Review of DEC Road Classification System

George Giummarra, Principal Consulting Engineer
Colin Leek, Principal Engineer

Consultancy requirements

- Review the Department's Policy for the management of all DEC roads
- Review current DEC road classification system and;
  - Make recommendations for any changes to classifications
  - Develop appropriate geometric design standards
  - Establish appropriate maintenance standards
  - Determine a risk assessment methodology
  - Provide a maintenance prioritisation methodology
  - Develop procedures for the management of bridges/culverts
  - Provide relevant procedures from the Codes of Practice
- Produce Road Operational Guidelines for DEC
- Recommend proposals for training of DEC staff

Need for a review of DEC road classifications

- Current DEC policy Statement No.40: Road Management is in draft form and in need of an update to align with proposed changes to classifications
- Current review and major upgrade of ROMAN
- Provide a more simplified and usable road classification system
- Able to identify risk and prioritise remedial works required
- Production of road operational guidelines that are better able to be understood and applied by field staff
- Making greater use of best practices as developed by similar organisations in Australia
- Provide consistent and uniform practices across all DEC road operations

Review of Policy Statement No. 40

- A proposed revised draft Policy Statement Number 40 has been prepared and submitted to DEC as a separate document for consideration.
- It incorporates the key findings of the review and the strategic and policy items that support the prepared road operational guidelines.
- DEC staff will need to complement the many roading policies with others relating to recreational, environmental and fire requirements to make the Policy document all encompassing.

Proposed DEC Road Operational Guidelines

Contents **(for designated roads)**

- a new and simplified road classification system
- geometric design standards for each road category
- management procedures for logging and other industry heavy haulage operations
- consideration of engineering practices for various climatic zones
- risk assessment methodology and intervention levels / road category
- inspection frequencies, response times for hazards/defects and condition recording procedures
- prioritisation of maintenance works and the preparation of a roads and bridges maintenance works program
- establishment of a bridge/culvert register, inventory system, inspection procedures and maintenance prioritisation procedures
- risk assessment procedure on bridge approaches
- codes of practice procedures for roadwork safety, risk assessment, selection of the appropriate traffic management plan and working with public utilities
- training requirements to assist staff to implement the new procedures adopted.

Proposed DEC road classification system

Austroads Class

Class	Description
1	Inter Capital City
2	Rural Highway
3	Main Road
4	Rural Local Road
5	Rural Special Purpose
6	Urban Highway
7	Significant Urban Local Road
8	Urban Local Road
9	Urban Special Purpose

WA Hierarchy (in ROMAN)

Value	Description
P	Primary Distributor
RD	Regional Distributor
LD	Local Distributor
A	Access Road
DA	District Distributor A
DB	District Distributor B

DEC Type (in ROMAN II for DEC use only)

Type	Description
Designated roads	
1	Public
Operational roads	
2	Primarily for DEC use only
3	Restricted use roads
4	Unused roads

DEC Category (in ROMAN II for DEC use only)

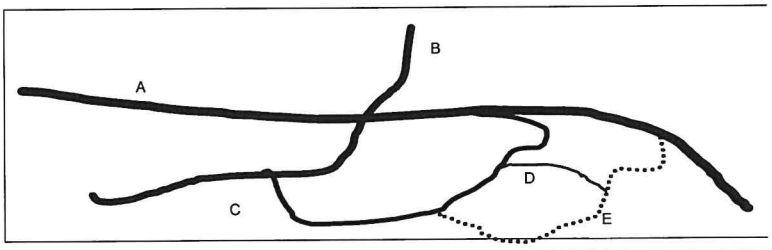
Category	Description
A	Major road
B	Secondary road
C	Minor road
D	Internal road
E	Track

DEC road type (based on available resources)

Type	Description	Comment
	Designated roads	
1	Roads that are primarily used to provide access for the general public and are considered of high importance.	Visitor access to recreational sites, community thoroughfares, private property and coastal/river access
	Operational roads	
2	Roads that are primarily used for DEC related activities although they are not closed to the public. Roads required for management purposes including fire prevention and suppression activities or are important for timber harvesting or other industry operations.	Most state forest roads and tracks, National Park and Reserve boundaries and management tracks, firebreaks etc
3	Roads that are subject to restricted access and are not open to the public without authorisation. Access may be restricted due to DEC policies or regulations, such as control of disease and weeds public safety during mining or timber harvesting activities. Access is restricted through adequate signage and gating where necessary.	Any roads in the Disease Risk Area (DRA), mine exclusion zones and temporary exclusion zones for timber harvesting activities
4	Roads that have no perceived functional value and are unworthy of further maintenance. The condition of these roads is unknown and may become untrafficable.	Roads excluded from asset management including relegated roads.

DEC road category

Category	Title	Typical ADT	Brief Description
A	Major road	>100	Commonly provides for main movements through a region
B	Secondary road	100 - 50	Generally provides for moderate use areas in a region
C	Minor road	50 - 20	Provides a link to moderate and low usage areas
D	Internal road	<20	Provides for internal access for low use areas
E	Track	<10	Provides access primarily for four-wheel drive vehicles



Geometric guidelines for each road category

Main elements covered include:

- Terrain types (flat, rolling, mountainous)
- Sealed and unsealed roads
- Operating speeds
- Cross-section elements (traffic lane and shoulder widths)
- Crossfall/camber including superelevation values
- Minimum radius curves
- Minimum stopping sight distance
- Maximum vertical grades
- Minimum crest and sag K values

Logging operations and requirements

- Process for accessing suitability
- Typical logging truck configurations and engineering requirements
  - Swept path
  - Intersection sight distance
  - Stopping sight distance
  - Signs and delineation

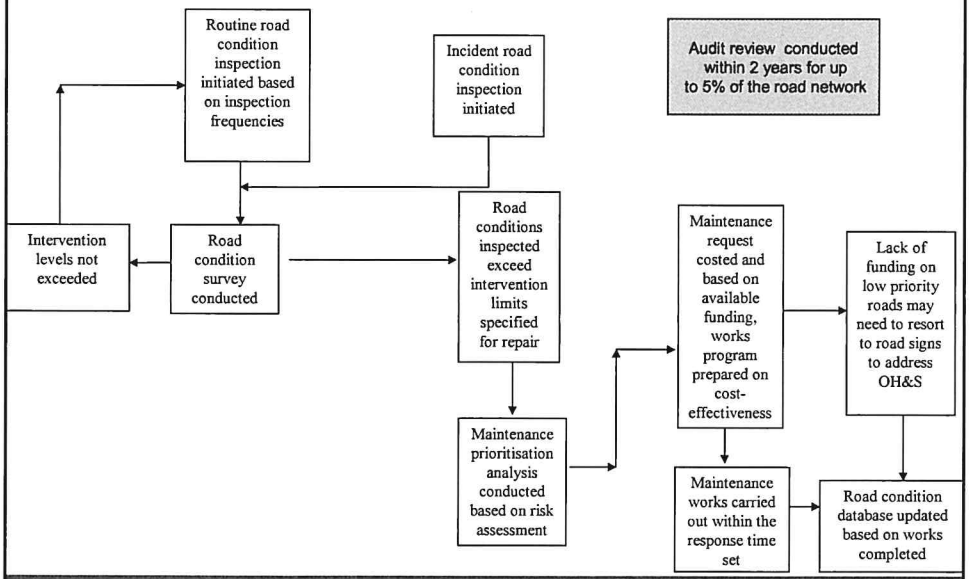
Information could be applied to the Restricted Access Vehicle (RAV) network

IBRA zones

Key considerations:

- terrain
- drainage systems
- material specifications
- maintenance practices
- stream crossings

Preparation of a roadworks program



Basic maintenance performance measures

Type of issue	Unsealed road	Sealed road
	Description of hazard/defect	
Safety	Obstructions on roadway ▪ fallen trees, limbs, dead animals or other objects	Obstructions on roadway ▪ fallen trees, limbs, dead animals or other objects ▪ ponding of water to cause slippery or dangerous surface
Serviceability	Pavement defects ▪ loose materials ▪ deformations, (including corrugations, rutting and rough ride) ▪ potholes ▪ road washouts	Pavement defects ▪ edge drop onto unsealed shoulder ▪ deformations, (including corrugations, shoving, rutting and rough ride) ▪ potholes ▪ environmental cracking
Safety	Roadside vegetation ▪ restricting sight distance or height clearance	Roadside vegetation ▪ restricting sight distance or height clearance
	Roadside furniture ▪ damaged/missing (safety signs, guideposts, safety barriers)	Roadside furniture ▪ damaged or missing (safety signs, guideposts, safety barriers and pavement markings)

Inspection and response frequency codes

Inspection index	
Code	Frequency
1	One week
2	One month
3	Three months
4	Twice per year
5	Once per year
6	Two years
7	Five years

Response index		Comment
Code	Frequency	
A	Within two working days of notification and inspection	Mainly used for severe or emergency situations
B	Within one working week of notification and inspection	Mainly used for safety hazards
C	Within one month of notification or inspection	Applies mainly to Category A roads
D	Within two months of notification or inspection	Applies mainly to Category B roads
E	Within three months of notification or inspection	Applies mainly to Category C roads
F	Within six months of notification or inspection	Applies mainly to Category D roads
G	Within twelve months of notification or inspection	Applies mainly to Category E roads

Risk assessment methodology

Description of hazard	Intervention level	Road category	Response time code
Materials on roadway to cause slippery or dangerous surface (sealed roads)	Area on roadway > 5 m²	A	A
	Area on roadway > 10 m²	B	A
Ponding of water, fallen trees, dead animals or other large objects	> 300 mm height of obstacle	A & B	A
		C	B
		D	C
		E	E
Road washouts	Depth > 300 mm	A & B	A
	Depth > 500 mm	C & D	D
	Depth > 600 mm	E	F
Roadside furniture	Stop signs, or other major traffic control items missing or damaged Guidepost and safety barriers missing or damaged	A & B	A
		C	B
		D	C
		E	F
Culverts	Culverts blocked	A & B	A
		C & D	D
		E	F

Maintenance prioritisation methodology

- **Risk score = probability of an incident × consequences of an incident**

Factors used to calculate risk score

Probability factors	Consequence factors
Hazard/defect factor weighting	ADT on road segment
% above intervention level set	% commercial vehicles
Length of the road segment	Road type
	Road category
	Operating speed environment

Bridge management system

- Key components
  - Asset register
  - Inventory of registered bridges
  - Bridge inspections (levels 1, 2 and 3)
  - Maintenance priority system of bridges and approaches
  - Development of a works program based on economic tools

Codes of Practice

- MRWA Code of Practice - Traffic management for works on roads
- AS1742.3 – Manual of uniform traffic control devices Part 3: Traffic control for works on roads
- Utility providers Code of Practice for Western Australia
  - Dial Before You Dig
  - Specifics requirements where applicable

Traffic Management for Roadworks

- Provides guidance for application of AS1742.3 and MRWA Code of Practice
- Adapts adopted DEC risk management principles
- Recognises very low traffic volumes and speed environment applicable to DEC roads
- Provides flow chart as decision tool for field staff
- Provides risk assessment worksheet for two forms of operations
  - Very short term works without traffic control
  - Static sites for longer term works
- Provides 32 generic plans for temporary traffic management use on DEC roads and possibly Local and Main Roads following approval

Flow chart for assessing unplanned works

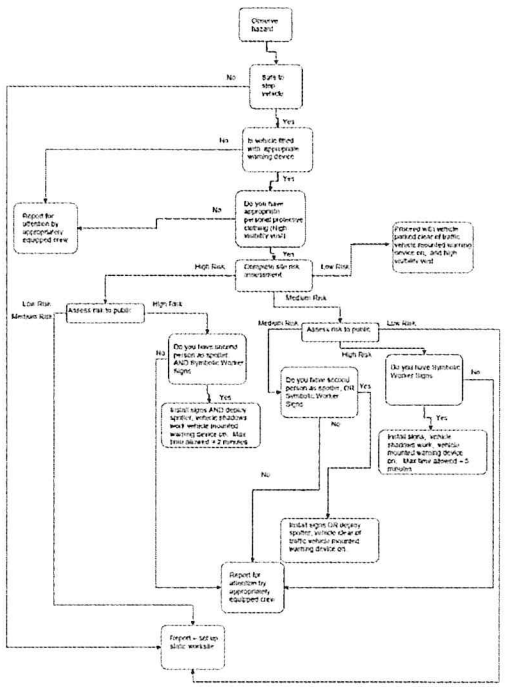


Chart for risk assessment for unplanned works

Title:	Works in Gaps in Traffic
Purpose:	To allow works of short duration to be undertaken with limited or no signage
Reason:	Risk in setting out signs is greater than undertaking work To allow small urgent work observed while travelling to be undertaken
Examples:	Maintenance of guide posts Removal of animal or debris from road Maintenance of signs

Road		Date	
Section		Time	

Site assessment

Condition	Condition rating table			Rating	Comment
Visability	Foggy/smokey	Overcast/dim	Clear		
	3	2	1		
Weather	Heavy rain	Light showers	Dry		
	3	2	1		
Sight distance	Good	Marginal	Poor		
	1	2	3		
Road surface	Slippery clay	Loose gravel	Good		
	3	2	1		
Road width	>6m	5-6m	<5m		
	1	2	3		
Clearance from edge	On road	<1.2m	>1.2m		
	3	2	1		
Traffic	Rare	Occassional	Frequent		
	1	2	3		
Heavy vehicles	None	Occassional	Frequent		
	1	2	3		
Road Class	Class A*	Class B	Class C/D		
	3	2	1		
Sun angle to driver:	High	Moderate	Low		
	1	2	3		
Total site assessment score					
Risk to public	High	Low	Nil		

Decision chart for unplanned works

Decision chart

Score:	Site assessment risk level	Risk to public	Work method
1-10	Low risk	Any	Proceed with vehicle warning device - vehicle clear of traffic
11-15	Medium risk	Low	Report damage. Programme and set up static site in accordance with approved plans
		Medium	Proceed with vehicle warning device, spotter and/or advance warning signs - vehicle clear of traffic
		High	Proceed with vehicle warning device and advance signs, work in shadow of vehicle, maximum 3 minutes on road
15 or more	High risk	Low	Report damage. Programme and set up static site in accordance with approved plans
		Medium	Contact base to report. Warn traffic as best possible. Programme and set up static site in accordance with approved plans
		High	Proceed with vehicle warning device, spotter and/or advance warning signs, work in shadow of vehicle, max 2 minutes on road

If in doubt - do not proceed - contact supervisor

Chart for risk assessment for use of generic TMP

Title:	**Risk Assessment for setting out a works in accordance with a generic Traffic Control Diagram**				
Purpose:	To allow works of short duration to be undertaken with limited or no signage				
Reason:	To establish a static worksite using a generic traffic management plan from manual				
Application:	Site must be closely compliant with limits shown on selected plan				
Road			Date		
Section			Time		
Site assessment					
Condition	**Condition rating table**			**Rating**	**Comment**
Visability	Foggy/smokey	Overcast/dim	Clear		
	3	2	1		
Weather	Heavy rain	Light showers	Dry		
	3	2	1		
Sight distance	Good	Marginal	Poor		
	1	2	3		
Road surface	Slippery clay	Loose gravel	Good		
	3	2	1		
Road width	>6m	5-6m	<5m		
	1	2	3		
Clearance from edge	On road	<1.2m	>1.2m		
	3	2	1		
Traffic	Rare	Occassional	Frequent		
	1	2	3		
Heavy vehicles	None	Occassional	Frequent		
	1	2	3		
Road class	Class A*	Class B	Class C/D		
	3	2	1		
Sun angle to driver:	High	Moderate	Low		
	1	2	3		
Total site assessment score					
Risk to public	High	Low	Nil		

Decision chart for using generic TMP

Decision chart			
Score:	Site assessment risk level	Risk to public	Work method
1-10	Low risk	Any	Proceed with traffic management plan
11-15	Medium risk	Low	Report to supervisor. Delay works. Site specific plan to be provided.
		Medium or High	Adopt more conservative plan with minimum 2 advance warning signs on one or both approaches. Decision to be made by person with WTM qualifiaction. If sight distance "Marginal", use Shadow vehicle for set out. If sight distance "Poor", use shadow and tail vehicle for set out
15 or more	High risk	Low or Medium	Report to supervisor. Site specific plan to be provided.
		High	Adopt more conservative plan with minimum 2 advance warning signs on one or both approaches. Use traffic contollers and pilot vehicle. Decision to be made by person with AWTM. If sight distance "Marginal", use Shadow vehicle for set out. If sight distance "Poor", use shadow and tail vehicle for set out

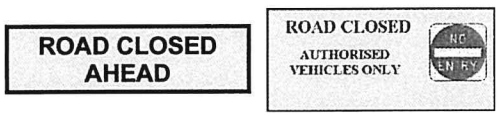
If in doubt - do not proceed - contact supervisor

Decision chart for selection of generic TMP

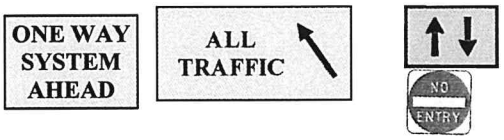
Work on road	Clearance from traffic	Remaining road width	Sight distance	Speed limit (km/h) or road category	Plan No	Restrictions
Yes	N/A	> 6.5 m	N/A	5B to 5E or < 80	1	
				5A or 80	9	
				100 or 110	10	
				Unposted > 70	11	
		< 6.5 m	>200m	5B to 5E or < 80	2	< 1,500 vpd
				5A or 80	5	
				100 or 110	6	
				Unposted > 70	18	
			<200m	5B to 5E or < 80	3	
				5A or 80	4	
				100 or 110	7	
				Unposted > 70	8	
No	< 1.2 m	> 5.5 m		5B to 5E or < 80	19	
				5A or 80	20	
				100 or 110	21	
				Unposted > 70	22	
		< 5.5 m	>200 m	5B to 5E or < 80	2	
				5A or 80	5	
				100 or 110	6	
				Unposted > 70	18	
No	<1.2m	< 5.5 m	< 200 m	5B to 5E or < 80	3	<1500vpd
				5A or 80	4	
				100 or 110	7	
				Unposted > 70	8	
	1.2 m-3.0 m	N/A	N/A	5C to 5E or < 70	15	
				5A or 5B or 70 or	13	
				90 to 110	12	
				Unposted > 70	14	
	3.0 m-6.0 m			5A to 5E or < 90	16	
				90 to 110	17	
				Unposted > 70	14	
Maintenance grading, shoulder grading/mowing			>250 m	Any class	23	<1500vpd
			<250 m	Any class	24	
Work close to intersections – > 5.5 m remaining for traffic –					26	
Work at intersections – > 6.5 m remaining for traffic – Infrequent					25	
Work close to intersections – < 5.5 m remaining for traffic					27	
Work at intersections – < 6.5 m remaining for traffic					27	
Work at intersections – Frequent truck traffic					27	
Road closure with detour posted					28	
Road closure detour not posted					29	
Road closure with local traffic permitted					30	To be used with Plan No 28 or 29
Signs for start of restricted entry zone					31	
Signs for one way system in restricted zone					32	

New DEC Signs

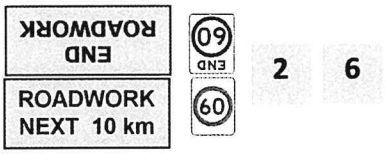
Signs for closing roads

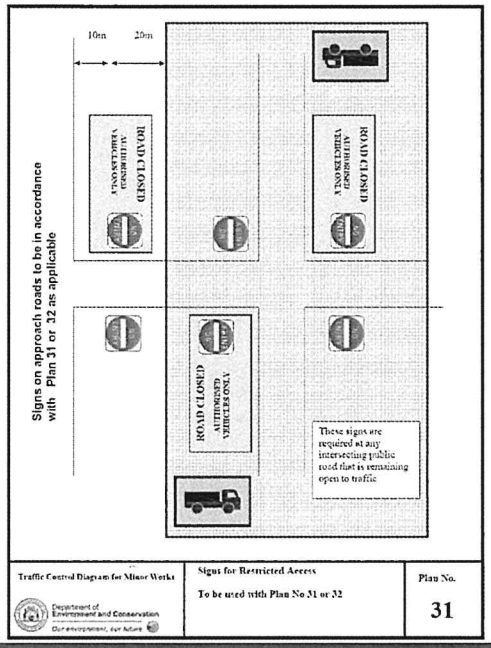


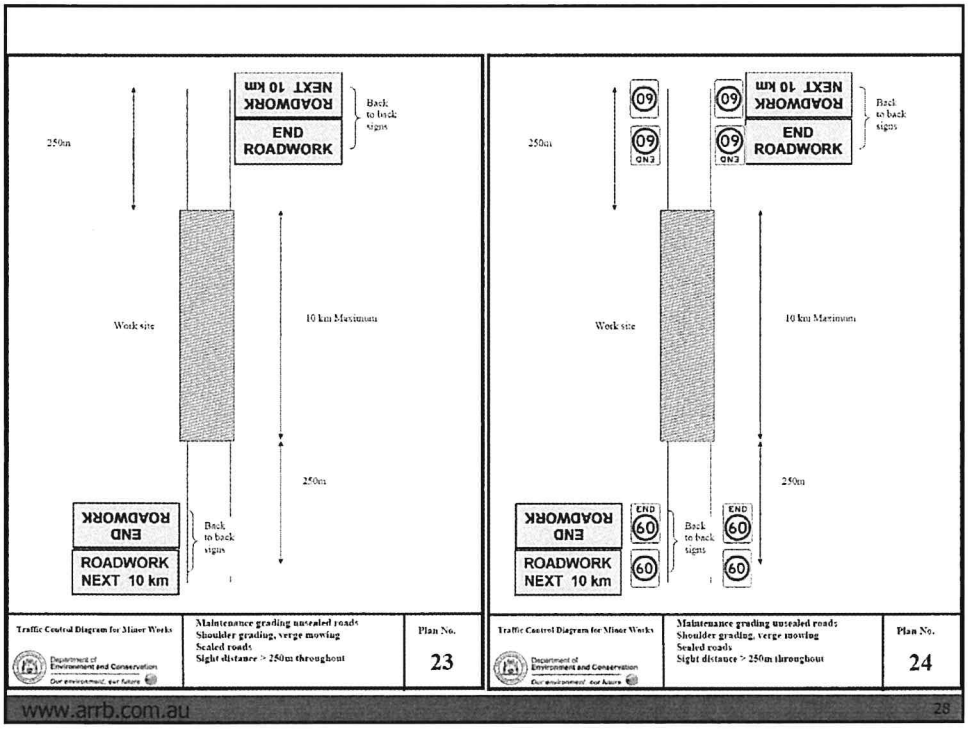
Signs for one way system in restricted access area



Signs for maintenance grading and verge mowing




10m
20m
ROAD CLOSED
AUTHORISED VEHICLES ONLY
ROAD CLOSED
AUTHORISED VEHICLES ONLY
ROAD CLOSED
AUTHORISED VEHICLES ONLY
Signs on approach roads to be in accordance with Plan 31 or 32 as applicable
These signs are required at any intersecting public road that is remaining open to traffic
Traffic Control Diagram for Minor Works
Department of Environment and Conservation
Our environment, our future
Signs for Restricted Access
To be used with Plan No 31 or 32
Plan No.
31


250m
ROADWORK NEXT 10 km
END ROADWORK
Back to back signs
Work site
10 km Maximum
250m
END ROADWORK
ROADWORK NEXT 10 km
Back to back signs
Traffic Control Diagram for Minor Works
Department of Environment and Conservation
Our environment, our future
Maintenance grading unsealed roads
Shoulder grading, verge mowing
Sealed roads
Sight distance > 250m throughout
Plan No.
23
250m
END
60
ROADWORK NEXT 10 km
END ROADWORK
Back to back signs
Work site
10 km Maximum
250m
END ROADWORK
ROADWORK NEXT 10 km
Back to back signs
Traffic Control Diagram for Minor Works
Department of Environment and Conservation
Our environment, our future
Maintenance grading unsealed roads
Shoulder grading, verge mowing
Sealed roads
Sight distance > 250m throughout
Plan No.
24

Training requirements

A workshop be conducted to cover the contents of the final road operational guidelines covering the application of:

- road classification system
- road type
- road categories
- geometric design standards
- road maintenance assessment procedures
- data collection requirements and intervention levels
- maintenance prioritisation methods
- application of the codes of practice

Maintenance of sealed and unsealed roads – guidelines to good practice

Training on bridge inspections (Level 1)

Plant operators training course

Advanced management training on sealed and unsealed roads

Development of a road and bridge maintenance works program using appropriate prioritisation techniques, and economic evaluation methods such as whole-of-life costing and net present values

Training on the application of the upgraded ROMAN, its data and processing attributes and output reports generated

Training of DEC staff in the various levels of traffic management

Questions ?