For Opposing Stream A-D
592.82	0.26	0.26	0.10	0.37

Slope For Opposing Stream A-C	Slope For Opposing Stream A-B	Slope For Opposing	Slope For Opposing
0.16	0.16		

D-B Stream From Right Hand Lane

Intercept For Stream D-B	Slope For Opposing Stream C-A	Slope For Opposing Stream C-B	Slope For Opposing Stream C-D	Slope For Opposing Stream A-D
592.82	0.26	0.26	0.10	0.37

Slope For Opposing Stream A-C	Slope For Opposing Stream A-B	Slope For Opposing	Slope For Opposing
0.16	0.16		

TRAFFIC DEMAND DATA

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
16.45-17.00									
B-ACD	0.87	5.10	0.170		0.15	0.20	2.9		0.24
A-BCD	0.33	14.20	0.023		0.02	0.03	0.4		0.07
A-B	1.17								
A-C	5.82								
D-AB	0.52	7.84	0.066		0.05	0.07	1.0		0.14
D-BC	0.40	5.59	0.071		0.06	0.08	1.1		0.19
C-ABD	0.03	14.43	0.002		0.00	0.00	0.0		0.07
C-D	0.42								
C-A	7.06								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.00-17.15									
B-ACD	1.06	4.56	0.234		0.20	0.30	4.3		0.29
A-BCD	0.46	14.78	0.031		0.03	0.04	0.6		0.07
A-B	1.43								
A-C	7.08								
D-AB	0.64	7.16	0.089		0.07	0.10	1.4		0.15
D-BC	0.48	4.98	0.097		0.08	0.11	1.5		0.22
C-ABD	0.04	15.04	0.003		0.00	0.00	0.0		0.07
C-D	0.51								
C-A	8.64								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.15-17.30									
B-ACD	1.06	4.56	0.234		0.30	0.30	4.5		0.29
A-BCD	0.46	14.78	0.031		0.04	0.04	0.6		0.07
A-B	1.43								
A-C	7.08								
D-AB	0.64	7.16	0.089		0.10	0.10	1.5		0.15
D-BC	0.48	4.97	0.097		0.11	0.11	1.6		0.22
C-ABD	0.04	15.04	0.003		0.00	0.00	0.0		0.07
C-D	0.51								
C-A	8.64								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.30-17.45									
B-ACD	0.87	5.10	0.170		0.30	0.21	3.3		0.24
A-BCD	0.33	14.20	0.023		0.04	0.03	0.4		0.07
A-B	1.17								
A-C	5.82								
D-AB	0.52	7.83	0.066		0.10	0.07	1.1		0.14
D-BC	0.40	5.59	0.071		0.11	0.08	1.2		0.19
C-ABD	0.03	14.43	0.002		0.00	0.00	0.0		0.07
C-D	0.42								
C-A	7.06								

TIME	DEMAND (VEH/MIN)	CAPACITY (VEH/MIN)	DEMAND/ CAPACITY (RFC)	PEDESTRIAN FLOW (PEDS/MIN)	START QUEUE (VEHS)	END QUEUE (VEHS)	DELAY (VEH.MIN/ TIME SEGMENT)	GEOMETRIC DELAY (VEH.MIN/ TIME SEGMENT)	AVERAGE DELAY PER ARRIVING VEHICLE (MIN)
17.45-18.00									
B-ACD	0.73	5.49	0.132		0.21	0.16	2.4		0.21
A-BCD	0.25	13.78	0.018		0.03	0.02	0.3		0.07
A-B	0.99								
A-C	4.90								
D-AB	0.43	8.31	0.052		0.07	0.06	0.8		0.13
D-BC	0.33	6.04	0.055		0.08	0.06	0.9		0.18
C-ABD	0.02	13.98	0.002		0.00	0.00	0.0		0.07
C-D	0.35								
C-A	5.91								

WARNING NO MARGINAL ANALYSIS OF CAPACITIES AS MAJOR ROAD BLOCKING MAY OCCUR

QUEUE FOR STREAM B ACD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.2
17.00	0.2
17.15	0.3
17.30	0.3
17.45	0.2
18.00	0.2

QUEUE FOR STREAM A-BCD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
.45	0.0
.00	0.0

QUEUE FOR STREAM D-AB

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.1
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1

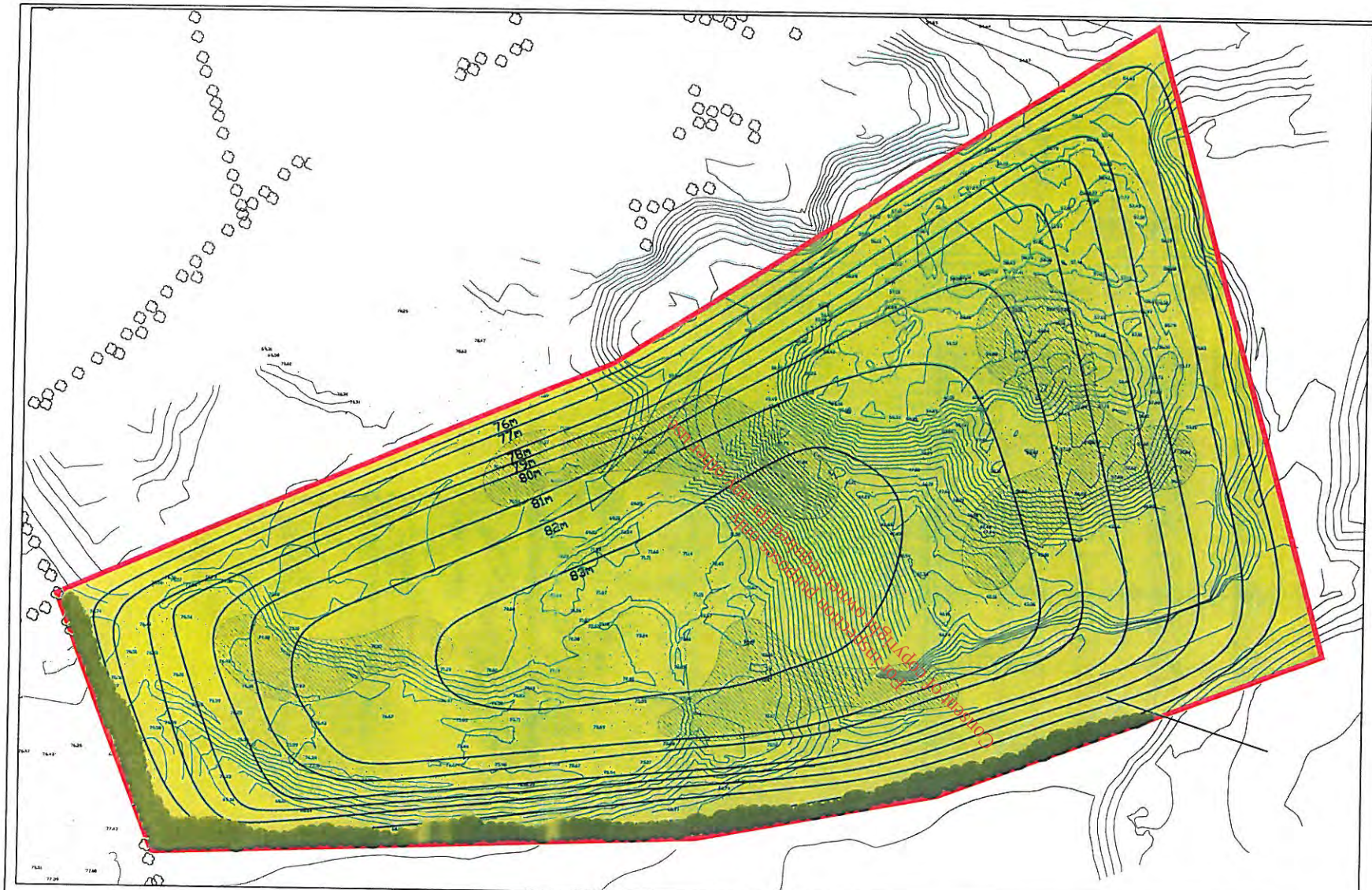
QUEUE FOR STREAM D-BC

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.1
17.00	0.1
17.15	0.1
17.30	0.1
17.45	0.1
18.00	0.1

QUEUE FOR STREAM C-ABD

TIME SEGMENT ENDING	NO. OF VEHICLES IN QUEUE
16.45	0.0
17.00	0.0
17.15	0.0
17.30	0.0
17.45	0.0
18.00	0.0

APPENDIX 14.1
Landscaping restoration master plan and earthworks specification



LEGEND

- Site boundary
- Grass seeding
- Meadow seeding
- Native hedgerow

PLANTING SCHEDULE

CG=Container grown, BR=bare root, RB= Root balled

GRASS SEEDING

Seed mix:	App rate:	Supplier:
Coburns Low Maintenance	35-50gr/sq.	James Coburn & son Ltd 32 Scarva Street, Banbridge, Co.Down, Northern Ireland. Ph: 00 44 (0) 28 40662207 Email: sales@coburns.net

MEADOW MIX (150mm topsoil)

Seed Mix	App rate:	Supplier:
WF03 - Wild Flower for diodiversity	1.5 gr/sq.m (with 1.5 gr/sq.m grass seed)	Design by Nature Creity Yard, Co.Laois (Via Carlow Post Office) Ph: 056 4442526 Email: sales@wildflowers.ie

NATIVE HEDGEROW (Planted in 450mm topsoil)

Species to be planted 10% standard trees and 90% whip trees with species evenly sperad thoughout mix

Species:	Size:	Condition:
1+1 trans feathered		
Corylus avellana	1000-1200mm br	feathered
Fraxinus excelsior	1000-1200mm br	feathered
Crataegus mongyna	1000-1200mm br	feathered
Prunus spinosa	1000-1200mm br	feathered
Ligustrum vulgare	3lt cg	bushy min 6 breaks
Rosa canina	3lt cg	branched min 4 breaks

1:1500@A3

NOTES

Do not Scale. Use Figured Dimensions Only
Not for Construction Purposes Unless Specifically Marked.

MITCHELL + ASSOCIATES
Landscape Architecture Architecture Urban Design Planning
Furnbally Court, Furnbally Lane, Dublin 8. Ireland
t: + 353 1 454 5066
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e: info@mitchellassoc.net

CLIENT: ROADSTONE	**PROJECT:** MALLAGHCRONE QUARRY			**JOB NO.** EMUL001
	DRAWING: LANDSCAPE REMEDIATION PLAN	**DATE:** 24.09.2010	**SCALE:** 1:1500@A3	**DRAWING NO.** 100
	DRAWN BY: ROWAN D'ARCY		**CHK'D:** CC	**REVISION.** -
	STATUS: PLANNING			

View from north-western edge of application site looking south-east towards Platin Cement Plant

EMUL001 MULLAGHCRONE QUARRY
Outline Landscape Specification
Earth Works

Subsoil cultivations
Subsoil should be placed in layers not exceeding 150mm thick; consolidation of fill may be accomplished by the use of special compacting machinery or by running over it with the next load; filling by tipping over an exposed face is not recommended because of the difficulty of consolidation.

After completion of subsoil moving, the formation level should be graded with the box scraper to even, running contours and then, depending on the soil texture and degree of compaction, loosened with a subsoiler or ripper.

Subsoil levels
Subsoil levels shall be 200mm below the finished ground levels in all areas for grass seeding to allow for 250mm of topsoil to be placed so that 50mm of topsoil stands proud of all kerbs, paths, etc.

Subsoil levels shall be 400mm below the finished ground levels in all areas for shrub planting to allow for 450mm of topsoil to be placed so that 50mm of topsoil stands proud of all kerbs, paths, etc.

Subsoil levels shall be 550mm below the finished ground levels in all areas for shrub planting to allow for 600mm of topsoil to be placed so that 50mm of topsoil stands proud of all kerbs, paths, etc.

Subsoil levels in all areas for tree planting shall be 900mm below the finished ground levels to allow for 900mm of topsoil to be placed.

Topsoil
Topsoil shall be native topsoil as removed and stored.
All imported topsoil to be of medium texture, pH matching that of the native topsoil, stone content 10mm in size not greater than 5% by weight, and no stones greater than 40mm in any dimension, and shall conform to BS 3882:1965. Topsoil shall be a free draining sandy loam. Depth of topsoil to be as specified.
Topsoil shall be free of perennial weed roots, i.e. couch grass, sticks, sub soil or any waste, toxic, putrescent or foreign matter.

After spreading, the soil should be cultivated to crumb size to a condition suitable for blade grading. Large stones and unwanted material 75mm and over should be picked off and carted away. Areas should then be blade graded to true flowing contours.
As topsoiling proceeds all consolidated wheel tracks shall be forked over.
Final grading of the top 150mm is to be carried out to ensure a true specified level and slope to avoid dishing or other depressions where water may collect. The use of a heavy roller to roll out humps will not be permitted and any area that becomes unduly compacted during the grading operation shall be loosened by forking or harrowing.

Topsoil levels
All topsoil shall be placed and graded by the Main Contractor to the following levels:

grass seeding	250mm
shrub / groundcover planting	450mm
hedge planting	600mm
tree planting	1000mm x 1000mm x 900mm pit

Maintenance of topsoil stockpiles

EMUL001 MULLAGHCRONE QUARRY
Outline Landscape Specification
Soft Works

Damage
All trees and plants are to be adequately and carefully packed and protected to survive transport, whatever means, to the site, during loading, transit or unloading.
If in spite of these precautions roots, branches, or shoots suffer slight damage, they are to be carefully pruned.
If major damage has occurred, the plant or tree shall be rejected and replaced at the Landscape Contractor's own expense.

Defects Liability Period
The Landscape Contractor shall be responsible for any plants that fail to take during the first full growing season (12 months) from date of completion.

Protection
The Landscape Contractor shall provide adequate temporary protection to the whole of his work and shall include temporary coverings, planked barrow runs and all other measures for protecting the work from damage.
The Landscape Contractor shall also protect from damage all existing roadways, kerbs, services and other completed works on site.
Any work damaged or soiled by weather, traffic or other causes due to inadequate temporary protection shall be removed and made good at the cost of the Landscape Contractor. The form of protection is left to the discretion of the Landscape Contractor.

Programme of Operation
The Landscape Contractor shall execute his works in conformity with a programme to be agreed with the Landscape Architect and shall include in his estimate for working within an agreed time limit.
No individual areas will be handed over unless there is an agreed sectional completion. The Landscape Contractor shall allow for keeping individual areas adequately maintained until the whole has been completed.

Site Inspection
Prior to the submission of tenders to the Landscape Architects, the Landscape Contractor is expected to visit the site and familiarise himself with the nature of the existing roads and pathways, the soil conditions, slope gradients, any hazards and other matters affecting the works. No extra charges will be made for any misunderstandings, or incorrect information or any of these points, or on grounds of insufficient description or lack of information will be allowed.

Setting Out
The Landscape Contractor will be responsible for checking all schedules and drawings by the Landscape Architect. In the event of any discrepancies being found between such schedules and drawings, or if the Landscape Contractor considers that additional detail drawings are required, the Landscape Contractor shall report such discrepancy in writing at least ten days before the works are to be executed.
The right is reserved to adjust the exact position of trees and specimen shrubs after they have been set out on site.
Any trees which are planted without approval of the setting out may be required to be re planted at the Landscape Contractor's expense.

Supervision and Contractor's Staff
The Landscape Contractor shall ensure full and adequate supervision of the site during the duration of the works.

The Landscape Contractor shall at all times during the Contract period employ sufficient persons of appropriate abilities, skills, care, and experience as are required for the proper performance of the Services in accordance with the Contract and shall ensure that a sufficient reserve of persons is

Passenger cover in relation to seating capacity of cab.
Cover for towing including trailers where applicable.
Loading and unloading risks both on and beyond public thoroughfares.

Health and Safety
The Landscape Contractors shall at their own cost arrange for the safe keeping during and after delivery to works of all manures, plants and equipment necessary to complete the job in hand. All oil and petrol containers must be kept in suitable sheds and the Landscape Contractor shall observe all regulation regarding the storage of poisonous and/or inflammable liquids.

The Landscape Contractor shall in performing the Services adopt safe methods of work in order to protect the health and safety of his own employees, the employees of the Employer and of all other persons, including members of the
public and shall comply with the requirements of the Health and Safety at Work Act 1974, The Management of Health and Safety Regulations 1992, Control Of Substances Hazardous to Health (COSHH) Regulations 1988 and 1994, and of the Road Traffic Act 1988 and of any other Acts, Regulations, Orders or any European Directive pertaining to the health and safety of employed persons.

The Landscape Contractor shall at the time of submitting his Tender provide to the Employer a written copy of his health and safety working procedures relating to the performance of the Contract.

The Landscape Contractor shall review his Health and Safety policy and safe working procedures as often as may be necessary and in the light of changing legislation or working practices or the introduction of new Work Equipment and shall notify the Supervising Officer in writing of any such revisions. The Supervising Officer may require the Landscape Contractor to amend its health and safety policy and safe working procedures to comply with any change in legislation or working practices or required as a result of the introduction of new Work Equipment.

Equal Opportunities Policy
The Landscape Contractor shall keep his equal opportunities policy in force for the duration of the Contract to comply with statutory obligations. Any findings of unlawful discrimination against the Landscape Contractor during the three years prior to the commencement of the Contract shall be reported to the Employer, together with details of the steps taken to avoid repetition.

Waiver
Failure by the Employer at any time to enforce the provisions of the Contract or to require performance by the Landscape Contractor of any of the provisions of the Contract shall not be construed as a waiver of any such provision and shall not affect the validity of the Contract or any part thereof or the right of the Employer to enforce any provision in accordance with its terms.

Acceptance
Payment will be made to the Landscape Contractor following certification of completed works by the Landscape Architect. There shall be no sectional handover unless previously agreed. In appropriate circumstances and where the contract involves the application of a defects liability period following practical completion of landscape works, there shall be a retention amounting to 5% of the total contract price, which shall be released when defects have been made good at the end of the defects liability period.

Default in provision of the service
Without prejudice to any other powers of the Employer, if the Landscape Contractor, for whatever reason fails to provide or perform the Services in whole or in part completely in accordance with the terms of the Contract then without prejudice to any remedy contained herein the Employer may by his own or other workmen provide and perform such Services or part thereof in which the Landscape Contractor has made default. The costs and charges incurred by the

Care must be taken to ensure that bare roots are protected from physical damage and desiccation at all times. All bare roots must be covered within two hours of lifting.

Bundling
Whip planting must be in bundles of the same species and size, all shoots must face in the same direction so that roots and shoots are not in contact, and must be of equal numbers. Bundles are to be securely tied with supple material which will not, by its nature or tension, cause damage to the plants.

Labelling
Each individual plant, bundle, bag, or lot of one species shall be labelled with a securely attached label, clearly indicating the plant name, grade and quantity.

Grass Seed
Grass seed shall conform to the requirements of British Standard 4428:1969 and subsequent amendments, and to the European communities (seed and fodder plants) regulations 1976.
The Landscape Contractor shall supply, with each seed mixture, a certificate stating the composition, purity, germination, year of collection and country of origin.
The germination capacity of each constituent of the mixture should be not less than 80%, and the purity of the mixture not less than 90%.
Total weed seed content should not be more than 0.5% and the total content of other crop seeds should not be more than 1%. These minimum figures shall be for the current 14 month period of annual tests.

The seed is to be thoroughly re-mixed before sowing to avoid patchiness on the ground and is to be 'Coburns Urban Parks mix' or similar approved, sown at a rate of 35 - 50g per square metre.
(James Coburn + Sons Ltd., 32 Scarva Street, Banbridge, Co. Down BT32 3DD
Telephone: 08 - 018206 - 62207 Fax: 08 - 018206 - 27250)

Wild Flower Seed
Wild Flora Mix is to be 'Coburn's Light Soil mix' or similar approved as supplied by Coburn's, seed merchants. Grass seed shall conform to the requirements of British Standard 4428:1969 and subsequent amendments, and to the European communities (seed and fodder plants) regulations 1976.

The seed is to be thoroughly re-mixed before sowing to avoid patchiness on the ground. The seed can be bulked up with sand to ease distribution, lightly raked or rolled in with a ringed roller, taking care not to bury the smaller seeds.
The seed is to be sown at a rate of 5gms per square metre.

Container grown Shrubs, Groundcovers, Climbers and Herbaceous Plants
Shrubs shall be bushy, well established nursery stock with a good fibrous root system. They shall be container grown, true to size, name and description as scheduled. Shrubs shall conform to the appropriate British Standards.
Plants shall not be pot bound, nor with roots deformed or restricted.

Bare root material will only be accepted where specified.

Herbaceous plants shall be supplied as well rooted clumps, showing several healthy buds, and grown in pots. pots shall be appropriate to the size of the plant supplied, minimum size 0.5litres (80mm square or 90mm diameter).

Whips and Transplants
All plant material must comply in all respects with the current edition of BS 3936 Parts 1, 4, and 5.

Tree Anchors, Stakes, Guys, etc.
All trees other than semimature trees and whips trees shall be supplied and fitted with one tree stake per tree.

Tree stakes shall be peeled poles of oak, sweet chestnut, pine or douglas fir, or tanalised larch. All stakes shall be preserved with water borne copper chrome arsenic to IS 131, to a net dry salt retention of 5.3kg per cubic metre of timber.
Stakes shall be supplied as sizes specified.

They shall be at least 1.8 metres long unless otherwise specified, with a minimum diameter of 75 mm at both butts.

Stakes shall be driven prior to planting with a drive all, wooden maul or cast iron mell, not with a sledge hammer.

Trees shall be tied to each stake with a purpose made tie and spacer, the tie to be overlapped and thrice nailed to the stake. Tree ties shall be rubber or PVC or proprietary fabric laminate composition, and shall be durable enough to hold the tree secure in all weather conditions for a period of three years.
They shall be flexible enough to allow for proper tightening of the tie.
Tree ties shall be 25mm -40mm wide depending on tree size. They shall be fitted with a simple collar spacer to prevent charring, and with a buckle for adjustment.
All Semimature trees shall be supplied and fitted with anchoring system: "Platipus root anchoring system kit" (as by Duckbill Anchors Ltd., Perrywood Business Park, Honeycrock Lane, Salfords, Nr. Redhill, Surrey, England, RH1 5DZ Tel: 01737 762300).

Mulch
Mulch shall be graded bark chippings from coniferous trees, particles 25 - 75mm , free of fine material, dust or wood.

Mulch will be rejected if in the Landscape Architect's opinion it is likely to be wind blown.
The Contractor should arrange to have an on site sample (or samples) inspected by the Landscape Architect prior to spreading. Spreading without the approval of sample is at the Contractor's own risk.

Approved chemicals
All chemicals used shall be non-toxic to human beings, birds and animals under normal use, and chemicals which are not agriculturally approved shall not be used.

The use of the following herbicides is acceptable:
Roundup
Basta
Tritox (only after 2nd cut)
Casoron G
Kerb Flo

The use of the following fertilizers is acceptable:
Fisons PS5 : grass areas
Osmocote Plus- fertiliser N:P:K 15:9:11 plus trace elements: Shrub areas
Enmag - 4:19:10 + 7.5% : Tree planting

The Landscape Contractor may only use alternative formulations and manufacturers with prior approval by the Landscape Architect.

WORKMANSHIP

Site Clearance

Remove and dispose of off-site any rubbish still occurring in topsoiled areas, including weeds, old masonry and rubble, metal, wood, and stones, excavating as necessary to permit the specified depth of final cultivations.

All scrub areas shall be grubbed and all existing plants of same shall be removed and disposed of including all root systems unless otherwise specified.

Before topsoiling, remove all stones over 75mm in diameter. Dig out any areas polluted by oil or chemicals and make up with clean soil. Break up the formation under any areas liable to ponding of rainwater, so that they drain.

Topsoil shall be moved and spread only in dry weather. No work to topsoil shall be carried out when it is waterlogged, or if it's moisture content is conducive to structural deterioration. minimise compaction of topsoil and subsoil when spreading, running machinery over the surface as little as possible.

Cultivation Generally

The aim of cultivation is to produce a well-drained and textured soil suitable for plant growth.
All areas to be planted, or seeded shall be cultivated to a minimum depth of 450mm or deeper if specified. Areas where obvious compaction has occurred shall be ripped.
Stones above 75mm longest dimension shall be removed from the top 100mm layer of shrub planting areas.

Final preparation - Seeding Areas

One week before seeding, Fisons PS5 or similar approved pre-seeding fertiliser shall be spread at a rate of 70g per square metre and incorporated in the surface layer. The soil shall be firmed and raked to a fine tilth suitable for seeding.

Final preparation - Wild flower seeding Areas

The soil shall be firmed and raked to a fine tilth suitable for seeding. No fertilisers shall be used on areas for wildflower seeding.

Final Preparation - Shrub planting areas

Coarse clean moist compost or approved peat substitute shall be forked in at a rate of 5kg per square metre and incorporated to a depth of 200mm.
Controlled release fertiliser N:P:K 15:9:11 plus trace elements - Osmocote plus or similar approved shall be applied at specified rates and raked into the top 50mm layer.
The surface shall be raked to a tilth suitable for planting.

Final Preparation Whip planting areas

Coarse clean moist compost or approved peat substitute shall be forked in at a rate of 5kg per square metre and incorporated to a depth of 200mm.
An approved fertiliser shall be spread at a rate of 70g per square metre and raked into the top 50mm layer.
The surface shall be raked to a tilth suitable for planting.

Planting Season

Forestry transplants and feathered trees other than evergreens will be planted between November and march inclusive. Evergreens will be planted in October or in April/May.
Planting shall normally be carried out during the period 1st October to 31 March in suitable weather.

Grass areas shall only be accepted as reaching practical completion when germination has proved satisfactory and all weeds have been removed.
No payment for re-seeding shall be made to the landscaping Sub-Contractor if the seed fails due to any cause whatsoever. He shall be required to make good the soiling and repeat the seeding until a good sward is obtained.

Bulbs / Corms
Bulbs/Corms shall be planted in a random pattern and allowed to naturalise. Avoid planting in straight lines. To plant, take out core in grass/shrub area, placing bulb/corm at base of hole ensuring no space is left under bulb. Hole must be wide enough to allow for base of bulb/corm to be placed directly on soil. Replace core and firm flush.

Shrubs
All shrubs shall be pit planted in precise locations as shown in plans. Pits shall be excavated 150mm wider in all directions than the natural root spread of the plant, and the bottom of the pit must be well forked to improve drainage.
Back filling of all pits shall be with soil and compost or an approved peat substitute in the ratio of 4:1.

All plastic and non-degradeable wrappings and containers shall be removed before planting. Make four vertical cuts with a sharp knife on the quadrants through the edge of container grown rootballs to sever girdling roots.

Whip Planting
All whips shall be notch planted in staggered pattern. Whip trees shall be planted randomly with no more than 5 plants of the same species planted in groups. Blocks of similar species are not to be planted. Pits shall be excavated 150mm wider in all directions than the natural root spread of the plant.

Tree Planting
Planting pits for trees in undisturbed ground will be backfilled with excavated material. Tree pits in mounds or other made up ground shall be backfilled with topsoil.

All tree pits for all trees other than semimature trees shall be excavated 200mm wider in all directions than the natural root spread, or rootball, and the base forked to improve drainage. Stakes shall be positioned before backfilling.
Topsoil backfill shall be mixed with peat substitute in the ratio of 4:1.
60g Enmag or similar approved slow release fertiliser shall be incorporated.
The backfill shall be settled and well firmed around the roots avoiding air pockets.

All semimature tree pits shall be excavated 500mm wider than the natural root rootball, and 150mm deeper to allow for 250mm of backfill mix, tamped firm to 150mm. In all semimature tree pits an additional depth of 150mm should be dug to allow for a 150mm gravel layer at the bottom of the pit to aid in drainage.
Sides of tree pit shall be ripped and loosened to ensure a good bond with the backfill and to avoid root girdling.

All semimature tree pits shall be backfilled with mix consisting of: 10 parts native topsoil and 5 parts sharp sand. 60g Enmag or similar approved slow release fertiliser shall be incorporated.
Backfilling shall be firmly tamped every 150-200mm and when pit is half full the backfill shall be flooded for further settlement. After excess water has drained further soil shall be added, tamped, and a final watering shall be given just before the final 75mm of backfill added.
The backfill shall be settled and well firmed around the roots avoiding air pockets.
All trees shall be well watered after planting.

symptoms to develop before carrying out any cultivations. Apply to manufacturers recommendations. Apply 'Roundup' to kill existing grass preseeding, and weeds germinating in topsoil.
If germinating weed grasses are less than 100mm high and broad leaved weeds have not produced full-sized keaves, do not apply 'Roundup'. Apply 'Basta' @ recommended rates, 4 to 7 days before cultivating.
Basta - by Hoechst Ltd. 3 - 7.5litre/Ha. Do not apply when rain is forecast within six hours. Apply to manufacturers recommendations.
'Actrilawn 10' - by May + Baker Ltd., 11litre/Ha. Shall be used in accordance with manufacturer's instructions. Apply 'Actrilawn' when grasses have reached the two leaf stage or beyond, and when seedlings have emerged and have reached cotyledon or two leaf stage (approx. 4 weeks after sowing). Do not mow grass within 7 days of treatment.
Casoron G - Granular weedkiller to be applied 5.6-22.5 kg /1000sq.m. Shall be used in accordance with manufacturer's instructions.
Kerb Flo - weedkiller to be applied 3.75 - 4.25litre/Ha. Shall be used in accordance with manufacturer's instructions.