Session 1.7 Expected Outcome of a Road Safety Audit

Conducting Road Safety Audits & Appraisals

Presented by: RTS &AGTT

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EXPECTED OUTCOME OF A ROAD SAFETY AUDIT

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BENEFITS OF A ROAD SAFETY AUDIT

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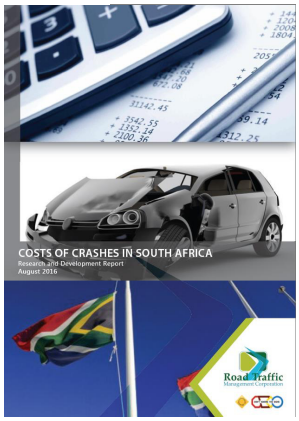
Cost of Road Crashes in South Africa



Unit Cost per Road Traffic Crash (Rand)				
Fatal	Major	Minor	Damage only	Any severity
R5 435 261	R765 664	R152 244	R48 533	R171 727

Unit Cost per Road Traffic Injury (Rand)			
Death	Serious	Slight	No injury
R3 916 187	R423 858	R71 352	R1 085

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Benefits of Road Safety Audits

Road safety auditing has the following benefits:

- A reduction in the likelihood of crashes;
- A reduction in the severity of crashes;
- Increased awareness of safe design practices & safety engineering among traffic engineers & road designers;
- A reduction in the need to modify projects after they are built;
- A reduction in the life-cycle cost of a road;
- A more uniform road environment;
- Eventual safety improvements to standards and procedures;
- More explicit consideration of the safety needs of vulnerable road users.

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Monetary benefits of road safety audits

Internationally, Road safety audits had the following benefits:

- Audit recommendations cost at 22 sites was $19 600 per site less during the design stage, compared to the cost to correct after construction.
- 9 audited sites reporting 250 different design stage audit comments that resulted in benefit-cost ratios ranging from 3 to 242.
- For audits of existing roads benefit-cost ratios ranged from 2 to 81.
- The rate of return for audited sites are as high as 120 % the first year[1].
- 20 Audited schemes in the UK had one less injury accident per year, compared to similar non audited sites.

[1] Jordan, P. (2003), *summary of studies presented in Conference on Road Safety Audits*;
[2] Belcher, M., Proctor, S., Cook, P., TMS Consultancy (2008), *Practical road safety auditing 2nd edition*

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Benefits of road safety audits

The benefits of RSAs therefore far outweighs the cost of conducting such studies.

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Outcomes of a Road Safety Appraisals and Audits

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Outcomes of a Road Safety Appraisals and Audits

Client	Commissioning an Audit	Process followed for Audits and Appraisals are similar.
Client / designer	Select and approve audit team	For appraisals there will most likely not be a designer involved, the Client deals directly with the Appraisal Team.
Client and designer	Compile / issue audit brief	
Client, designer and audit team	Commencement meeting	
Audit team	Information review; Site Inspection	For appraisals, there should be a extensive focus on understanding current crashes, road users behaviour and the road environment.
Audit team	Road Safety Report	Road safety audits should identify and classify road safety risks, make recommendations regarding mitigation without being prescriptive.
Client, designer and audit team	Completion meeting	
Client and designer	Review audit findings; Response report	Road safety appraisals should identify and classify road safety risks, make specific recommendations, which could include conceptual solutions, depending on the terms of reference.
Designer	Implement design changes	
Client, designer and audit team	Feedback	**Formal client response is critical for all studies.**

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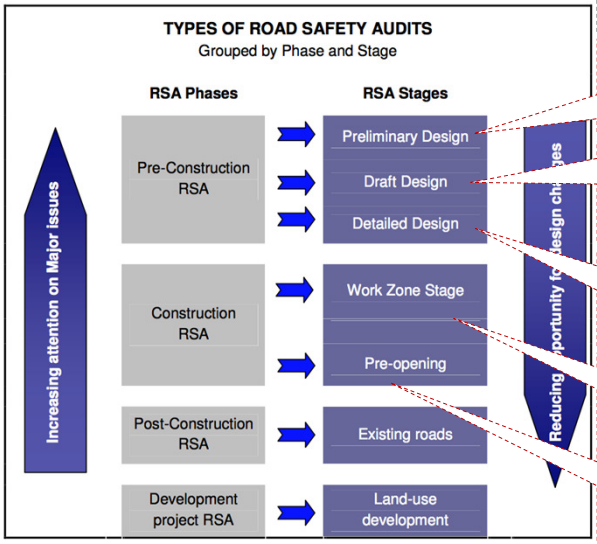
Outcomes of a Road Safety Appraisals and Audits



Scope extent of different audit stages, could include:

Prelim: Project scope, alignment, operating and design speed, safety performance of alternatives.

Draft: design standards, alignment, sight distance, cross sections, access, accommodation of different modes.

Detail: same as draft, also intersection layouts, roadside hazards, drainage, accommodation of traffic

Construction: Review of traffic management proposals at at time of construction.

Pre-opening: General safety of project, removal of all construction equipment and signs.

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Outcomes of a Road Safety Appraisal

A Road Safety Appraisal should provide:

- Comprehensive analysis of crash history.
- Identification of crash risk contributing factors.
- Objective review of the safety performance of a road section.
- Identification and classification of road safety risks.
- Should include all causes (maintenance, management and design).
- Should address all modes of transport.
- Consider the entire road environment.
- Documentation of the appraisal process, with proposed mitigations.
- Could include conceptual solutions.

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Outcomes of a Road Safety Appraisal

A Road Safety Appraisal is not:

- A desktop exercise.
- A pavement or road asset condition assessment.
- A redesign of the road.
- An informal check, inspection or consultation.
- A means to ranking or comparing one project or option over another.

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Outcomes of a Road Safety Audit

A Road Safety Audit should provide:

- Objective review of the safety performance of a road project.
- Comprehensive safety review of the design.
- Identification and classification of road safety risks.
- Focus on potential serious and fatal risks.
- Highlight other risks, especially risk with low mitigation cost.
- Documentation of the audit process, with proposed mitigations.

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Outcomes of a Road Safety Audit

EXPECTED OUTCOME OF A ROAD SAFETY AUDIT

A Road Safety Audit is not:

- A quality control review, a design review or a peer review.
- A judgement of the quality of a project.
- A compliance check with standards, guidelines or drawings and specifications.
- A redesign of a project.
- An informal check, inspection or consultation.
- A means to ranking or comparing one project or option over another.

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Outcomes of a Road Safety Audit

EXPECTED OUTCOME OF A ROAD SAFETY AUDIT

Typical road safety appraisal risk matrix – R524

	Risk	Finding	Likelihood	Severity	Risk Rating	Recommended interventions
1.	Lack of non-motorised transport infrastructure	• Insufficient NMT infrastructure – pedestrians required to walk in the roadway. • Pedestrian crossings not well sign posted and not visible to motorists. No safe refuge provided for pedestrians. • Pedestrian crossings at intersections provided upstream of vehicle stop line, instead of at the stop line. • Intersections are too wide and difficult for pedestrians to cross. • Insufficient (safe) provision has been made for vulnerable road users (e.g. scholars) to cross the road.	Probable	Serious	Intolerable	• NMT facilities to be provided on one or both side/s of the road, depending on pedestrian demand and road side environment. • Pedestrian crossings to be provided downstream of all major intersections, as well as at mid-block to facilitate pedestrian movement. • Median islands to be implemented at pedestrian crossings to provide safe refuge for pedestrians. • Refer to NMT facility proposals in *Annexure J*. • Refer to typical pedestrian crossing layouts in Annexure K.
2.	Road geometry and cross section	• From km 0 to km 42 the road cross section is too narrow, given the local and farm accesses from route R524 and does not safely facilitate high speed differentials between through traffic and traffic turning off the R524. • Additional climbing lane are required up to km 42. • Existing road cross section does not accommodate pedestrians – pedestrians have to walk in the roadway. • Numerous bridges do not have any shoulder. Pedestrians need to walk in the roadway. • The single lane cross section in the urban sections leads to delay for long distance trips. The cross section needs to be upgraded.	Probable	Serious	Intolerable	• Improved road cross section with 2x3,5m lanes with paved shoulders of 2,0m to 2,2m – shoulders should not be wider, to prevent the shoulder from being used as an extra lane. • Upgrade passing lanes: taper lengths should be extended to allow merging drivers to adjust their speeds and merge into a single lane before the end of the transition. • Implement additional passing lanes – km 0 to km 42. • Upgrade bridges to allow for shoulder as well as NMT facilities. • Upgrade urban cross section to four-lane dual carriageway.

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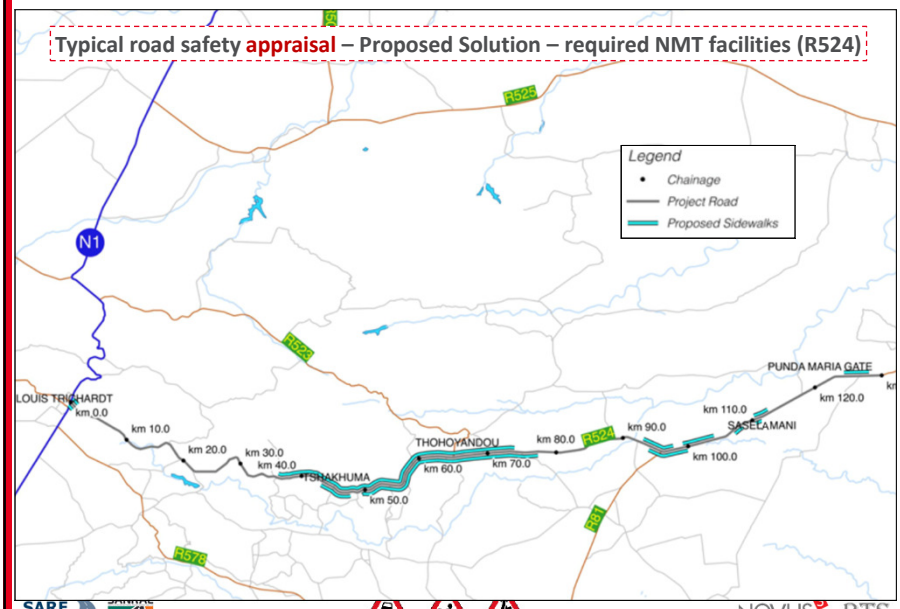
Outcomes of a Road Safety Audit

Typical road safety appraisal – Proposed Solution – required NMT facilities (R524)



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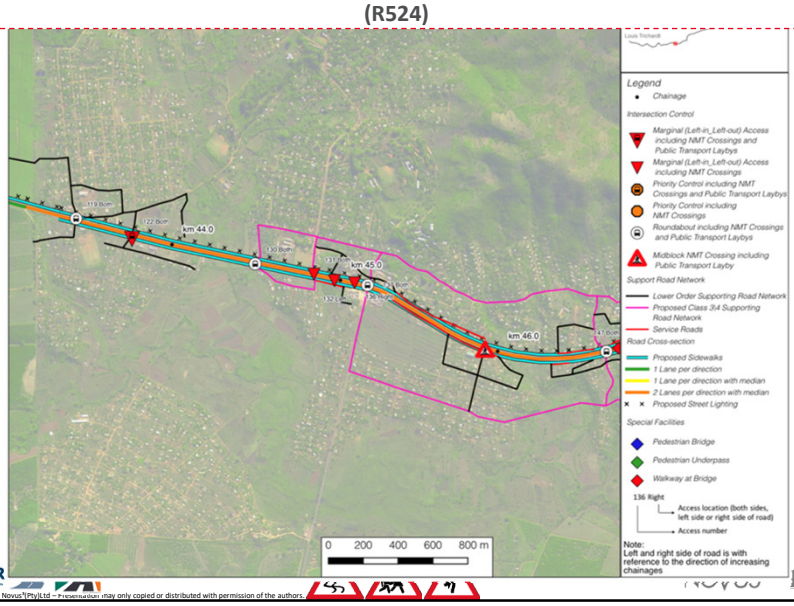
Outcomes of a Road Safety Audit

Typical road safety appraisal – Proposed Solution – access and NMT management plan (R524)



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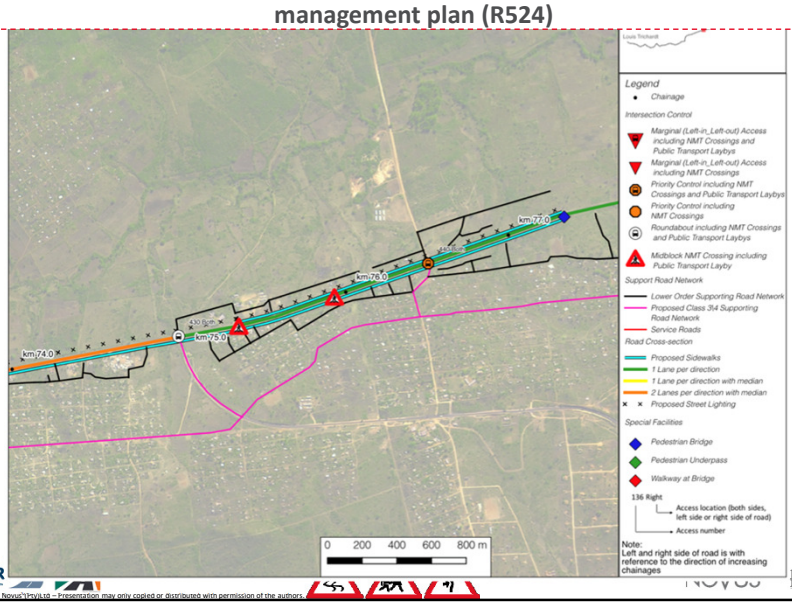
Outcomes of a Road Safety Audit

Typical road safety appraisal – Proposed Solution – access and NMT management plan (R524)



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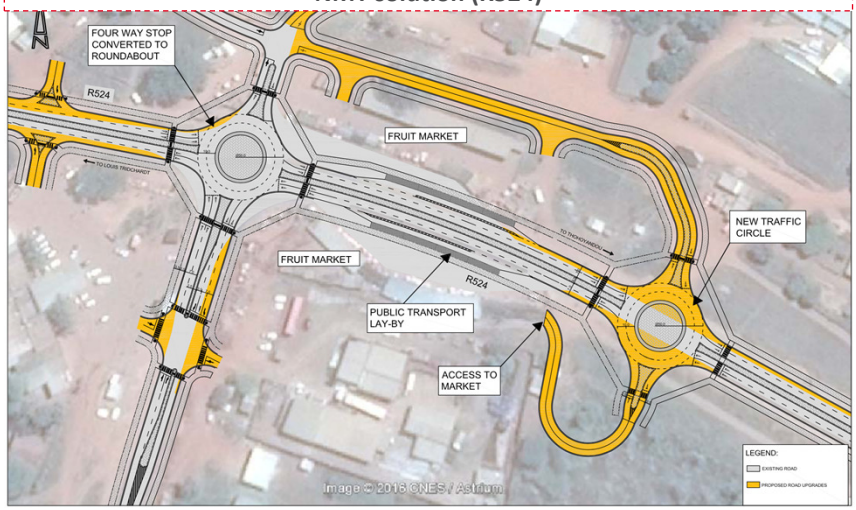
Outcomes of a Road Safety Audit

Typical road safety appraisal – Proposed Solution – conceptual access and NMT solution (R524)



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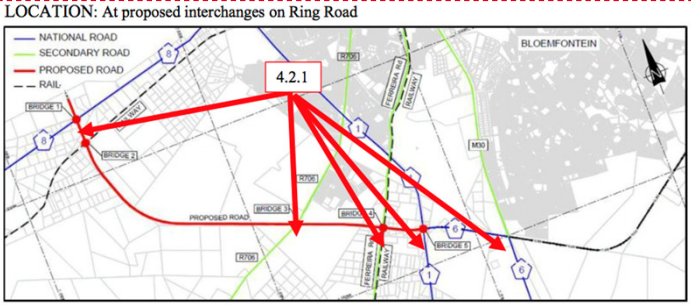
Outcomes of a Road Safety Audit

Typical Stage 1 road safety audit– audit finding – road sections with insufficient street lighting (N8)

LOCATION: At proposed interchanges on Ring Road



Care should however be taken to ensure that by lighting the intersection, there is no significant contract between dark approach roads and the well-lit intersection. In addition, the provision of such lighting should be accompanied by a maintenance regime.

Probability	Severity	Risk	Action
Occasional	Serious	Medium	Correct or reduce risk significantly

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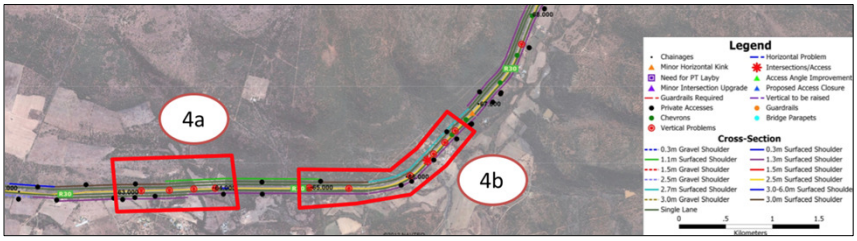
Typical Stage 3 road safety audit– audit finding – map and audits risks (R30)



	Description	Audit Finding	Likelihood	Severity	Risk Rating	Audit Recommendation
4.	Road Alignment	The alignment has some vertical crest curves with k-values that are below the minimum allowable.	Probable	Serious	Intolerable	Based on the combination of vertical and horizontal curves, the location of farm accesses and the cross section, it is recommended that the road alignment needs to be corrected at the following locations: • km 34.00 to km 37.00 • km 58.00 to km 62.00 • km 62.50 to km 68.00 • km 69.00 to km 71.50
5.	Bridge Parapets	The bridges along the R30 have steel handrails instead of concrete parapets. This means that bridges may not be able to withstand the collision of vehicles. Guardrails are not installed correctly where it ties in with the bridge parapets (insufficient number of posts and back to back guardrails are not provided).	Improbable	Catastrophic	High	Bridge parapets should be checked for structural integrity in case of a vehicle/bridge crash and should most likely be replaced with concrete parapets, which can withstand a vehicle crash.

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CLIENT RESPONSE REQUIRED

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Client Response

Clients must respond formally road safety audits and appraisals recommendations.

- *To evaluate audit findings or recommendations*
- *To determine if the recommendations should be implemented*
- *To record all decisions in writing*
- *To put the audit recommendations into effect.*

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Client Response

The Audit response will only be effective if the client defines and documents the following:

- *Who will respond to an audit report?*
- *Who will sign off on the audit response report?*
- *How will the agreed remedial measures be taken on board for action?*
- *Who will ensure that the agreed actions are followed through?*

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Procedure to deal with audit findings

Audit recommendations are not mandatory, but do require a formal response with reasons or a plan of action for each finding.

Each finding in the Road Safety Audit Report can be dealt with by

- *Accepting the problem and the proposed recommendation; initiating the remedial action.*
- *Accepting the problem in principle, but due to other constraints, implement a partial or different solution.*
- *Not accepting the finding or recommendation at all.*

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Procedure to deal with audit findings

The audit response for road safety audits for new or upgraded roads will require input from the design engineers.

The design engineer has to advise:

- Implications of the audit finding for the current design
- Can the safety risk be addressed in the current design?
- Should an alternative solution be designed?
- What are the cost implications – design and/or construction cost.

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SUMMARY

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Summary

Design according to standards, guidelines or typical drawings does not ensure a safe road.

RSAs is an independent review to identify safety risks, when the cost to mitigate the risk is low.

RSAs reduce the risk of litigation.

A formal documented response to RSAs are critical.

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END OF LECTURE

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