iRAP Cayman Islands

Inception Report, 2014

iRAP

About iRAP

The International Road Assessment Programme (iRAP) is a registered charity dedicated to saving lives through safer roads.

The iRAP vision for a world free of high risk roads will be achieved in partnership with government and non-government organisations through:

- Inspection of high-risk roads and development of Star Ratings and Safer Roads Investment Plans
- Provision of training, technology and support that will build and sustain national, regional and local capability
- Tracking road safety performance so that funding agencies can assess the benefits of their investments.

Road Assessment Programmes (RAP) are now active in more than 60 countries throughout Europe, Asia Pacific, North, Central and South America and Africa.

iRAP is financially supported by the FIA Foundation for the Automobile and Society and the Road Safety Fund. Projects receive support from the World Bank Global Road Safety Facility, automobile associations, regional development banks, donors and government agencies.

National governments, automobile clubs and associations, charities, the motor industry and institutions such as the European Commission also support RAPs in the developed world and encourage the transfer of research and technology to iRAP. In addition, many individuals donate their time and expertise to support iRAP.

For more information

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To find out more about the programme, visit www.irap.org. You can also subscribe to 'WrapUp', our e-newsletter, by sending a message to icanhelp@irap.org.

The image on the document´s title page was taken on North West Point Road, West Bay, Cayman Islands.

Contents

1 Introduction

Road crashes cause enormous grief to victims, their families and friends. They are also often a factor responsible for tipping a household into financial distress. The loss of a wage-earner due to death or disability can be disastrous, leading a family into lower living standards and poverty. In the Cayman Islands, an average of 8 fatalities occurred per year between 2007 and 2012[1], equivalent to 14 per 100,000 population. This well in excessive of the WHO's 2013 figure of 8.7 traffic deaths per 100,000 inhabitants in high income countries[2] and, as such, the impact of road trauma is very severe in the Cayman Islands.

With the United Nations 2011-2020 Decade of Action for Road Safety well underway, now is the time to act towards reducing road trauma in the Cayman Islands. The goal of the Decade of Action for Road Safety is to halve the forecast level of road deaths by 2020, preventing 5 million deaths and 50 million serious injuries worldwide.

Safe road infrastructure for all road users will be crucial in achieving this goal. This is where iRAP, as the next generation of road assessment, has an important role to play. Together with safer behaviour, safer speeds and safer vehicles, iRAP can help save millions of lives.

This project plan for 2014 has been developed by the National Roads Authority (NRA) of the Cayman Islands Government in partnership with iRAP. Based on discussions held during January 2014, the project plan outlines the proposed activities as part of year one of a staged implementation of iRAP within the Cayman Islands. The project plan forms part of a sustainable integration of iRAP as part of Cayman Islands commitment to the Decade of Action. The plan forms part of the iRAP's overall vision for a **Cayman Islands free of high risk roads**.

The proposal provides a staged approach to the development of a locally owned and delivered iRAP programme in the Cayman Islands following consultation with key stakeholders in January 2014. This includes a focus on capacity building of local stakeholders as part of the delivery of year one of the programme, in addition to building political and community support and commitment as part of the programme.

Key deliverables of iRAP support for the program includes assistance with the:

- establishment, support and management of an integrated iRAP Cayman Islands programme,
- development of cooperative action to link proposed iRAP outcomes with policy and target setting,
- creation of a plan that will seek to build and support local capacity to deliver and manage programme implementation in the longer term,
- provision of global support and resources of iRAP,
- training of road engineers in the use of iRAP methodology and tools,
- establishment of a routine road inspection program to monitor infrastructure safety,

[1] Cayman Islands Economics and Statistics Office http://www.eso.ky/2012compendiumofstatistics.html#4
2 WHO (2013) Global Status Report on Road Safety (http://www.who.int/violence_injury_prevention/road_safety_status/2013/en/index.html)

- development and adoption of infrastructure improvement plans for approximately 238 mi (382km) of paved roads and for approximately 1.9 mi (3.1km) of road designs[3], and
- planning for advocacy at the national level to support action for better road safety.

[3] It should be noted that distances in the Cayman Islands are measured in miles.

2 Business Plan Summary

2.1 The human tragedy

Average fatalities per year (2007 – 2012)[4] = **8**

Estimated serious injuries per year **80** [5]

The economic cost

1 USD	= $0.82 KYD[6]
Cayman Iss GDP per capita	= $57,610 USD[7]
Cayman Iss GDP per capita	= **$ 47,240 KYD**
Cost of life[5]	= 70 x GDP per capita
	= **$ 3,306,814 KYD**
Cost of serious injury[5]	= 25% x Cost of life
	= **$ 826,704 KYD**
Total cost to country	= **$ 92,590,792 KYD**

The Safe System Approach

Leading road safety agencies have targeted new road safety strategies around the "safe system" concepts of Safe Vehicles on Safe Roads with Safe Users at Safe Speeds.

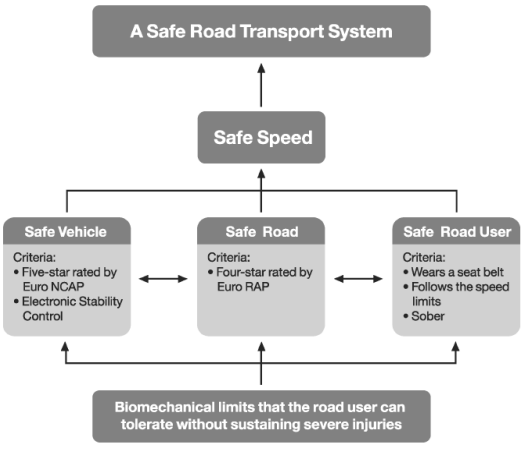


Figure 1 Sweden: Safe System approach

2.2 Cayman Islands free of high risk roads

The United Nations Decade of Action for Road Safety from 2011-2020 requires ambitious and focused leadership to reduce the unduly high level of road trauma in the Cayman Islands.

The NRA will lead the implementation of Cayman Islands' plan for the Decade. The iRAP Cayman Islands initiative will provide the performance tracking tools for the Decade and the investment analysis to deliver the "Safe Roads" component of the plan with confidence.

Star Rating of roads will provide the benchmark of the current engineering safety of the road network. Five star roads are the safest and one star the least safe.

Safer Road Investment Plans (SRIP) will identify and locate the cost effective road improvements and quantify the expected lives saved and economic benefit possible.

The **Cayman Islands free of high risk roads** initiative will deliver:

- Assessment of 238 mi (382km) of paved roads and 1.9 mi (3.1km) of road designs,
- Targeted investment in proven high return treatments across the country, and
- The elimination of 1 and 2 star roads by 2020.

[4] Cayman Islands Economics and Statistics Office http://www.eso.ky/2012compendiumofstatistics.html#4

[5] Refer to "True Cost of Road Crashes" http://irap.org/about-irap-3/research-and-technical-papers

[6] Rate as at February 1, 2014

[7] United Nations Statistics Division - Cayman Islands http://data.un.org/CountryProfile.aspx?crName=Cayman%20Islands)

2.3 iRAP Cayman Islands in 2014

- Phase I of the project is completed with the submission and acceptance of this inception report,
- Star Rating and Investment Plans completed on 238 mi (382km) of paved roads and 1.9 mi (3.1km) of road designs,
- Ministerial commitment and launch of "Cayman Islands free of high risk roads" policy upon completion of Phase II of the project.

2.4 iRAP Cayman Islands in 2014-15

- Ministry obtains funding to implement first stage of iRAP improvements.
- As part of the anticipated Phase 3 of the project, Ministry staff and other relevant stakeholders receive training in using iRAP results to establish scope for relevant improvement projects. As part of this training, iRAP will arrange for two local experts from the NRA to be enrolled in the iRAP course in Road Safety, held at the University of Birmingham, England. iRAP will meet the course enrolment fees from the project funds with travel costs to be funded by the Cayman Islands authorities.
- Initial projects are designed and implemented.

2.5 iRAP Cayman Islands 2016-2020

- Additional projects are designed and implemented and a follow up inspection is completed to assess the progress made,
- Positive communications plan with the public (e.g. launch of road going from one star to three or four star), and
- Minimum standards for new road projects to achieve a desired star rating level.

iRAP Cayman Islands is an initiative of the NRA with the support of key stakeholders including the Ministry of Planning, Agriculture, Housing and Infrastructure, the Ministry of Health, Environment, Youth, Sports & Culture, and the Royal Cayman Islands Police Service.

For more information on iRAP refer to www.irap.org.

3 iRAP Cayman Islands

According to the data from the Royal Cayman Islands Police Services, an average of 8 people lose their lives on the roads of the Cayman Islands annually. With a 2012 population of 56,732, this equals a death rate of 14.1 per 100,000 population. The countries leading the world in road safety have death rates that are less than 5 per 100,000 population.

The NRA has approached iRAP to assist in the establishment of iRAP Cayman Islands and progress towards a Cayman Islands free of high risk roads.

3.1 Programme Governance

The NRA will lead the iRAP Cayman Islands initiative supported by other stakeholders under the guidance of the iRAP team as required to build a locally run sustainable programme. Key stakeholders within the Cayman Islands will participate in the proposed iRAP Cayman Islands Steering Committee and working groups to ensure a coordinated programme integrated with existing agency operations.

All stakeholders will be invited to become associate members of iRAP at no cost providing links to stakeholders from RAP programmes in over 60 countries, all seeking to eliminate high risk roads.

The programme structure is summarised below and includes:

- iRAP Cayman Islands Steering Committee
- iRAP Cayman Islands Technical Working Group

Final membership details will be finalised as part of year one of the programme. Regional communication strategies will be incorporated to ensure stakeholders at a district level are involved as required.

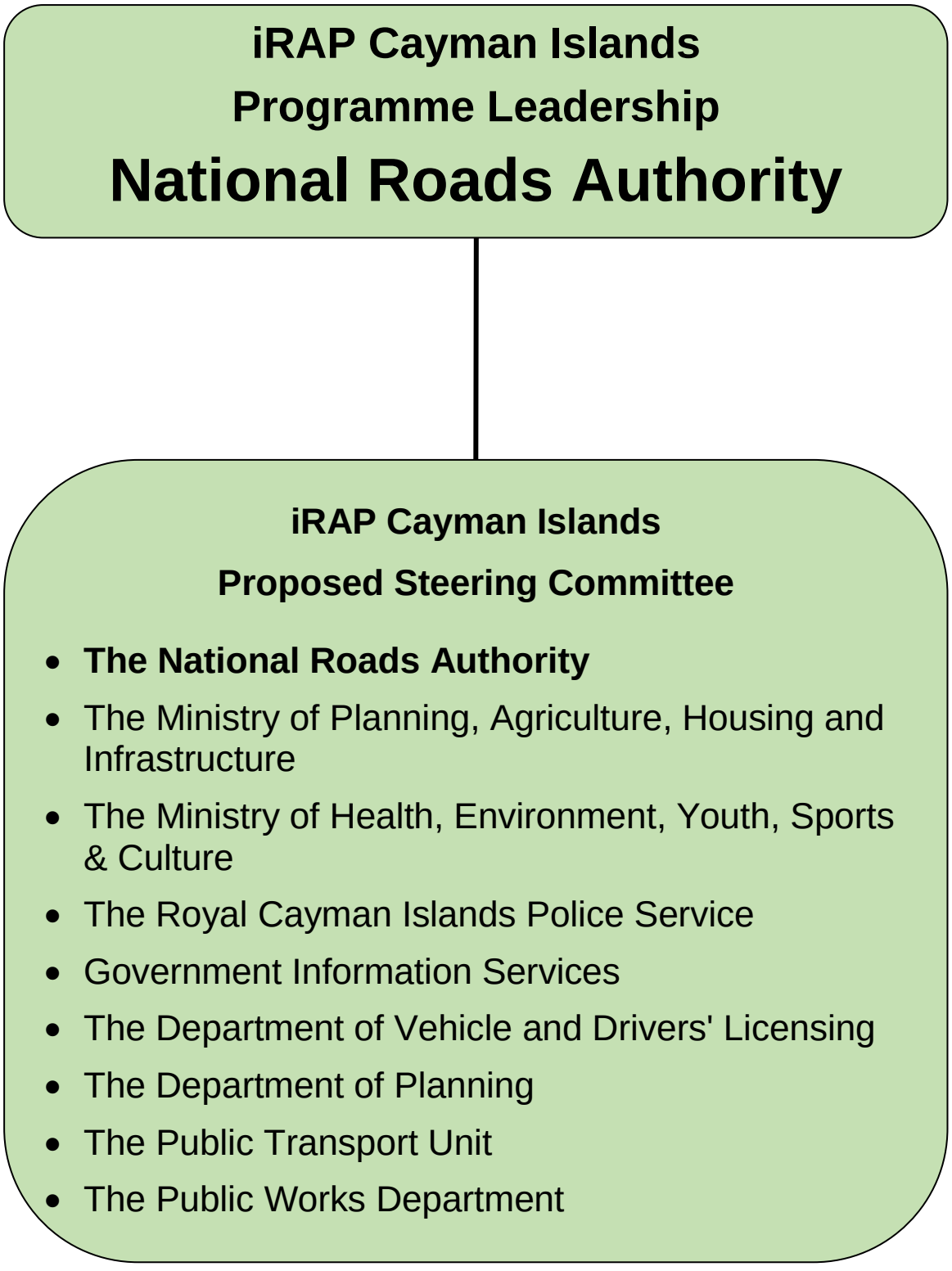


Figure 2 **iRAP Cayman Islands Proposed Governance Structure**

3.1.1 iRAP Membership

iRAP has launched the iRAP Membership scheme that is free to join and links all active programmes across the world for the mutual benefit of all. Full Membership is recommended for all of the Cayman Islands stakeholders and completion of the one page application form is recommended during 2014. Refer to http://irap.org/about-irap/membership for more details.

3.1.2 Steering Committee

Prior to the inception mission, the process of identifying iRAP Steering Committee members was begun. This Steering Committee is chaired by the NRA and the initial Steering Committee meeting was held on January 14, 2014, prior to the launch of the road survey. The Steering Committee will:

- provide local ownership, leadership, role definition and support for the iRAP Cayman programme and its focus on safer roads,
- oversee each phase of the programme and facilitate actions required for the programme success,
- review the project outcomes and directions for the ongoing iRAP programme in the Cayman Islands,
- provide leadership and commitment for the longer-term implementation of the iRAP recommendations and elimination of high risk roads,
- monitor road safety performance and track progress over the Decade of Action,
- ensure training and capacity building support a sustainable programme, and integration with national workforce participation objectives are achieved,
- provide leadership, direction and delivery of communications strategies and plan.
- develop, deliver and monitor the iRAP Cayman Islands business plan and budget,
- participate in the iRAP global community and share local experience and knowledge for the mutual benefit of all iRAP members.
- ensure the iRAP model and processes are applied in accordance with standards and requirements specified by the iRAP Global Technical Committee,
- provide the Cayman Islands centre of knowledge and expertise in the iRAP models and protocols,
- ensure the technical integrity and high quality application and documentation of the iRAP protocols in the Cayman Islands,
- contribute to model and technical activities with countries in the region and contribute to the continuous improvement of the models and processes through the iRAP Global Technical Committee as required,
- ensure local research activities take advantage of the iRAP data-sets and coordinate local research projects that inform the local Cayman Islands application of the iRAP models,
- obtaining data and liaising with national, provincial and local road authorities,

  producing maps and reports associated with the risk mapping, performance tracking, star rating and safer roads investment plan iRAP protocols,

Support for the Steering Committee will be provided by iRAP on an ongoing basis as required by the NRA.

4 iRAP Cayman Islands - 2014 Programme

The iRAP Cayman Islands Programme in 2014 will have a focus on building the awareness of the programme outcomes at a political, technical and stakeholder level and the commitment of all stakeholders to a Cayman Islands Free of High Risk Roads. The programme governance framework will be established and the business case prepared to secure the necessary commitment and resources to ensure the funding of safer infrastructure improvements. All activities will be undertaken with the focus on building the capacity of the local stakeholders to deliver the ongoing programme in terms of management, assessment, design and construction. Key activities will include:

- **Star Rating** of approximately 238 mi (382km) of existing roads,
- **Star Rating** of approximately 1.9 mi (3.1km) of road design,
- **Development** of a Safer Roads Investment Plan for the 238 mi (382km) of existing roads and 1.9 mi (3.1km) of road designs that highlights at a network level where the cost effective countermeasures are and the potential lives saved and economic returns possible.
- Development of a detailed **communications plan** including relevant announcements as part of the Decade of Action.
- Integration of iRAP Cayman Islands into **budget planning** for future improvements.

4.1 National Road Safety Strategy

The key outputs of the iRAP Cayman Islands programme will provide objective data that can guide policy and performance tracking throughout the Decade of Action for Road Safety. The iRAP team will work with the NRA to ensure all opportunities to utilise the iRAP assessments and performance measures are integrated and included as part of the strategy. This could include but is not limited to:

- Policy target of “Cayman Islands free of high risk roads” to capture the full safe system outcomes discussed above.
- Policy target of “No 1 or 2 star roads by 2020” to capture the targeted action to bring road infrastructure safety up to a minimum standard on the paved road network in the Cayman Islands. Implementation decision should be based on benefit-cost analysis results, so improvements may be focused on the portion of the paved road system with higher volumes.
- Inclusion of various key performance indicators related to the crash performance on the road network, the condition of the asset or the economics of road upgrades.
- Estimates of the expected returns from the overall programme to provide the business case for investment in road safety across the country.

Following the final briefing at the end of Phase II in mid-2014, further assistance on these issues could be integrated into the plan for Phase III of the project in 2014-15.

4.1.1 Policy Announcement

At the conclusion of Phase II in mid-2014, the iRAP Steering Committee should consider announcement of a future safety policy. An example announcement is provided below for information.

Cayman Islands free of high risk roads

"In accordance with the United Nations Decade of Action plan, the Cayman Islands commits to eliminating high risk roads on the higher volume portion of the paved road system by 2020.

The implementation of iRAP Cayman Islands will be based on assessment of 238 mi (382km) of paved roads and 1.9 mi (3.1km) of road designs. Our engineers will apply proven cost-effective road improvements that will save over XXX deaths and serious injuries over 20 years and deliver $ X million KY of benefits every year by 2020.

We have set a policy target to have no one or two star roads on the higher volume portion of the paved road network by 2020 - a lasting life saving legacy that will benefit generations to come."

Figure 3 Example Safer Roads Announcement for Use at the Conclusion of Phase II

4.1.2 Detailed Road Safety Business Case

The iRAP team will assist the NRA and other stakeholders in preparing a detailed business case for safer road infrastructure improvements in the Cayman Islands. This will build on work completed as part of the preparation phase and will seek to estimate the economic impact of road crashes and the key parts of the economy affected. Inputs will be required from the key stakeholders including but not limited to the NRA, the Ministry of Planning, Agriculture, Housing and Infrastructure, the Ministry of Health, Department of Planning and the Royal Cayman Islands Police Service and will build on recent work completed in the UK to explore the true impact of crash costs across the community.

Estimates will be refined on the expected economic benefits and lives saved from the proposed infrastructure investment programme over the United Nations Decade of Action. iRAP will assist in the development of a plan to assist in securing the long-term commitment to eliminate high risk roads across the Cayman Islands. This will include activities to help secure international funding for a safety improvement programme to begin in 2014-15.

5 Phase I—Project Planning

The objective of Phase I has been to plan the iRAP Cayman Islands project. Phase I of the project is complete with the inception mission to Cayman Islands carried out during January 2014 and the preparation of this Inception Report. Phase II involves the development of star ratings and safer roads investment plans for the selected road network in the Cayman Islands, as well as providing training to key local stakeholders. Phase III, which has not yet been funded, will assist the Cayman Islands with the implementation of the safety improvement projects based on the iRAP safer roads investment plan. Figures 4 & 5 show photos from the initial Steering Committee meeting during the inception mission to the Cayman Islands.

Figure 4 Meeting at the NRA office, during the inception mission to the Cayman Islands in January 2014

Figure 5 Meeting at the NRA office, during the inception mission to the Cayman Islands in January 2014

6 Phase II—Star Rating and Safer Roads Investment Plan Development

Once the final report is delivered, iRAP will arrange for two local experts from the NRA to be enrolled in the iRAP course in Road Safety, held at the University of Birmingham, England[8].

The course provides an introduction to the iRAP technology for evaluating the safety impact of road infrastructure, with topics covered including:

- Risk Mapping existing roads using crash data,
- Star Rating existing roads using inspection images and data,
- Star Rating the design of new and rehabilitated roads from plans,
- Prioritising Safer Road investment plans, and
- Safety Performance Tracking roads.

iRAP will meet the course enrolment fees from the project funds with travel costs to be funded by the Cayman Islands authorities.

6.1 Proposed Road Network

6.1.1 Existing Roads

The primary and collector road networks on Grand Cayman Island are managed by the NRA and include 238 mi (382km) of paved roads. Following consultation with key stakeholders, the entire primary and collector paved road network has been selected to be surveyed as part of the iRAP Cayman Islands project. As shown below in Table 1, the survey network incorporates some primary routes including Esterley Tibbetts Hwy, Sea View Road, Shamrock Road T2, Bodden Town Road and West Bay Road, as well as paved portions of a number of shorter routes: Figure 6 shows a map of the iRAP Cayman Islands road network while figures 7 – 9 show photos taken on a number of roads on the iRAP Cayman Islands network.

[8] http://www.birmingham.ac.uk/students/courses/cpd/civil-engineering/irap.aspx

Table 1. Road Sections Included on the iRAP Cayman Islands Network

Road ID	Road Name	Direction	Length (km)
59	North Sound Rd	O-E	2.023
59	North Sound Rd	E-O	2.023
58	Thomas Russell Ave	N-S	0.278
58	Thomas Russell Ave	S-N	0.278
55	Elgin Ave	E-O	0.935
55	Elgin Ave	O-E	0.935
57	Bobby Thompson Way T2	N-S	0.331
56	Bobby Thompson Way T1	N-S	0.470
45	Huldah Ave	N-S	0.146
107	Fern Cir	-	0.780
46	Fairbanks Rd	E-O	1.337
47	Aspiration Dr	E-O	0.569
48	Academy Way	E-O	0.314
48	Academy Way	O-E	0.314
47	Aspiration Dr	O-E	0.569
46	Fairbanks Rd	O-E	1.337
107	Fern Cir	-	0.780
45	Huldah Ave	S-N	0.146
56	Bobby Thompson Way T1	S-N	0.470
57	Bobby Thompson Way T2	S-N	0.331
44	Agnes Way	N-S	0.373
44	Agnes Way	S-N	0.373
109	Lyndhurst Ave	E-O	0.333
109	Lyndhurst Ave	O-E	0.333
41	Smith Rd	E-O	1.495
41	Smith Rd	O-E	1.495
54	Hospital Rd	S-N	0.265
54	Hospital Rd	N-S	0.265
52	Goring Ave	S-N	0.303
52	Goring Ave	N-S	0.303
50	Walkers Rd	N-S	2.685
37	South Sound Rd	O-E	4.308
37	South Sound Rd	E-O	4.308
50	Walkers Rd	S-N	2.685
51	Boilers Rd	S-N	0.335
51	Boilers Rd	N-S	0.335
49	South Church St	N-S	3.730
49	South Church St	S-N	3.730
53	Louise Llewelly Way	O-E	0.192
53	Louise Llewelly Way	E-O	0.192
61	Shedden Rd	O-E	1.749
61	Shedden Rd	E-O	1.749
66	Harbour Dr	S-N	0.286
66	Harbour Dr	N-S	0.286
77	Cardinall Ave	O-E	0.186
77	Cardinall Ave	E-O	0.186
78	Fort St	O-E	0.303
78	Fort St	E-O	0.303
80	Albert Panton St	N-S	0.182
80	Albert Panton St	S-N	0.182
79	Edward St	N-S	0.235
79	Edward St	S-N	0.235
75	Dr Roys Dr	O-E	0.352
75	Dr Roys Dr	E-O	0.352
76	Main St	O-E	0.137
76	Main St	E-O	0.137
71	Mary St	E-O	0.558
67	North Church St	S-N	1.132
67	North Church St	N-S	1.132
71	Mary St	O-E	0.558
65	Eastern Ave	S-N	1.587
65	Eastern Ave	N-S	1.587
73	Mcfield Ln	S-N	0.195
73	Mcfield Ln	N-S	0.195
74	Gresscott Ln	S-N	0.227
74	Gresscott Ln	N-S	0.227
72	School Rd	E-O	0.664
72	School Rd	O-E	0.664
70	Rock Hole Rd	E-O	0.627
70	Rock Hole Rd	O-E	0.627
64	Godfrey Nixon Way	O-E	0.454
64	Godfrey Nixon Way	E-O	0.454
69	Bodden Rd	E-O	0.446
69	Bodden Rd	O-E	0.446
68	West Bay Rd	S-N	8.347
95	Willie Farrington Dr	S-N	0.934
96	Mount Pleasant Rd	S-N	1.129
111	Capt Reginald Parsons Dr	S-N	1.015
111	Capt Reginald Parsons Dr	N-S	1.015
96	Mount Pleasant Rd	N-S	1.129
95	Willie Farrington Dr	N-S	0.934
89	Church St	S-N	0.787

Road ID	Road Name	Direction	Length (km)
91	Stadium Dr	S-N	0.369
91	Stadium Dr	N-S	0.369
89	Church St	N-S	0.787
92	Powell Smith Rd	S-N	0.889
90	Birch Tree Hill Rd	S-N	1.559
93	Conch Point Rd	O-E	1.546
93	Conch Point Rd	E-O	1.546
90	Birch Tree Hill Rd	N-S	1.559
92	Powell Smith Rd	N-S	0.889
86	Town Hall Rd	S-N	0.959
87	Fountain Rd	S-N	0.775
87	Fountain Rd	N-S	0.775
86	Town Hall Rd	N-S	0.959
81	North West Point Rd	S-N	3.147
83	Boatswain Bay Rd	O-E	0.788
88	Finch Dr	O-E	0.698
88	Finch Dr	E-O	0.698
83	Boatswain Bay Rd	E-O	0.788
81	North West Point Rd	N-S	3.147
82	Watercourse Rd	S-N	1.409
82	Watercourse Rd	N-S	1.409
84	Hell Rd	O-E	0.762
85	Rev Blackman Rd	O-E	0.658
110	West Church St	O-E	0.498
94	Batabano Rd	O-E	1.511
94	Batabano Rd	E-O	1.511
110	West Church St	E-O	0.498
85	Rev Blackman Rd	E-O	0.658
84	Hell Rd	E-O	0.762
68	West Bay Rd	N-S	8.347
104	Lawrence Blvd	O-E	0.456
104	Lawrence Blvd	E-O	0.456
112	Gecko Link	O-E	0.084
112	Gecko Link	E-O	0.084
98	Canal Point Dr	O-E	1.716
98	Canal Point Dr	E-O	1.716
113	Snug Harbour Dr	O-E	0.136
99	S/N 3	O-E	0.054
99	S/N 3	E-O	0.054
102	Jennifer Dr	O-E	1.144
101	S/N 5	N-S	0.077
103	Andrew Dr	E-O	1.150
100	S/N 4	S-N	0.072
97	Lime Tree Bay Ave	O-E	0.521
97	Lime Tree Bay Ave	E-O	0.521
60	Esterley Tibbetts Hwy	S-N	9.455
60	Esterley Tibbetts Hwy	N-S	9.455
62	Dorcy Dr	N-S	1.218
38	Crewe Rd T1	O-E	2.711
39	Crewe Rd T2	N-S	0.672
39	Crewe Rd T2	S-N	0.672
38	Crewe Rd T1	E-O	2.711
62	Dorcy Dr	S-N	1.218
63	Owen Roberts Dr	O-E	1.538
63	Owen Roberts Dr	E-O	1.538
43	Tropical Gardens Rd	O-E	0.660
43	Tropical Gardens Rd	E-O	0.660
42	Linford Pierson Hwy	E-O	2.414
42	Linford Pierson Hwy	O-E	2.414
40	Old Crewe Rd	N-S	0.639
40	Old Crewe Rd	S-N	0.639
14	Shamrock Rd T1	O-E	1.723
15	Shamrock Rd T2	O-E	8.840
15	Shamrock Rd T2	E-O	8.840
14	Shamrock Rd T1	E-O	1.723
36	Selkirk Dr	S-N	1.659
36	Selkirk Dr	N-S	1.659
29	East-West Arterial Rd	O-E	5.229
29	East-West Arterial Rd	E-O	5.229
35	S/N 1	N-S	0.115
35	S/N 1	S-N	0.115
34	Victory Ave	S-N	0.950
34	Victory Ave	N-S	0.950
33	Prospect Dr	S-N	2.021
33	Prospect Dr	N-S	2.021
32	Marina Dr	S-N	1.965
32	Marina Dr	N-S	1.965
31	Mahogany Way	S-N	1.112
31	Mahogany Way	N-S	1.112
30	Mangrove Ave	S-N	1.161
30	Mangrove Ave	N-S	1.161
28	Poindexter Rd	S-N	1.606
28	Poindexter Rd	N-S	1.606
26	Spotts Newlands Rd	S-N	0.557

Road ID	Road Name	Direction	Length (km)
27	Chime St	S-N	0.352
27	Chime St	N-S	0.352
26	Spotts Newlands Rd	N-S	0.557
21	Hirst Rd	S-N	3.557
21	Hirst Rd	N-S	3.557
22	Rackley Blvd	S-N	0.608
22	Rackley Blvd	N-S	0.608
106	Farrell Rd	O-E	0.510
106	Farrell Rd	E-O	0.510
23	Southward Dr	O-E	0.501
23	Southward Dr	E-O	0.501
25	Leeward Dr	S-N	1.168
25	Leeward Dr	N-S	1.168
24	Windward Rd	S-N	1.107
24	Windward Rd	N-S	1.107
18	Will T Rd	S-N	1.478
18	Will T Rd	N-S	1.478
19	Starapple Rd	S-N	0.347
20	Burgundy Way	S-N	0.101
20	Burgundy Way	N-S	0.101
19	Starapple Rd	N-S	0.347
17	Beach Bay Rd	N-S	1.593
17	Beach Bay Rd	S-N	1.593
16	Northward Rd	S-N	1.911
16	Northward Rd	N-S	1.911
12	Condor Rd	O-E	0.440
13	Anton Bodden Dr	O-E	1.464
13	Anton Bodden Dr	E-O	1.464

Road ID	Road Name	Direction	Length (km)
12	Condor Rd	E-O	0.440
11	Bodden Town Rd	O-E	8.699
10	Frank Sound Rd	S-N	5.792
10	Frank Sound Rd	N-S	5.792
8	Sea View Rd	O-E	8.979
9	East End Rd	E-O	1.579
108	John Mclean Dr	E-O	0.308
108	John Mclean Dr	O-E	0.308
9	East End Rd	O-E	1.579
105	Eastland Dr	S-N	0.620
105	Eastland Dr	N-S	0.620
6	Austin Conolly Dr	S-N	5.354
1	Queens Hwy	E-O	4.798
2	Old Robin Rd	E-O	5.122
3	North Side Rd	E-O	4.015
7	Hutland Rd	N-S	2.252
7	Hutland Rd	S-N	2.252
4	Rum Point Dr	E-O	6.951
5	Water Cay Rd	N-S	1.874
5	Water Cay Rd	S-N	1.874
4	Rum Point Dr	O-E	6.951
3	North Side Rd	O-E	4.015
2	Old Robin Rd	O-E	5.122
1	Queens Hwy	O-E	4.798
6	Austin Conolly Dr	N-S	5.354
8	Sea View Rd	E-O	8.979
11	Bodden Town Rd	E-O	8.699

[1] Lengths are provisional estimates only and are subject to final confirmation from field surveys. Further work will be necessary to identify the exact start and end points, dual carriageway locations and key landmarks to reference and segment the network. Some road sections noted above will be further subdivided at major intersections, traffic census points, town limits, or other locations of interest to the NRA.

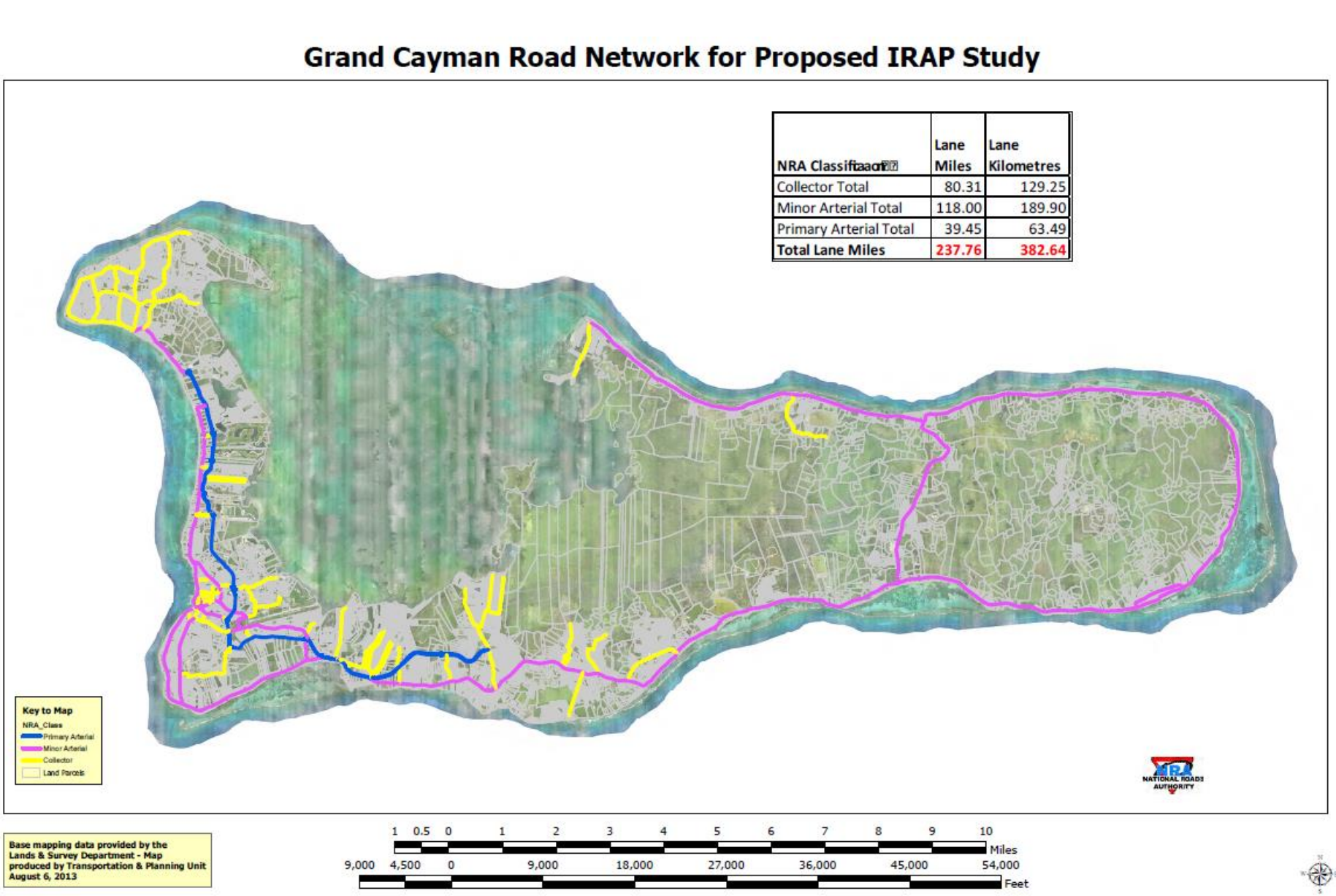


Figure 6 **Map of the iRAP Cayman Islands Network**

Figure 7 West Bay Road

Figure 8 South Church Street, George Town

Figure 9 Esterly Tibbetts Highway

6.1.2 Road Designs

In addition to the 238 miles of existing roads, the NRA has asked iRAP to provide Star Ratings & SRIP for the proposed 1.5 mile Airport Connector Road. The design consists of a new limited access, primary arterial dual carriageway road which runs from the Owen Roberts International Airport to a point on the Esterley Tibbetts Highway near the south end of the Camana Bay Development. It is partially urban and partially rural in nature.

Figure 10 below shows the route of the proposed Airport Connector Road.

Figure 10 **Proposed Airport Connector Road alignment**

6.2 Collation of Cayman Island Background Data

The iRAP Cayman Islands Star Rating and Investment Plan will require available data to be sourced in relation to the road network and the general road safety situation in the Cayman Islands. The collection of this information will be coordinated by the NRA with support of the iRAP team and will involve inputs from many of the key stakeholders. Required data sets will include:

6.2.1 Traffic and speed data

The sourcing of traffic and speed data on the designated road network, where available, and identification of gaps in traffic volumes, traffic mix, speed and other flow characteristics for the final network will be required. Where possible, this will be completed prior to the coding phase so that, if required, subjective traffic flow observations can be recorded.

Based on discussions with the NRA and observations from the inception mission, motorcycle volumes on roads in the Cayman Islands appear to be relatively low. Clearly, no separate counts of motorcycle volumes will be needed. Pedestrian and bicycle volumes will be estimated through the iRAP data coding and preparation process with advise from the NRA, and will be reviewed for appropriateness by the Technical Working Group.

Speed survey data would be desirable so that the Safer Roads Investment Plan can be based on actual traffic speeds, rather than posted speed limits. Speed studies could also help define the priority for speed enforcement activities in the longer term. The iRAP team will liaise with NRA staff potential arrangements for speed studies at selected locations on the road network.

6.2.2 Countermeasure cost data

To enable cost estimates of proposed countermeasure programs to be developed a series of cost estimates/unit rates for typical projects in the Cayman Islands will be required. Over 90 countermeasures are used in the iRAP analysis. The iRAP team will provide to the NRA for review typical countermeasure costs used in recent iRAP studies in the Latin America and Caribbean Region, and will endeavour to source relevant countermeasure costs used by the United States Road Assessment Program (usRAP). These costs will be updated for the Cayman Islands based on the results of this review.

6.2.3 Crash data

Crash data at the aggregate level on the surveyed roads is a required input for calibrating the iRAP model. This will be required by road user type where available. Detailed, site specific crash data is not specifically required for the successful completion of the iRAP project. If readily available, however, the crash data can provide a very useful countermeasure review tool in later stages of the project. Further meetings with the Royal Cayman Islands Police Service to obtain available crash data are planned.

6.2.4 Key demographic and economic data

Key demographic and economic data to be used for the analysis will be obtained by the iRAP team and reviewed by the Steering Committee. This will include data related to the cost of fatalities, discount rates and other economic measures.

6.2.5 Local Inputs required for Background Data Collection

The iRAP team will work with the NRA, the Steering Committee, identified technical experts and local stakeholders to source all local data identified above.

6.3 iRAP Road Survey Data Collection, Coding, and Analysis

This section describes the road survey data collection, coding, and analysis activities that will be conducted as part of Phase II of the study.

6.3.1 iRAP Road Survey Data Collection and Launch

With the approval of the Steering Committee, iRAP has contracted with an accredited and experienced vendor, Servicios Mexicanos de Ingenieria Civil (SEMIC) from Mexico City, Mexico, to conduct the road survey in the Cayman Islands. Prior to the inception mission, the SEMIC team transported the equipment necessary to conduct the iRAP road survey data collection to the Cayman Islands, and fitted it to an NRA provided vehicle. Figure 11 below the vehicle used by SEMIC to conduct the survey

Figure 11 Photograph of the NRA provided vehicle mounted with SEMIC survey equipment

Upon completion of the vehicle fit-out, SEMIC sought and obtained accreditation of the vehicle according to iRAP specification *RAP-SR-2-3*. Refer to the *Star Rating Inspection System Accreditation Specification and Record* for further details. Capabilities of the vehicle included the ability to take digital photography at regular intervals along the road network (equivalent to video photography) tied to measured odometer distances, GPS coordinates (latitude and longitude), and horizontal and vertical alignment data. The survey of the road network in the Cayman Islands was completed in approximately two weeks. The survey was carried out in conjunction with the NRA, and NRA staff participated in the data collection and provide local knowledge of the road system.

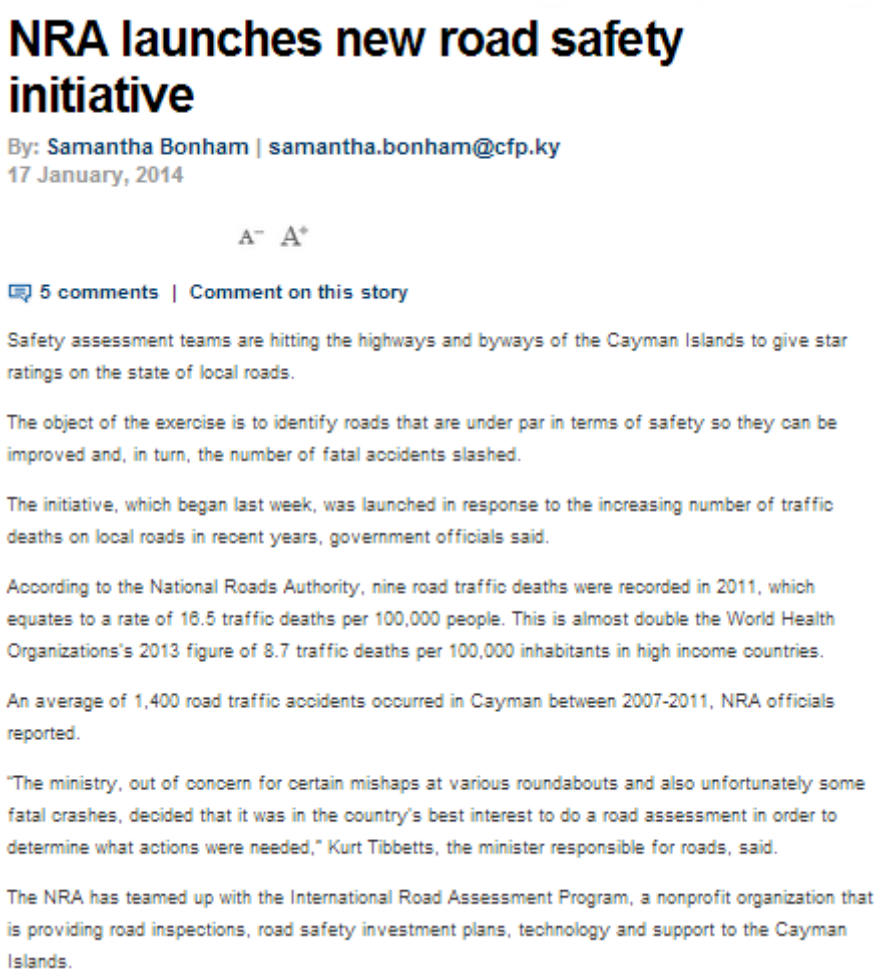
On January 16, 2014, a public launch event with press coverage took place, arranged by the NRA to take advantage of the survey vehicle being operational in the Cayman Islands. The event was addressed by the honourable Kurt Tibbett, Minister for Planning, lands, Agriculture, Housing and Infrastructure. Figures 12 and 13 show photos from the January 16 launch.

Figure 12 Photograph of the Project Launch in the Cayman Islands

Figure 13 Photograph of the Survey Vehicle at project launch in the Cayman Islands

6.3.2 Media Coverage of project launch

The project launch in the Cayman Islands on January 16 was covered by print, online and television media sources. The figure below is an excerpt obtained from a local print and online media agency, *the Cayman Compass*, which ran an article covering the project launch.[9]



NRA launches new road safety initiative

By: Samantha Bonham | samantha.bonham@cfp.ky
17 January, 2014

A⁻ A⁺

5 comments | Comment on this story

Safety assessment teams are hitting the highways and byways of the Cayman Islands to give star ratings on the state of local roads.

The object of the exercise is to identify roads that are under par in terms of safety so they can be improved and, in turn, the number of fatal accidents slashed.

The initiative, which began last week, was launched in response to the increasing number of traffic deaths on local roads in recent years, government officials said.

According to the National Roads Authority, nine road traffic deaths were recorded in 2011, which equates to a rate of 16.5 traffic deaths per 100,000 people. This is almost double the World Health Organizations's 2013 figure of 8.7 traffic deaths per 100,000 inhabitants in high income countries.

An average of 1,400 road traffic accidents occurred in Cayman between 2007-2011, NRA officials reported.

"The ministry, out of concern for certain mishaps at various roundabouts and also unfortunately some fatal crashes, decided that it was in the country's best interest to do a road assessment in order to determine what actions were needed," Kurt Tibbetts, the minister responsible for roads, said.

The NRA has teamed up with the International Road Assessment Program, a nonprofit organization that is providing road inspections, road safety investment plans, technology and support to the Cayman Islands.

Figure 14 Excerpt from an article in the Cayman Compass covering the project launch

6.3.3 iRAP Video Coding Assessment

The iRAP Cayman Islands project will involve the assessment of over 50 attributes of the road environment that influence road safety outcomes. Data on these attributes will be obtained at intervals of 100m along the road network. With the approval of the Steering Committee, iRAP has contracted SEMIC to conduct the coding assessment using the video and other data from the road survey. SEMIC coding staff have been trained and accredited by the iRAP team for this role in a previous project. iRAP will provide guidance to the coding team on unique aspects of the road system in the Cayman Islands and will complete a quality assurance review of 10% of the surveyed network. The coding activity is expected to be completed in March 2014. Below is a photo of the SEMIC coding team in Mexico.

[9] The Cayman Compass, http://www.compasscayman.com/caycompass/2014/01/17/NRA-launches-new-road-safety-initiative/

Figure 15 iRAP Video Coding Assessment by SEMIC

6.3.4 iRAP Data Analysis and Review

The iRAP team will perform final data preparation and data review in Phase II of the study. iRAP will be required to review the star ratings, fatality estimations, countermeasures programs and reports in detail, to ensure all results are appropriate for the Cayman Islands. The data analysis is expected to be completed in late May 2014. A final briefing for Phase II will be held in the Cayman Islands for members of both the Steering Committee and the Technical Working Group.

Figure 16 Star Rating and Safer Roads Investment Plan Process

6.3.5 iRAP Reporting

In June 2014, iRAP will submit a detailed report of the project outcomes, covering:

- Star Maps of the iRAP roads surveyed for Cars, Pedestrians, Bicyclists and Motorcyclists
- Detailed condition reports of all roads surveyed
- Estimated casualty rates expressed as the number of killed and seriously injured per kilometre
- Suggested Safer Roads Investment Plans for consideration by the Steering Committee and funding agencies
- Estimated casualty savings from the suggested investment plan

6.3.6 Online Resources

Full results, including data tables and charts, interactive maps and download files, as well as data underpinning the analyses, will be made available to NRA nominated stakeholders in the iRAP online software at http://vida.irap.org.

Figure 17 ViDA login page

The Star Ratings and Safer Road Investment Plans will be accessible through ViDA - the Road Assessment Programme's online analysis software. A guide to using ViDA to access the full results, plus details on how to request a User Account is available at http://downloads.irap.org/docs/ViDA_tour.pdf. The guidance document shows how the maps, charts, tables, economic analysis and download files can help to improve safe road design by improving understanding of the role that road infrastructure plays in influencing the likelihood and severity of common crash types and identifying countermeasures that will reduce risk.

Access to the iRAP online software is password protected. Usernames and passwords will be allocated to all key iRAP project stakeholders as nominated by the NRA. For further information about accessing or using the software, contact Morgan Fletcher, iRAP Senior Road Safety Engineer at morgan.fletcher@irap.org.

Figure 18 shows an example of a star rating map from another country; this map illustrates the car occupant star ratings for the Pacific Corridor from Mexico to Panama. Figure 19 shows examples of the benefits and costs of typical countermeasures from safer roads investment plans developed for other countries.

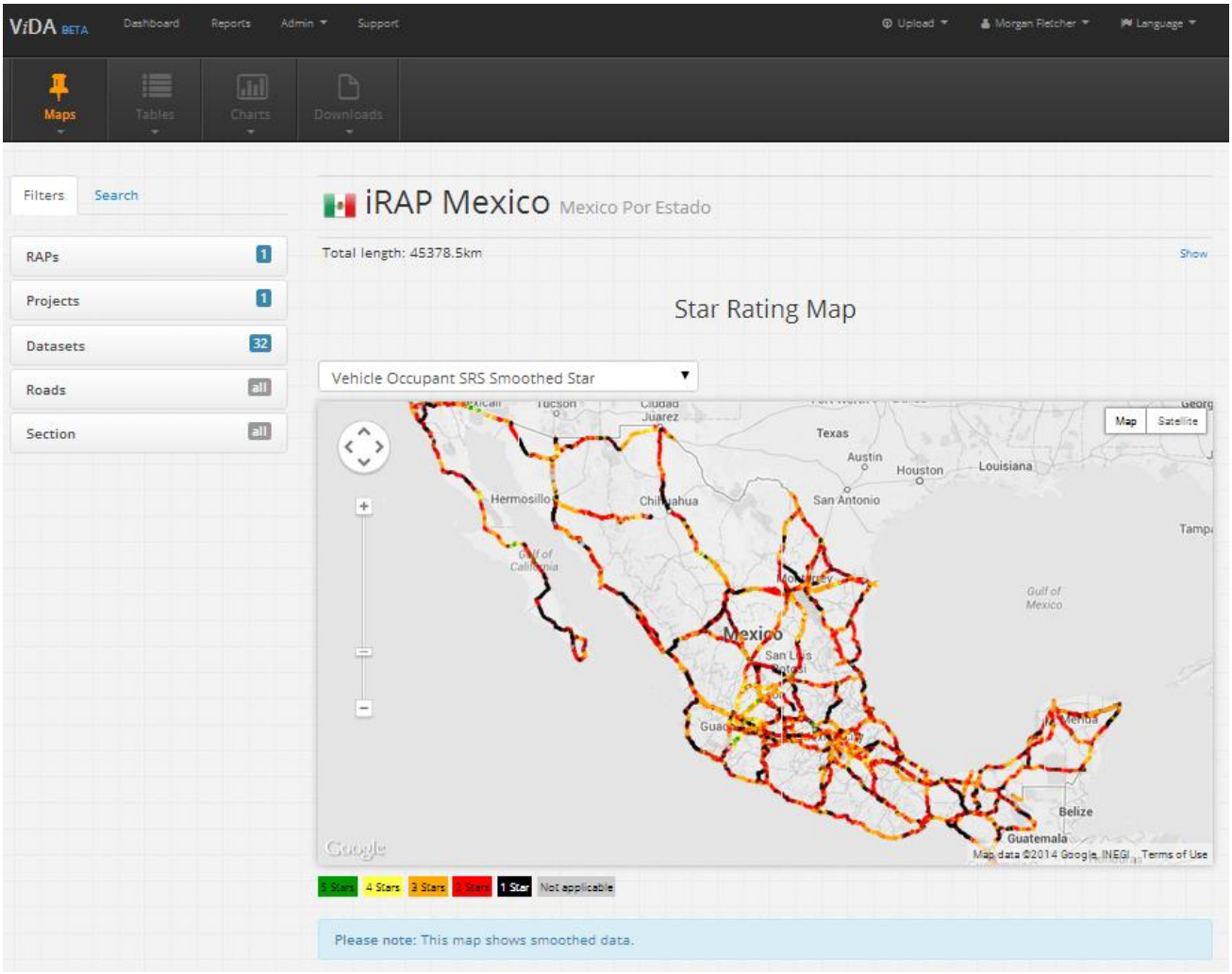


Figure 18 Example of a Star Rating Map in ViDA

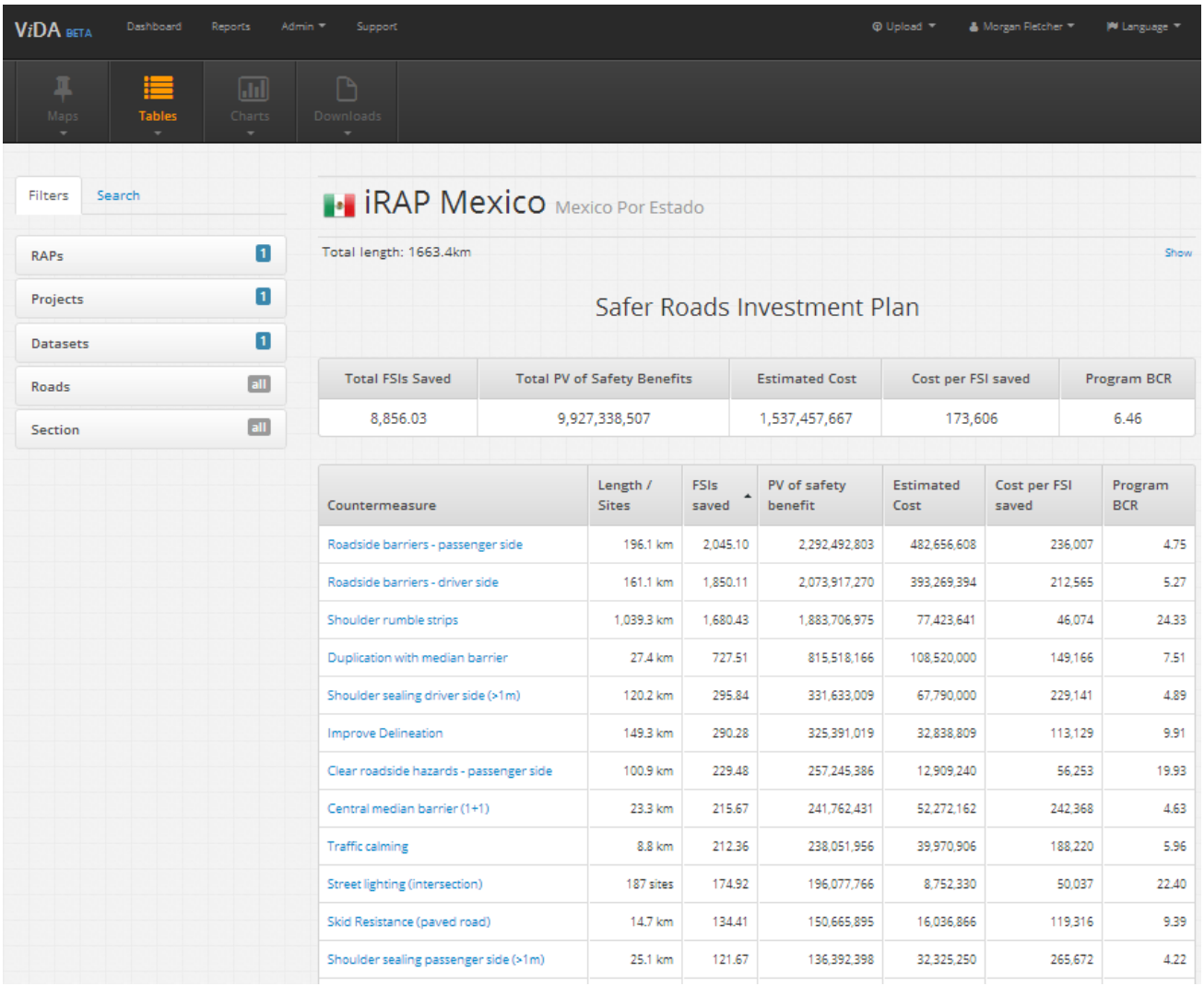


Figure 19 Typical Safer Road Investment Plan Outcomes in ViDA

7 Phase III—Implementation of iRAP Recommendations

The iRAP assessment provides a targeted programme of engineering improvements and where they are cost effective and have the greatest opportunity to reduce death and injury on the Cayman Islands road network. The implementation of these recommendations is required before a life is saved. The final briefing of Phase II that will be conducted by the iRAP team for the Steering Committee and the Technical Working Group will provide initial guidance on how the iRAP study results can be implemented. iRAP recommends funding of a Phase III effort in which both the Steering Committee and iRAP work together to guide the development and implementation of a safety improvement programme in the Cayman Islands. The following discussion addresses the key elements of an effective implementation programme.

7.1 Financing, Planning and Design of Recommendations

In relation to the key elements of project implementation it is expected that the NRA already has significant in-house expertise and experience in developing and implementing projects. The iRAP team and the NRA staff will work together on effective approaches to incorporating safety improvements in every project. Key tasks will include:

- Review of the iRAP recommendations in conjunction with local experience and video data collected
- Review and modification of the proposed improvement to be considered at each site if required. For example the exact location or type of some recommended pedestrian treatments may alter from the initial iRAP recommendation. This is expected as the iRAP assessment is a network-level tool and the professional review and decision of the local engineer, based on local experience, should take precedence.
- Implementation of simple improvements within maintenance programmes where possible.
- Planning investigation studies to review site conditions and fully cost and specify the works for more complex or expensive recommendations.
- Design and construction of the improvement – including the star rating of the design prior to construction where appropriate.
- Measurement and celebration of the improvement. Small local improvements can still create a measurable improvement in the star rating at that point (see example below). Where this is the case the engineering team can gain immediate feedback on the improvement they have made and celebrate the success. National and local politicians may also like to share this success publicly (e.g. the road section going from one star to three stars).

Figure 20 Example of a Safety Improvement Project Showing the Star Rating Before and After Improvement

7.2 Construction of Countermeasure Recommendations

Construction of improvements is expected during Phase III in 2015 and beyond and is not covered in Phases I and II in the 2013-14 programme.

7.3 iRAP Road Safety Toolkit

As part of the Implementation Phase, the iRAP core team will provide training materials and information on the iRAP Road Safety Toolkit (http://toolkit.irap.org/) that provides basic implementation details for 70 typical countermeasures recommended in an iRAP Investment Plan. The information includes basic elements required to design and build the feature safely and some implementation issues that need to be considered as part of the design (e.g. approach angles for safe roundabout design, catering for pedestrians at roundabouts). The toolkit is a supplementary guide only to existing design standards and is provided as a simple source of best practice information and the cumulative experience of engineers and iRAP teams around the world.

Ideas and experience of the Cayman Islands engineering community will also be sought and included in the toolkit and local case studies will be added where possible.

7.4 Review of Road Design Specifications

As part of the implementation support activity it is proposed that NRA staff undertake a review of standard cross sections in use across the Cayman Islands in conjunction with the iRAP core team. This will be undertaken to determine the typical star ratings of the standard cross sections currently in use and the

identification of any critical road attributes that impact safety that are not currently in the specifications (e.g. roadside protection or intersection specification).

The aim of this exercise will be to identify any simple additions to current design practice that may contribute to immediate safety gains in all new projects completed in the Cayman Islands.

7.5 Specification of Minimum Star Ratings for New Design

The NRA and iRAP project team will also consider the viability of the introduction of a minimum star rating for new designs that may be linked to road function, mobility requirements, volume or other requirements. For example a new design can be built to existing standards but must achieve an operating speed of 45 mph (70km/h) with a minimum star rating of three stars for all road users.

7.6 Training for Programme and Project Implementation

As part of Phase III, iRAP can provide training on effective use of iRAP results in managing a safety improvement programme for the Cayman Islands and in the appropriate design of individual projects. The training on safety improvement programme implementation is appropriate for NRA staff. The training on using iRAP results in design of specific projects is appropriate for both Ministry staff and design consultants. This will create a strong programme and project delivery team for the Cayman Islands with appropriate safety knowledge.

8 Risk Mapping

Risk Maps are typically prepared in countries where the crash data and traffic flow data is of sufficient quality and location referenced to allow the risk mapping to occur. Initial discussions with the NRA indicate that risk mapping is not feasible in the Cayman Islands at this time due to the limited crash data available to the road authorities. However, if data crash data are made available by the Royal Cayman Islands Police Services, risk mapping may be feasible in the future. iRAP can provide training on risk map preparation as part of Phase III.

8.1 Training and Preparation of Pilot Risk Maps

Once appropriate crash data are available, iRAP will tailor a Risk Mapping training course and hands-on workshop to work with the available data and prepare the various risk mapping reports in conjunction with the Steering Committee team. This will be completed in accordance with the *EuroRAP202_RAP Road Risk Mapping Manual* and associated training materials. Given the 238 mi (382km) size of the road network in the Cayman Islands, even manual risk mapping methods could be very effective. Figure 21 shows examples of risk maps prepared in other countries.

Figure 21 Typical Risk Mapping Report

8.2 Performance Tracking

Through the iRAP Cayman Islands initiative, the Cayman Islands Government will be able to measure success and the effectiveness of investment. Star Ratings and Risk Maps provide objective measures that can be used to track road safety performance, report on road safety outcomes and establish policy positions. In the UK, for example, EuroRAP used Risk Maps to demonstrate that the government had achieved a significant reduction on many high-risk primary route roads between 2002 and 2011 (see Figure 22 below). A comparison of risk distribution across the network in the first and latest data periods revealed a positive shift to the lower risk categories.

Table 1. Britain's most improved roads (2002-2006 vs. 2007-2011)

Road no.	From - to description	Region/country	Length (km)	Road type[1]	No. F&S crashes (2002-06)	EuroRAP Risk Rating (2002 06)[2]	No. F&S crashes (2007-11)	EuroRAP Risk Rating (2007-11)[2]	% decrease in no. F&S crashes	Measures implemented include:
A4128*	High Wycombe - A413 (Great Missenden)	SE	11	Single	31	132.0	4	20.9	-87%	Speed limit review, improved directional and warning signs, improved road markings, intelligent road studs, traffic calming measures, upgrading pedestrian crossing facilities in villages
M6	M6 J44 (Carlisle) - A74(M) Gretna	NW	10	Motorway	24	38.7	5	7.1	-79%	Upgrade from 2-lane dual carriageway to 3-lane motorway, 3m hard shoulder, junction improvements, local access road provided adjacent to route
A435*	Cheltenham - A46 (Tewkesbury)	SW	12	Single	25	81.3	7	22.8	-72%	Junction improvements including widening, signing and lining, interactive signs, resurfacing, traffic calming, speed limit changes, toucan crossing
A418	Thame - Aylesbury	SE	13	Single	24	44.6	7	13.4	-71%	Resurfacing, speed limit changes, red surface treatment and renewed cross hatching at high risk junction
A120	Puckeridge - Braintree	E	40	Mixed	58	38.2	19	8.8	-67%	Kerb re-alignment, additional warning signs, high friction surfacing, speed limit changes, road marking improvements
A34	Stafford - Stoke-on-Trent	WM	21	Dual	30	33.9	10	11.4	-67%	Mobile camera enforcement, resurfacing, signing improvements, speed limit changes, pedestrian facilities
A41	A1 (Edgware) - M1 J5 (Watford)	E/London	10	Mixed	45	84.3	15	26.3	-67%	Signing and lining improvements, high friction surfacing, central island alterations, coloured surfacing
A52	Nottingham RR - Bingham	EM	13	Mixed	33	39.4	11	13.7	-67%	Average speed cameras, consistency of signing and markings, 50mph buffer zones between 40mph/NSL, central safety barriers
A1066	Thetford - Diss	E	31	Single	38	90.1	13	32.5	-66%	Centre hatching markings on non-overtaking sections, improved edge definition markings on lay-bys, vegetation clearance, signing improvements
A21	Pembury - A229 (Hurst Green)	SE	21	Single	49	65.8	19	27.2	-61%	Drainage, lighting, signing, lining and junction improvements, traffic calming, speed limit review

*Ranked by percentage reduction in the number of fatal or serious (F&S) crashes between 2002-06 and 2007-11; significant reduction in the number of F&S crashes between data periods at the 98% confidence level; minimum of 19 F&S crashes 2002-06; minimum F&S crash density of 1 F&S/km 2002-06; * indicates roads classified as non-primary; [1] road type accounting for at least 80% of section length; [2] EuroRAP Risk Rating based on the number of fatal or serious crashes per billion vehicle km travelled: black (high risk), red (medium-high risk), orange (medium risk), yellow (low-medium risk), green (low risk); measures implemented based on road authority responses to pre-publication consultation.*

Figure 22 Performance Tracking Example from UK

9 Communications Plan

An iRAP communications plan will be developed in consultation with the NRA and the Steering Committee to reflect the desired communications outcomes for the programme in the Cayman Islands. Improving road safety is a positive and lasting contribution to every community and individual in the country and the sharing of this news is important. This ensures a supportive and well-informed road safety community, engineering community and political environment to progress towards a Cayman Islands free of high risk roads.

Key communications events in year one of the programme can include:

- The launch of the star rating results and the plans for road upgrades. Major policy announcement of “A Cayman Islands free of high risk roads” at the conclusion of Phase II.
- Risk mapping, launching star rating upgrades post-construction and additional communications activities should be undertaken as part of the implementation activities in Phase III.

10 Project Timeline and Resources

The programme for 2014 is outlined below.

Table 2. Project timeline

Project Inception Report – Phase I	Expected Timing
iRAP Cayman Islands Inception Mission	Completed
Briefing meeting with the Ministerial level people.	Completed
iRAP Workshop with the Steering Committee	Completed
Meetings with key agency staff	Completed
Presentation of Inception Report	Completed
Field trip with local stakeholders	Completed

Star Rating and Investment Plans – Phase II	Expected Timing
Review and analysis of road network	Completed
Finalise definition of Road Network and review of existing data	Completed
Mobilization of survey vehicle and media launch of survey inspection	Completed
Steering Committee meeting	Completed
iRAP Cayman Islands road survey – launch & survey	Completed
Collation of Cayman Islands background data	January - March 2014
iRAP Cayman Islands survey data coding	February 2014
iRAP quality assurance of coded data	March 2014
iRAP data analysis and preparation of star ratings and SRIP	March – May 2014
Review of results with Stakeholders	June 2014
iRAP Cayman Islands Star Rating – Draft and Final Reports Results	June 2014

Preparation of Terms of Reference -- Phase III	Expected Timing
Site review and planning investigation activities to prioritise and finalise the iRAP Safer Roads Investment Plan and provide sufficient specification of works to allow procurement of the first year of improvements	September 2014 - November 2014
Recommendations on the collection of before and after data to assist in evaluating the success of the investment	September 2014 - November 2014
Guidelines on good design and assistance in use of the iRAP Road Safety Toolkit by the project team (http://toolkit.irap.org).	September 2014 - November 2014
Advice on potential use of iRAP at a strategic level within the Cayman Islands by the Ministry of Finance & Economic Development, Ministry of Planning, Agriculture, Housing and Infrastructure and Ministry of Health, Environment, Youth, Sports & Culture, and where iRAP outputs can be included within the Cayman Islands Road Safety Strategy.	September 2014 - November 2014
Potential review of design standards to include minimum star ratings for new roads and/or the inclusion of critical road safety features into standard cross-sections (e.g. roadside hazard condition, footpaths).	September 2014 – February 2015
Potential to include star rating in crash reporting, use star ratings and fatality estimations to help target enforcement, education or improved maintenance standards.	February 2012 March 2012
Star rating of new road upgrades that will enable the celebration or Ministerial launching of the improvement undertaken by the Government (e.g. a section of road that moves from one star to three star as a result of an investment)	September 2014 onwards

11 Further Information and Key Contacts

Further information on iRAP is available at www.irap.org

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