JKR STANDARD

JKR/SIRIM 5:2023

ICS: 91.040

Penarafan Hijau JKR (pH JKR) for road

JKR

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JKR Malaysia vision is to become a world-class service provider and centre of excellence in asset management, project management and engineering services for the development of the nation's infrastructure through creative and innovative human capital and state-of-the-art technology.

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JKR STANDARD

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JKR Standard is developed through consensus by established committee, which consists of experts in the subject matter. The use of this standard is voluntary, and it is open for adoption by regulators, government agencies, associations, industries, professional bodies, etc.

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Foreword

This standard was developed by the Project Committee on *Penarafan Hijau* JKR (pH JKR) for Road established by SIRIM Berhad.

This standard was developed with the following objectives:

a) as a guide for assessing the sustainability of road projects;

b) provide a comprehensive and appropriate strategy towards sustainable road project implementation;

c) to create awareness and promote sustainable development; and

d) as a guide to all parties involved in the *penarafan hijau* scheme.

This standard will be subjected to review to reflect current needs and conditions. Users and other interested parties may submit comments on the contents of this standard for consideration into future versions.

Compliance with this standard does not by itself grant immunity from legal obligations.

Penarafan Hijau JKR (pH JKR) for road

0. Introduction

This standard was developed to help the construction industry, specifically the road construction indusry, to implement and meet the requirements of sustainable road standards that are recognised according to current requirements in line with various good green management practices.

This standard was developed based on the *Penarafan Hijau* JKR (pH JKR) Manual for the Road Sector which was published by JKR in 2018. The requirements of this standard take into account best practices and are arranged in the order of the implementation process of a road project.

1. Scope

This standard sets out the evaluation criteria and methods for assessing the sustainability of road projects. This standard focuses on seven main areas, namely sustainable site planning and management, pavement technologies, environment and water, access and equity, construction activities, material and resources, and innovation.

This standard applies to the construction of new roads and upgrading of existing roads.

2. Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Environmental Quality Act 1974 (Act 127)

Persons with Disabilities Act 2008 (Act 685)

Solid Waste and Public Cleansing Management Act 2007 (Act 672)

Uniform Building By-Law 1984 (UBBL 1984)

Environmental Quality (Scheduled Wastes) Regulations 2005

MS 825: Part 1, *Code of practice for the design of road lighting - Part 1: Lighting of roads and public amenity areas*

MS 1184, *Universal design and accessibility in the built environment - Code of practice*

MS IEC 60364 series, *Electrical installations of buildings*

MS ISO 9001, *Quality management systems - Requirements*

MS ISO 14001, *Environmental management systems - Requirements with guidance for use*

MS ISO 45001, *Occupational health and safety management systems - Requirements with guidance for use*

JKR/SIRIM 1, *Manual for Green Product Scoring System*

JKR/SIRIM 3, *Environmental protection and enhancement works for projects*

SIRIM Eco-Labeling Scheme - Criteria Documents, SIRIM Berhad

Arahan Teknik (J) 2C/85, Manual on Traffic Control Devices: Temporary Signs and Work Zones Control, JKR Malaysia

Arahan Teknik (J) 5/85, Manual for the Structural Design of Flexible Pavement, JKR Malaysia

Arahan Teknik (J) 8/86, A Guide on Geometric Design of Roads, JKR Malaysia

Arahan Teknik (J) 10/86, A Guide to the Design of Cycle Track, JKR Malaysia

Arahan Teknik (J) 35/2018, Geometric Guideline for Exclusive Motorcycle Lane, JKR Malaysia

Nota Teknik (J) 18/97, Basic Guidelines on Pedestrian Facilities, JKR Malaysia

Nota Teknik (J) 29/2015, Guideline for the Provision of Road Lighting, JKR Malaysia

Nota Teknik (J) 33/2015, Guidelines for Motorcycle Facilities, JKR Malaysia

JKR/SPJ/2015-S1, Standard Specification For Road Works Section 1: General, JKR Malaysia

JKR/SPJ/2020-S2, Standard Specification For Road Works Section 2: Earthworks, JKR Malaysia

JKR/SPJ/2008-S4, Specification For Road Works Section 4: Flexible Pavement, JKR Malaysia

JKR/SPJ/2020-S5, Standard Specification for Road Works Section 5: Concrete Pavement, JKR Malaysia

JKR/SPJ/2011-S7, Standard Specification for Road Works Section 7: Road lighting, JKR Malaysia

JKR/SPJ/2008-S8, Standard Specification For Road Works Section 8: Traffic Signal System, JKR Malaysia

JKR/SPJ/2017-S19, Standard Specification For Road Works Section 19: Traffic Management At Work Zones, JKR Malaysia

Standard Drawing For Road Works, Section 9: Motorcycle Lane, JKR Malaysia

A Guide To The Visual Assessment Of Flexible Pavement Surface Condition, JKR Malaysia

Garis Panduan Rekabentuk Cerun, Cawangan Kejuruteraan Cerun, JKR Malaysia

Garis Panduan Perancangan Pemuliharaan Dan Pembangunan Kawasan Sensitif Alam Sekitar (KSAS), PLANMalaysia

Geotechnical Design Requirement, Cawangan Kejuruteraan Geoteknik, JKR Malaysia

Guideline on Road Safety Audit Management, JKR Malaysia

Guidelines for Development of Smart Green Linear Infrastructure for Safe Movement of Large Wild-Mammals in Peninsular Malaysia: Underpasses and Overpasses for Roads, Department of Wildlife and National Park

Guidelines for Environmental Noise Limits and Control, Department of Environment, Ministry of Energy, Science, Technology, Environment & Climate Change

Highway Capacity Manual, Ministry of Works Malaysia

Interim Guide to Evaluation and Rehabilitation of Flexible Road Pavement, JKR Malaysia

Manual Fasiliti Keselamatan Jalan, JKR Malaysia

Manual Saliran Mesra Alam (MSMA), Department of Irrigation and Drainage, Ministry of Natural Resources, Environment and Climate Change

Pelan Induk Rangkaian Ekologi Central Forest Spine (PIRECFS), PLANMalaysia

Rancangan Fizikal Negara (RFN), PLANMalaysia

Road Safety Audit, Guidelines For The Safety Audit of Roads And Road Project In Malaysia, JKR Malaysia

Road Traffic Volume of Malaysia, Highway Planning Division, Ministry of Works Malaysia

Standard Operating Procedure (SOP) Senggara Jalan, JKR Malaysia

Standard Specifications for Building Works, JKR Malaysia

MyHijau Directory, Malaysian Green Technology And Climate Change Corporation, http://www.myhijau.my

Portal JKR Material Approval List (JMAL), JKR Malaysia, https://www.jkr.gov.my

3. Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

3.1 Certificate of Practical Completion (CPC)

Certificate that is issued when the entire construction work has been completed. The issuance of CPC marks the commencement of the Defect Liability Period (DLP) as provided in the contract.

3.2 competent person

Person with an accredited green rating tool certification or equivalent for road or infrastructure projects.

3.3 Environmental Impact Assessment (EIA)

Process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human- health impacts, both beneficial and adverse.

3.4 Environmental Management Plan (EMP)

3.4.1 for EIA

Document that translates the pollution prevention and mitigation measures (P2M2s) recommended in the EIA Report and the approval conditions (CoAs) into action.

[SOURCE: EGIM 2016]

3.4.2 for non-EIA

Documentation of administrative environmental management and coordination procedures for on-site management for projects costing above RM 20 million including earthworks, or project sites located within, adjacent to or near Environmentally Sensitive Areas (ESA) identified by the relevant state authority.

3.5 Enviromentally Sensitive Area (ESA)

Areas that are of critical importance in terms of the goods, services and life-support systems that they provide such as water purification, pest control and erosion regulation. In addition, they also refer to areas that harbour the wealth of the nation's biodiversity.

NOTE. ESA is also known as *Kawasan Sensitif Alam Sekitar* (KSAS).

3.6 new roads

New alignment that accommodates connection within areas, access and traffic movement.

3.7 Quality Management System (QMS)

Collection of business processes focused on consistently meeting customer requirements and enhancing their satisfaction.

3.8 Road Safety Audit (RSA)

Formal examination of the planning, design and construction of a road project, and of the characteristics and operation of an existing road, by independent and qualified examiners, to identify any potentially unsafe feature or operational arrangement that may adversely affect the safety of any road user.

3.9 Traffic Management Plan (TMP)

A document prepared by the Contractor's Engineer that describes the Contractor's proposal on how to manage the traffic on site during the course of construction of a road project. The document must be verified by a Professional Engineer.

3.10 traffic study

Systematic and scientific process whereby the impact of the new generated traffic is assessed and mitigation measures prescribed.

3.11 upgrading existing road

Restoration of an existing road where the cross section, structural capacity of the pavement and/or riding quality is improved.

3.12 Value Management (VM)

Systematic and innovative multi-disciplinary approach to study the specific functions of a program, design, product, service, project, facility and system to achieve better value and optimal cost without affecting the performance level of the program / project.

3.12.1 Value Assessment (VA)

Implemented during the initial stage of programme/project planning with the aim of determining the cost and scopes of a programme/project.

3.12.2 Value Engineering (VE)

Aims to align or realign the technical solutions appropriately to meet project objectives, abide to project scopes and cost budget capping made at Strategic Assessment Phase (project approval).

3.12.3 Value Review (VR)

Aims to assess the achievement of the objectives/outcomes of a programme/project compared to the objectives/outcomes that have been set at the planning stage.

SOURCES:

1. *Penambahbaikan Pelaksanaan Pengurusan Nilai dan Garis Panduan dan Peraturan bagi Perancangan Bangunan dalam Program/Projek Kerajaan Persekutuan, Pekeliling Unit Perancang Ekonomi, Jabatan Perdana Menteri, Bil.1 Tahun 2015*

2. *A guide on value management (VM) - Integration in affordable housing programmes and projects*, CIDB Malaysia

4. Criteria, responsibilities and processes

4.1 Criteria

The criteria selected for *Penarafan Hijau* JKR (pH JKR) provide an indication that the development is carried out and controlled in a sustainable manner. By understanding these criteria, the project team can implement the project based on sustainable development principles.

4.1.1 Projects subscribing to this scheme shall be rated based on the following seven criteria:

a) Sustainable Site Planning and Management (SM)

Most of the project sites have been identified by the government beforehand. The freedom of choice is quite limited. However, sites that have been identified are to be managed and developed in a sustainable manner in order to minimise environmental impacts.

b) Pavement Technologies (PT)

The latest technology in design and construction of roads which can increase the sustainability of a road should be adopted.

c) Environment and Water (EW)

Earthworks, erosion and sedimentation control and storm water management should be carried out sustainably. Restoration and preservation of the environment should also be taken into account.

d) Access and Equity (AE)

Safety and facility of road users can be enhanced by conducting a safety audit at any stage of development. Road facilities such as pedestrian bridges and bicycle lanes can also increase the level of road user safety. Rest and Recreation Areas and Scenic View Areas can also enhance the facility of road users.

e) Construction Activities (CA)

The quality of the road can be enhanced by implementing a management system based on the ISO 9001 or any other equivalent standard that covers the the design and construction phase of the project. Consideration should be given to ensuring user safety when undertaking maintenance or upgrading works.

f) Material and Resources (MR)

Good environmental practices such as the 3 ‘R’s, i.e. reduce, reuse and recycling, should be implanted and the practice monitored in order to reduce the consumption of natural resources and to ensure the efficient use of materials generally.

g) Innovation (IN)

Initiatives and innovative designs that are in line with the government's mission is encouraged.

4.2 Roles and responsibilities

4.2.1 The *Jawatankuasa Induk* is a special committee established at the headquarters of the Public Works Department (JKR) Malaysia and is responsible for:

a) planning and monitoring the implementation of policies as well as setting the direction of the pH JKR;

b) determining the need to update or re-establish standard documents; and

c) collecting, updating and analysing information from projects registered in the database system.

4.2.2 The *Jawatankuasa Penarafan* is a special committee consisting of federal and/or state-level government agencies appointed by the *Jawatankuasa Induk* and is responsible for:

a) confirming/verifying/ validating of the recommended results; and

b) planning strategies for programmes and activities to promote pH JKR.

4.2.3 The Secretariat is an organisation appointed by the *Jawatankuasa Penarafan* and is responsible for:

a) managing the registration of pH JKR projects;

b) collecting and managing information on registered projects;

c) confirming the appointment of a facilitator and verification team;

d) managing the appointment of a validation team;

e) managing meetings of the *Jawatankuasa Penarafan*;

f) issuing the letter/certificate of rating upon approval of the *Jawatankuasa Penarafan*;

g) submitting the list of project ratings, a copy of the *Penarafan Hijau* Scoring Assessment Form (pH JKR) and proof documents to the *Jawatankuasa Induk* at the JKR Headquarters; and

h) submitting a copy of the pH JKR certificate for each rating stage to the *Jawatankuasa Induk* at the JKR Headquarters.

4.2.4 The Project Team Leader is an officer appointed by the project owner and is responsible for:

a) ensuring that the rating process including administrative and logistical matters run smoothly until the rating is achieved;

b) identifying and appointing a facilitator;

c) monitoring the performance of the facilitator;

d) identifiying and appointing a verification team; and

e) collecting and reporting registration information and rating achievement records together with proof documents to the secretariat based on progress of implementation.

4.2.5 The facilitator is a competent person who is responsible for:

a) ensuring the project meets the requirements of this standard;

b) coordinating each discipline/field related to rating activities; and

c) conducting self-assessment with the project team.

4.2.6 The Project Team consists of members appointed by the project owner and is responsible for:

a) ensuring compliance with the pH JKR criteria;

b) setting a reasonable green rating target score for the project according to the scope, cost and requirements of the project;

c) making reference to the pH JKR checklist for designs and specifications that meet the criteria of the scores applied for;

d) ensuring that the green rating or green agenda is included as one of the agenda items in its meetings and the progress status is discussed;

e) preparing proofing documents according to discipline to meet the rating process at the design evaluation, scoring verification and scoring validation stage; and

f) ensuring that targeted scores can be achieved at all stages of the rating process.

4.2.7 The verification team is the project team consisting of competent persons appointed by the Project Team Leader and responsible for:

a) verify the implementation on site according to the design; and

b) recommend the rating to the *Jawatankuasa Penarafan*.

4.2.8 The validation team is an independent team consisting of competent persons appointed by the secretariat and responsible for:

a) verify the implementation on site according to the design; and

b) recommend a rating of 4 stars and above to the *Jawatankuasa Penarafan*.

4.3 *Penarafan Hijau* JKR (pH JKR) implementation process

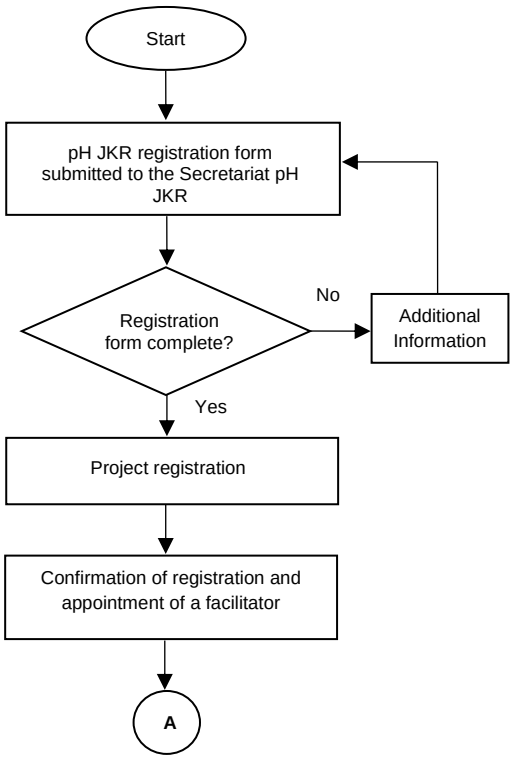
The pH JKR emphasises the overall progression from the planning phase to submission. The implementation process is divided into two types of development, which are new road development and existing road development. The process of implementing the *penarafan hijau* is as shown below:

a) Stage 1 - Application and registration (refer Figure 1);

b) Stage 2 - Design assessment (refer Figure 2);

c) Stage 3 - Verification of scoring (refer Figure 3); and

d) Stage 4 - Validation of scoring (refer Figure 4).

Stage	Process	Responsibilities	Procedure/Reference
Application and registration		Project Team Leader Secretariat Secretariat Secretariat	Complete the pH JKR registration form in Annex B. Ensure that the information in the registration form on the project is complete. Manage information on registered projects. Issue letter of confirmation of project registration and appointment of a facilitator to the Project Team Leader.

NOTES:

1. Registration should be carried out at the project planning stage.

2. The validity period of registration is three years. The design evaluation process (Stage 2) should be carried out within the period. However, the extension of the period can be applied by the Project Team Leader based on the progress of the project implementation.

Figure 1. Stage 1 - Application and registration

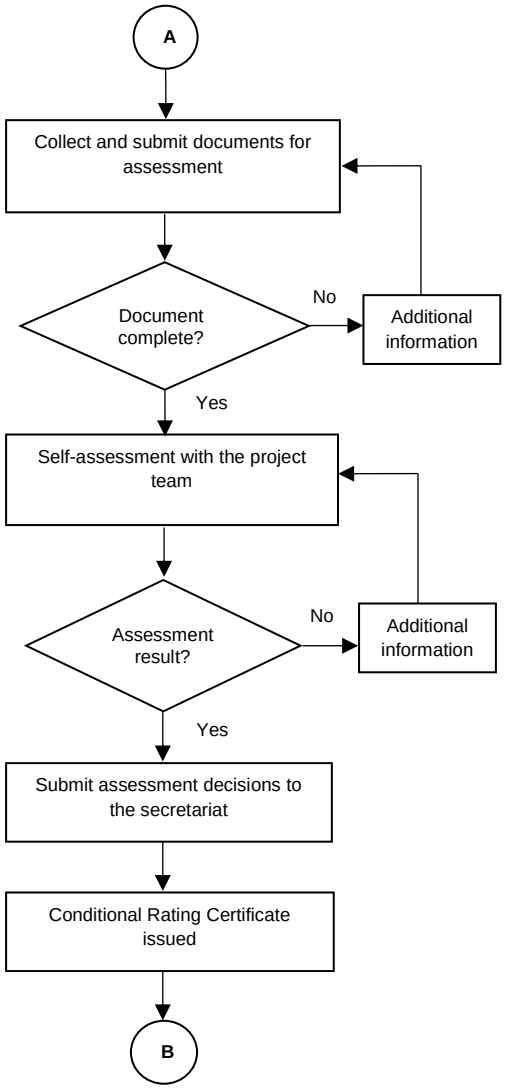
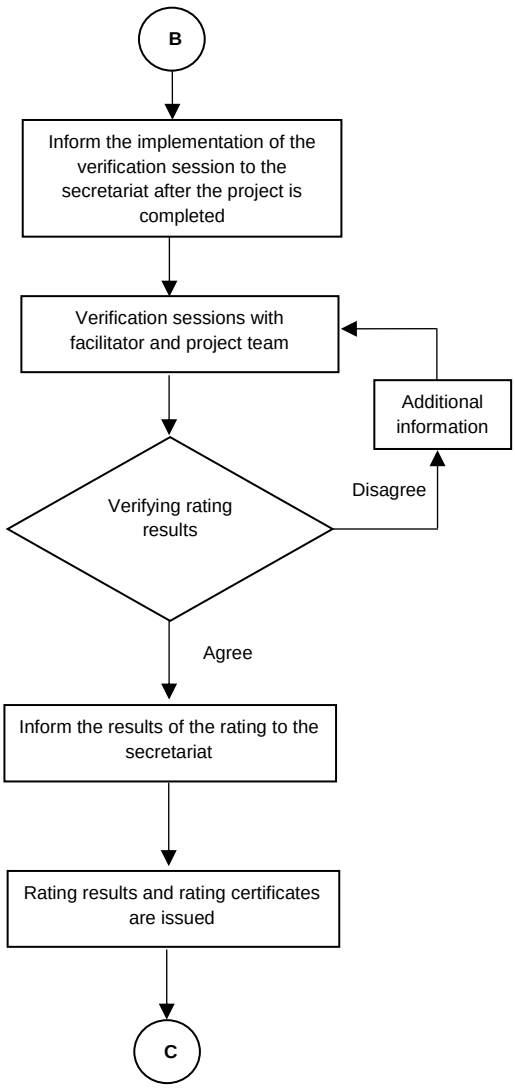
Stage	Process	Responsibilities	Procedure/Reference
Design assessment		Facilitator Facilitator Facilitator and Project Team Leader Facilitator and Project Team Leader Project Team Leader Secretariat	Complete the pH JKR assessment scoring form in Annex C. Check and make sure the scoring evaluation form for the project is complete. Evaluate the *Penarafan Hijau* for the project. Obtain results based on a joint evaluation by the project team. Present the results of the assessment carried out by the project team, along with proof documents. Issue Conditional Rating Certificate (CPC) to Project Team Leader.

Figure 2. Stage 2 - Design assessment

Stage	Process	Responsibilities	Procedure/Reference
Verification of scoring		Project Team Leader Facilitator and Project Team Leader Facilitator Project Team Leader Secretariat	Verification activity should be completed within 6 months of issuance of the CPC. Complete the pH JKR assessment scoring form in Annex C. If re-verification needs to be conducted, submit additional information to the verification team. Only one re-verification is allowed. The notification is made officially and accompanied by a copy of Annex C, together with supporting document(s). Submit the results and a copy of the rating certificate to the *Jawatankuasa Induk*.

NOTES:

1. The rating certificate will only be issued by the secretariat for a rating of 3 stars and below.
2. For ratings of 4 stars and above, it is necessary to go through a validation process (Stage 4).

Figure 3. Stage 3 - Verification of scoring

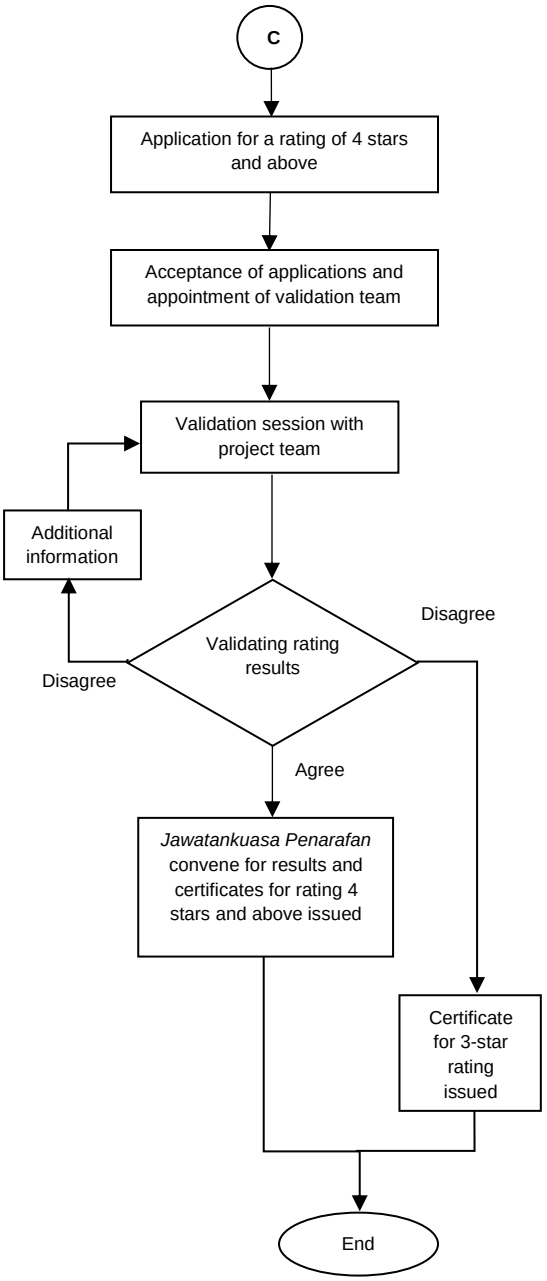
Stage	Process	Responsibilities	Procedure/Reference
Validation of scoring		Facilitator and Project Team Leader Secretariat Validation team Facilitator Validation team *Jawatankuasa Penarafan* Secretariat	Review of the pH JKR assessment scoring form in Annex C. If revalidation needs to be held, the facilitator needs to submit additional information to the validation team. The validation team submits the decision to the secretariat. Submit results and copies of rating certificates for 4 stars and above to the *Jawatankuasa Induk*. For projects that do not pass the validation process, a 3-star rating certificate will be submitted.

Figure 4. Stage 4 - Validation of scoring

4.4 Road categories

Road categories are as in Table 1.

Table 1. Road categories

Road categories		Description
A	Expressway	An Expressway is a divided highway for through traffic with full control of access and always with grade separations at all intersections. In rural areas, they apply to the interstate highways for through traffic and form the basic framework of National Road Transportation for fast travel. They serve long trips and provide higher speed of travelling and comfort. To maintain this, they are fully access controlled and are designed to the highest standards. They form the basic framework of the road transportation system for through traffic in urbanised areas. They also serve relatively long trips and smooth traffic flow and with full access control and complement the Rural Expressway. All expressways including the ramps will have full access control. However, in urban areas, it may be appropriate to allow left in - left out access with service interchange ramps to enhance connectivity to the existing road network. Any such connections on entry ramps should provide for appropriate acceleration distances onto the expressway, and any access on an exit ramp shall have adequate deceleration distance so that safety is not affected. Any such connections should be assessed for the likely usage and the traffic capacity determined.

Table 1. Road categories *(continued)*

Road categories		Description
	Highway	They constitute the interstate national network for intermediate traffic volumes and complement the expressway network. They usually link up directly or indirectly the Federal capital, state capitals, large urban centers and points of entry/exit to the country. They serve long to intermediate trip lengths. Speed of travel is not as important as in an Expressway but relatively high to medium speed is necessary. Smooth traffic is provided with partial access control.
B	Federal roads	Federal Roads are roads that are gazetted under the Federal Road Ordinance and are usually roads linking the state capitals, airports, railway stations and ports. Roads within Felda Land Schemes and those in other Regional Land Schemes constructed under the Federal Fund shall also fall under this category. The maintenance of these roads is the responsibility of the Federal Government and is done through the State JKR with funds from the Federal Government. Federal Roads can fall into the rural category under the national highway network, or the urban category under the arterial roads which link major urban centers.
C	State roads	State Roads are all the other roads within the state outside the jurisdiction of the Local Authority or District Office, built to JKR Standard. They are normally constructed with State Funds. The maintenance of these roads are the responsibility of the State Government and is done through the State JKR. State roads can fall into the rural category under primary road network in the state, or the urban category under collector roads within urban centers.

Table 1. Road categories *(concluded)*

Road categories		Description
D	Local authority roads	Local Authority Roads are all those roads within the limits and boundaries of the Local Authority and are normally maintained by the responsible Local Authority. Local roads can fall under the rural category if it is a minor road supporting the local network, or the urban category if it serves as minor streets in a local town network.
E	Rural roads	Rural roads are all those roads directly under the jurisdiction of the District Office. They can be earth or metaled roads, usually with no right of way, and maintained by the District Office. Rural roads are under the rural category and serve predominantly the local rural areas only.

4.5 Matrix

Matrix criteria and road categories are as in Table 2 below.

Table 2. Description criteria and road categories

No.	Criteria	Type of development									
		New road					Upgrading existing road				
		A	**B**	**C**	**D**	**E**	**A**	**B**	**C**	**D**	**E**
SM	**Sustainable Site Planning and Management**										
1	Requirements for road works design	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Road alignment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Site vegetation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4*	Noise mitigation	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA
5*	Services for disabled users	NA	✓	✓	✓	NA	NA	✓	✓	✓	NA
6*	Noise control	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA
PT	**Pavement technologies**										
1	Existing pavement evaluation	NA	NA	NA	NA	NA	✓	✓	✓	✓	NA
2	Permeable pavement	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Pavement performance tracking	NA	NA	NA	NA	NA	✓	✓	✓	✓	NA
4	Pavement design life	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Table 2. Description criteria and road categories *(continued)*

No.	Criteria	Type of development									
		New Road					Upgrading existing road				
		A	B	C	D	E	A	B	C	D	E
EW	**Environmental and Water**										
1	Enviromental Management System (EMS)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Stormwater management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3*	Ecological connectivity (Elective Criteria)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AE	**Access and Equity**										
1	Safety audit	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2*	Scenic views	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Pedestrian access	NA	✓	✓	✓	NA	NA	✓	✓	✓	NA
4*	Motorcycle lane	✓	✓	✓	✓	NA	✓	✓	✓	✓	NA
5*	Access to rest area	✓	✓	NA	NA	NA	✓	✓	NA	NA	NA
6	Cycle track	NA	NA	NA	✓	NA	NA	NA	NA	✓	NA
CA	**Construction activity**										
1	Requirements for road work design	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2*	Occupational Health and Safety Mangement System (OHSMS)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Waste management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Traffic management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Routine maintenance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	Housekeeping	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
7	Sustainable construction	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MR	**Material resources**										
1	Material reuse	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Green product	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Road inventories	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Efficient road lightings and/or traffic signal systems	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
IN	**Innovations**										
1	Innovation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

NOTES:

1. NA - Not applicable criteria due to the type of development that is being rated. It does not affect the overall score count.

2. *If the criteria not related to the project, it will be counted as NA.

4.6 Classification rating

The *Penarafan Hijau* level for the construction of new roads and the upgrading of existing roads is as in Table 3.

Table 3. *Penarafan Hijau* level

Percentage (%)	Star	pH JKR ratings
80 - 100	★★★★★	Global Excellence
70 - 79	★★★★	National Excellence
50 - 69	★★★	Best Management Practices
40 - 49	★★	Potential Recognition

5. Rating system

5.1 Assessment stage

The assessment for certification is divided into 2 stages, which are the design stage and the construction (verification) stage.

5.2 Details of marking

Table 4. Design assessment

No	Marking criteria		Maximum points	
			New road	Upgrading existing road
1	SM	Sustainable Site Planning and Management	21	23
2	PT	Pavement Technologies	9	9
3	EW	Environment and Water	8	8
4	AE	Access and Equity	16	16
5	CA	Construction Activities	14	14
6	MR	Material and Resources	13	13
7	IN	Innovation	5	5
Total points			**86**	**88**

Table 5. Verification assessment

No	Marking criteria		Maximum points	
			New road	Upgrading existing road
1	SM	Sustainable Site Planning and Management	16	16
2	PT	Pavement Technologies	12	11
3	EW	Environment and Water	10	10
4	AE	Access and Equity	16	16
5	CA	Construction Activities	24	24
6	MR	Material and Resources	14	14
7	IN	Innovation	5	5
Total points			**97**	**96**

To quantify project scoring for certification, the project team is required to submit the scorecard (Annex C) for assessment. The scorecard consists of criteria and sub-criteria which have different points.

6. *Penarafan Hijau* (pH JKR) categories and implementation strategies

All criteria are categorised as follows:

a) SM - Sustainable Site Planning and Management

b) PT - Pavement Technologies

c) EW - Environment and Water

d) AE - Access and Equity

e) CA - Construction Activities

f) MR - Material and Resources

g) IN - Innovation

The description, requirements, scoring, guidance and proof documents of all the above criteria are set out in Tables 6 to 12 below.

6.1 Sustainable Site Planning and Management (SM)

Table 6. Criteria requirements for SM

Criteria 1: Sustainable Site Planning and Management					
No. (SM)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
1	**Requirements for road works design** **New road/ Upgrading existing road** To study and review requirements for upgrading an existing road or construction of new roads. The outcomes will be used to design the project.	Input for new road and upgrading existing road: a) Traffic study. b) Site Investigation Data. c) Flood records. d) Response to public complaints or requests from public, local authority and etc. e) Value Management (VM). f) Survey Drawing. Additional input for upgrading existing road: a) Pavement Evaluation report. b) As built drawings. c) Accident reports. d) Structures replacement (Bridge assessment report/ Inventory card).	 1 1 1 1 1 1 1 1 1 1	A proper study needs to be conducted towards causes which lead to the construction of the road that may comprise any of below: i) Traffic study report which consists of traffic volume, existing level of service (LOS) and growth rate. ii) Site Investigation Report consists of Physical Data (Field Data) and Laboratory Data, Groundwater Level, Original Ground Level, geological report and etc. iii) Flood records which shows highest flood level, magnitude, frequency and recurrence of event from relevant authorities or carry out own study. iv) Public response through any medium (e.g.: newspaper, emails, etc.) v) Structure replacement due to life span of the structure in accordance to bridge/ structure assessment or damages or Inventory Card consists of rating existing condition of the structure. vi) Value Management (VA, VE, VR) Report to determine scope and cost of the project.	A. <u>Design Evaluation Stage</u> i) Reports/ records/ data that support the requirement for road works design. ii) Traffic Study Report iii) Site Investigation Data/ Report iv) Flood records from *Jabatan Pengairan Saliran* / Information from residents v) Response / complaints / Bridge assessment report/ Inventory card vi) VM report

Criteria 1: Sustainable Site Planning and Management					
No. (SM)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
		e) Forensic Report.	1	vii) Survey Drawing consisting of data survey of existing ground level, utilities (TNB, TM, Telecommunication, etc.), structure information such as culvert and drainage, TBM, contour level, Invert Level, Cross Section, etc. viii) Pavement evaluation report consisting of functional and structure condition of a pavement section and it is to determine the type of treatment for the existing road. ix) As built drawings are essential for reference. (for upgrading works only). x) Accident reports which refer to black spot records. (for upgrading works only). xi) Forensic report consisting of data evaluation, cause of failure, and improvement recommendations from the forensic investigation of the accident scene, pavement, drainage/culvert, and bridge damage/failures (for existing roads only). <u>References</u> i) Road Traffic Volume of Malaysia ii) Highway Capacity Manual iii) *Manual Saliran Mesra Alam, MSMA*	vii) Survey Data/ Drawing viii) Pavement Evaluation Report ix) As built drawings x) K 27 for accident reports xi) Forensic Report B. <u>Verification Scoring Stage</u> Not applicable

Criteria 1: Sustainable Site Planning and Management					
No. (SM)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
2	**<u>Road alignment</u>** **New road/Upgrading existing road** To follow closely the contours to minimise high cutting and embankment. To avoid construction of road in sensitive areas such as swampy areas, forest reserved and catchment areas.	a) Cut slope not more than 6 berms. b) Normal cut slope not steeper than 1:1.5 or Rock slope not steeper than 4:1. c) Normal fill slope not steeper than 1:2. d) Height of berm not more than 6 m. e) Maximum grade less than 7 %. f) No reclamation involving existing water bodies. g) Provide added uphill lane (climbing lane) where the length of critical grade exceeds 5 %. AND h) Not in Environmentally Sensitive Area (KSAS). OR i) Sensitive area with mitigation plan.	1 1 1 1 1 1 1 1 1	i) To design according to JKR guidelines and specifications: • *Arahan Teknik (J) 8/86* • *Garis Panduan Rekabentuk Cerun* • Geotechnical Design Requirement, CKG ii) No reclamation involving existing water bodies. iii) Maximum gradient or road less than 7 % to reduce carbon emission from ascending vehicles. <u>References</u> i) *Arahan Teknik (J) 8/86* ii) *Rancangan Fizikal Negara (RFN)* iii) *Garis Panduan Rekabentuk Cerun* iv) Geotechnical Design Requirement v) *Garis Panduan Perancangan Pemuliharaan Dan Pembangunan Kawasan Sensitif Alam Sekitar* (KSAS)	A. <u>Design Evaluation Stage</u> i) Related engineering drawings ii) Relevant authority letter OR iii) *Rancangan Fizikal Negara (RFN)/Rancangan Struktur (RS)/ Rancangan Tempatan Daerah (RTD)* OR iv) EIA report/EMP B. <u>Verification Scoring Stage</u> i) Related as-built drawings
3	**<u>Site vegetation</u>** **New road/Upgrading existing road**	a) Use bio-engineering techniques (example: vetiver grass, creeper and regeneration of natural plant species and material).	1	i) Use JKR/SIRIM 3. ii) In the absence of existing guidance, it may be necessary to have an expert develop an entirely new site-specific vegetation plan.	A. <u>Design Evaluation Stage</u> i) Bill of Quantities (BQ)

Criteria 1: Sustainable Site Planning and Management					
No. (SM)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
	To study and review requirements for upgrading an existing road or construction of new roads. The outcomes will be used to design the project.	b) Use native plant species. c) Use of grass/creeper for slope protection/unpaved shoulder. d) Hydroseeding with Bio-degradable Erosion Control Blanket (BECB) on slope (example: paddy straw, coconut husk, rice husk etc.). e) Preservation of existing tree/vegetation.	1 1 1 1	iii) Long term maintenance plan and goals must be established for the plant community. <u>Reference</u> i) JKR/SIRIM 3	B. <u>Verification Scoring Stage</u> i) Photo evidence
4	**<u>Noise mitigation</u>** **New road/Upgrading existing road** Reduce or eliminate annoyance or disturbance to surrounding neighborhoods and environments from road construction noise during construction.	a) Supply and install noise barrier including maintenance during the construction and defects liability period for urban area/ residential area. OR b) Ensure low decibel noise level from all site equipment to control noise pollution.	2 2	Establish, implement, and maintain a formal Noise Mitigation (NM) during construction for the prime contractor. The NM must address, at minimum, the following elements: i) Responsible party for noise mitigation activities, contact information, their responsibilities and their qualifications. Include information for NM preparer, if applicable or completed by an outside party. ii) Project location and distance to closest receptor of noise. Include a description of the surrounding zoning and parcel information (i.e., commercial, residential, hospitals, schools, parks, sensitive habitat). iii) A list of proposed construction activities (e.g. demolition, excavation, paving, bridge, foundations, finishing).	A. <u>Design Evaluation Stage</u> i) Bill of Quantities (BQ) ii) Related engineering drawings B. <u>Verification Scoring Stage</u> i) EMP ii) Environmental Monitoring Report (EMR)

<table>
<tr><th colspan="6">Criteria 1: Sustainable Site Planning and Management</th></tr>
<tr><th>No. (SM)</th><th>Descriptions</th><th>Requirements</th><th>Mark</th><th>Guidelines</th><th>Proof documents</th></tr>
<tr>
<td></td>
<td></td>
<td>Limiting Sound Level (L_{Aeq}) From Road Traffic (For new road and/ or redevelopment of upgrading existing road)
<table>
<tr><th>Receiving Land Use Category</th><th>L_{Aeq} Day 7am - 10 pm</th><th>L_{Aeq} Night 10pm-7am</th></tr>
<tr><td>Noise sensitive Areas Low Density Residential Areas</td><td>60 dBA</td><td>55 dBA</td></tr>
<tr><td>Suburban and urban Residential (Medium Density)</td><td>65 dBA</td><td>60 dBA</td></tr>
<tr><td>Commercial and Mixed development</td><td>70 dBA</td><td>65 dBA</td></tr>
<tr><td>Industrial</td><td>75 dBA</td><td>70 Dba</td></tr>
<tr><td colspan="3">NOTE. In situations where the existing sound levels of receptors are higher than limits prescribed above, or within (less than) 2 dBA of the above prescribed limits, the maximum permissible levels stipulated in Schedule 3 shall apply.</td></tr>
</table>
[SOURCE: Schedule 4 from *Guidelines for Environmental Noise Limits and Control*]</td>
<td></td>
<td>iv) Dates and working hours of proposed construction activities.

v) A list of noise generating devices used during each construction activity.

vi) A list of noise mitigating devices used during each construction activity, including personal safety equipment requirements for all site employes.

vii) Noise permit numbers, agency or local authority policies associated with construction work, as applicable.

viii) Description of noise monitoring standards, methods, and acceptable levels.

ix) Description of correction procedures for non-compliant noise levels.

x) Signature of responsible party.

<u>Reference</u>

i) Guidelines for Environmental Noise Limits and Control</td>
<td></td>
</tr>
</table>

Criteria 1: Sustainable Site Planning and Management					
No. (SM)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
		NOTE: If this criteria are not related to the project, it will be counted as not applicable.			
5	**<u>Services for disabled users</u>** **New road/Upgrading existing road** Providing dedicated facilities for disabled users.	a) Crossing for disabled users with noise making devices installed. b) Walkway access for disabled users by providing sidewalks sloped for easy access. c) Tactile on the pedestrian pathway and access for disabled users. NOTE: If this criteria are not related to the project, it will be counted as not applicable.	1 1 1	To design disabled facilities according to: i) Persons with Disabilities Act 2008 (Act 685). ii) Uniform Building By-Law 1984 (UBBL 1984). iii) MS 1184. <u>References</u> i) Persons with Disabilities Act 2008 (Act 685). ii) Uniform Building By-Law 1984 (UBBL 1984). iii) MS 1184. iv) Local Authority's policy and requirements.	A. <u>Design Evaluation Stage</u> i) Bill of Quantities (BQ) ii) Related engineering drawings B. <u>Verification Scoring Stage</u> i) Photo evidence ii) Related as-built drawings
6	**<u>Noise control</u>** **New road/Upgrading existing road** Improve healthy environment by reducing traffic noise pollution during operation.	a) Supply and install noise barrier including maintenance during the construction and defects liability period for urban area/ residential area. OR b) Ensure that all site equipment is using low decibel to control noise pollution.	2 2	Levels of traffic noise typically range from 70 to 80 dBA at a distance of 15 m from the roads. These levels affect majority of people, interrupting concentration increasing heart rates, or limiting the ability to carry on a conversation. Most people prefer the noise levels in their homes/ small office to be below the 40-45 dBA range. Overview of quiet pavement options, fundamentals and research, including pavement design guidelines for reducing tire-pavement noise. Noise barrier is an exterior structure designed to protect sensitive land area from noise pollution.	A. <u>Design Evaluation Stage</u> i) Related engineering drawings ii) Bill of Quantities (BQ)

<table>
<tr><th colspan="6">Criteria 1: Sustainable Site Planning and Management</th></tr>
<tr><th>No. (SM)</th><th>Descriptions</th><th>Requirements</th><th>Mark</th><th>Guidelines</th><th>Proof documents</th></tr>
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<td>Limiting Sound Level (L_{Aeq}) From Road Traffic (For New Roads and/ or redevelopment of existing Roads)

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<tr><td colspan="3">NOTE. In situations where the existing sound levels of receptors are higher than limits prescribed above, or within (less than) 2 dBA of the above prescribed limits, the maximum permissible levels stipulated in Schedule 3 shall apply.</td></tr>
</table>

[SOURCE: Schedule 4 from Guidelines for Environmental Noise Limits and Control]</td>
<td></td>
<td>Noise barrier shall be provided in sensitive areas such as housing situated beside busy roads or highways, schools and hospitals.

The type of noise barrier used shall be either absorptive, reflective, dispersive or mixed depending upon the noise level survey conducted and recommendations made by noise barrier experts.

<u>References</u>

i) JKR/SPJ/2008-S4.

ii) Arahan Teknik (J) 5/85.

iii) Guidelines for Environmental Noise Limits and Control.</td>
<td>B. <u>Verification Scoring Stage</u>

i) Related as-built drawings

ii) Sound Testing Report

iii) Photo Evidence</td>
</tr>
</table>

Criteria 1: Sustainable Site Planning and Management					
No. (SM)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
		NOTE: If this criteria are not related to the project, it will be counted as not applicable.			

6.2 Pavement Technologies (PT)

Table 7. Criteria requirements for PT

Criteria 2: Pavement technologies					
No. (PT)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
1	**<u>Existing pavement evaluation</u>** **Upgrading existing road** To determine the strength and residual life of the existing pavement structure as a basis for rehabilitation design	a) Carry out the following tests and integrated data analysis to determine the current functional and structural condition of the road. b) Surface condition survey. c) Coring and Dynamic Cone Penetrometer test. d) Deflection test. e) Trial pit and laboratory test. f) Surface Regularity Test	1 1 1 1 1 1	i) Pavement evaluation shall only be conducted on roads where the existing pavement structure will be reused as part of the new pavement. ii) Pavement evaluation is conducted to determine the functional and structural condition of road section either for the purpose of routine monitoring or planned corrective action. Functional condition is primarily concerned with the ride quality or surface texture of a highway section. Structural condition is concerned with the structural capacity of the pavement as measured by deflection, layer thickness, and material properties. iii) At the network level, routine evaluations can be used to develop performance models and prioritise maintenance or rehabilitation efforts and funding. At the project level, evaluations are more focused on establishing the root causes of existing distress in order to determine the best rehabilitation strategies.	A. <u>Design Evaluation Stage (for upgrading existing road only)</u> i) Pavement Evaluation Report; or ii) Related engineering drawings B. <u>Verification Scoring Stage</u> Not applicable

Criteria 2: Pavement technologies					
No. (PT)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
				iv) Pavement evaluation report should include the following test categories or other relevant evaluations: a) Surface condition survey b) Non-destructive testing • Deflection test • Surface Regularity test c) Destructive Testing • Dynamic Cone Penetrometer (DCP) • Trial Pit and Laboratory test <u>References</u> i) *Arahan Teknik (J) 5/85.* ii) A Guide to the Visual Assessment of Flexible Surface Conditions. iii) Interim Guide to Evaluation and Rehabilitation of Flexible Road Pavement.	

Criteria 2: Pavement technologies					
No. (PT)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
2	**<u>Permeable pavement</u>** **New road/Upgrading existing road** Improve flow control and quality of stormwater runoff through use of permeable pavement.	a) Use of permeable pavement mix design with higher range of air void (18 -25 %). b) Pavement crossfall 2.5 % and min unpaved shoulder to drain gradient 0.7 %-4 %. c) Drainability of permeable pavement wearing course having a minimum thickness of 50 mm shall not be less than 10 litre/min through a discharge area of 54 cm^2.	1 1 1	Following are some of the key design and maintenance elements that will promote maximum performance of permeable pavements: i) Design elements ii) Maintenance repairs <u>References</u> i) JKR/SPJ/2008-S4 ii) *Arahan Teknik (J) 5/85*	A. <u>Design Evaluation Stage</u> i) Permeable pavement design report. ii) Bill of Quantities (BQ) iii) Related engineering drawings B. <u>Verification Scoring Stage</u> i) Permeable pavement installed (processes) on the project (Photos/Progress Report) ii) Permeable pavement mix design record iii) Related testing report
3	**<u>Pavement performance tracking</u>** **Upgrading existing road** Allow for more thorough performance tracking by integrating construction quality and pavement performance data.	Use a process that allows construction quality measurements and long- term pavement performance measurements to be spatially located and correlated to one another. This implies four requirements: a) Construction quality measurements must be spatially located such that the location of the quality measurement is known.	2	Develop and implement a pavement tracking system. Example : i) Highway Development and Management (HDM-4) ii) International Roughness Index (IRI)	A. <u>Design Evaluation Stage</u> Not applicable B. <u>Verification Scoring Stage</u> i) Test report

Criteria 2: Pavement technologies					
No. (PT)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
		b) Pavement condition measurements must be taken at least every 3 years and must be spatially located to a specific portion of roadway or location within roadway. c) An operational system, computer based or otherwise, that is capable of storing construction quality measurements, pavement condition measurement and their spatial locations. d) The designated system must be demonstrated in operation, be capable of updates and have written plans for its maintenance in perpetuity. <u>Details</u> This generally means spatially located construction quality measurements in a permanent location system and maintaining those records indefinitely. Examples of construction quality records include but not limited to: i) Density test ii) Water Content test iii) Bitumen Content test iv) Gradation test v) Slump test vi) Air Content test vii) Compressive Strength test viii) Thickness test			

Criteria 2: Pavement technologies					
No. (PT)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
		Examples of pavement condition measurements include, but not limited to the extent and severity of: i) Cracking ii) Permanent deformation (rutting) iii) Bleeding iv) Faulting v) Joint Spalling vi) Pavement strength			
4	**<u>Pavement design life</u>** **New road/Upgrading existing road** Minimise life cycle costs by promoting design of long-lasting pavement structures**.**	a) Pavement design is in accordance with a design procedure that is formally recognised, adopted and documented by the agency. b) Design life considered for each type of pavement:- Rigid pavement > 40 years design life. OR Flexible pavement > 20 years design life. AND To strengthen road using soil stabilisation method.	1 4 3 2	i) Generally, not all pavement sections on a project will be designed as long-lasting sections. This credit is not applicable to roads that are not surfaced with asphaltic or Portland cement concrete such as gravel road or road seal with bituminous surface treatment. ii) Consider designing long-lasting pavement that meets the requirement of this credit. Any number of pavement design methods can produce pavement sections that meets the requirement of this credit. <u>References</u> i) JKR/SPJ/2008-S4. ii) JKR/SPJ/2020-S5. iii) *Arahan Teknik (J) 5/85.*	A. <u>Design Evaluation Stage</u> i) Design report ii) Related engineering drawings B. <u>Verification Scoring Stage</u> i) Material approval record ii) Related as-built drawings iii) Photo evidence

6.3 Environment and Water (EW)

Table 8. Criteria requirements for EW

Criteria 3: Enviroment and Water.					
No. (EW)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
1	**Environmental Management System (EMS)** **New road/Upgrading existing road** Improve environmental stewardship by using a contractor that has the formal environmental management process.	Design stage: a) Provision for Environmental Protection Works (EPW) in contract document. Verification stage: a) MS ISO 14001 certification for the main contractor. b) Appointment of Environmental Officer (EO).	1 2 1	i) Main contractor certified to MS ISO 14001. References: i) MS ISO 14001.	A. Design Evaluation Stage i) Bill of Quantities (BQ) B. Verification Scoring Stage i) Valid MS ISO 14001 certification from the main contractor ii) EO appointment letter
2	**Stormwater management** **New road/Upgrading existing road** To have best management practices for stormwater during the design and construction stage of road project	a) Demonstrate that the planned Best Management Practices (BMP)s conform to all applicable 5 % above minimum flow control standards set by MSMA. b) Demonstrate that the planned BMPs conform to all applicable 5 % above minimum water quality standards set by MSMA.	1 1	i) Refer to latest Manual Saliran Mesra Alam (MSMA). ii) Preserve native vegetation. iii) Protect soil with good infiltration capacity. iv) Assess the feasibility of infiltration and evapotranspiration to reduce the needs for retention pond outside the right of way. v) Convey stormwater in swales to promote infiltration.	A. Design Evaluation Stage i) Erosion Sediment Control Plan (ESCP) ii) Drainage design report iii) Bill of Quantities (BQ) B. Verification Scoring Stage i) Water quality monitoring report

Criteria 3: Enviroment and Water.					
No. (EW)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
				vi) Consider geometric design for erosion control and flow moderation. Reference *Manual Saliran Mesra Alam (MSMA)*	
3	**Ecological connectivity** **New road/Upgrading existing road** Provide and improve wildlife access and mobility across roadways	a) Provide dedicated eco-friendly wildlife crossing structures and protective fencing as determined by EIA report and to comply with the Department of Wildlife and National Park (PERHILITAN) requirements. OR b) Provide any suitable mitigation measures in sensitive areas for wildlife. NOTE: If this criteria are not related to the project, it will be counted as not applicable.	5 3	i) Study the animal population in the area, migration pattern, types of animals and habitual behavior. ii) Protective fencing. References i) Guidelines for Development of Smart Green Linear Infrastructure for Safe Movement of Large Wild-Mammals in Peninsular Malaysia: Underpasses and Overpasses for Roads. ii) Pelan Induk Rangkaian Ekologi Central Forest Spine (PIRECFS).	A. Design Evaluation Stage i) Approved EIA report ii) Related drawings iii) Bill of Quantities (BQ) iv) Related authority letter B. Verification Scoring Stage i) Related as-built drawings ii) Photo evidence

6.4 Access and Equity (AE)

Table 9. Criteria requirements for AE

Criteria 4: Access and Equity					
No. (AE)	**Descriptions**	**Requirements**	**Mark**	**Guideline**	**Proof documents**
1	**<u>Safety audit</u>** **New road/Upgrading existing road** Improve road safety through Road Safety Auditing by an accredited Road Safety Auditor registered with BEM	Design stage: a) Road Safety Audit Stage 1-3 (Design Stage). Verification stage: b) Road Safety Audit Stage 4 (Construction and pre-opening Stage). c) Additional Audit For Traffic Management at Work Zone (TMWZ) (Construction Stage). d) Road Safety Audit Stage 5 (Operational Stage). NOTE. Maximum marks for verification is 5.	5 4 1 1	Follow decision agreed upon in RSA Meeting and incorporate in the design. <u>References</u> i) Road Safety Audit, Guidelines For The Safety Audit of Roads And Road Project In Malaysia ii) Guideline on Road Safety Audit Management	A. <u>Design Evaluation Stage</u> i) RSA Report, Designer's Response report and decision of meeting for Stage 1 to Stage 3; or ii) RSA Stage 3 Compliance Report; or iii) Any exemption of any stages of audit (to be issued only by the authorised party). B. <u>Verification Scoring Stage</u> i) RSA Report and Contractor's Response report for Stage 4 to Stage 5. ii) Additional Audit Report for TMWZ.
2	**<u>Scenic views</u>** **New road/Upgrading existing road**	Provide designated parking area for road user to stop and experience the scenic views at strategic locations.	2	Provide locations, such as lookout point or pullouts, where road users can stop to enjoy a scenic, historic, cultural, natural,	A. <u>Design Evaluation Stage</u> i) Related engineering drawings; or

Criteria 4: Access and Equity					
No. (AE)	**Descriptions**	**Requirements**	**Mark**	**Guideline**	**Proof documents**
	Feature scenic, natural and recreational qualities into roadways	NOTE: If this criteria are not related to the project, it will be counted as not applicable.		recreational or archaeological feature of the roadway area. References Local Authority's policy and requirements.	ii) Need Statements/Terms of Reference B. Verification Scoring Stage i) Related as-built drawings ii) Photo evidence
3	**Pedestrian access** **New road/Upgrading existing road** Promote walkable communities by providing pedestrian safe and friendly roads.	a) At grade crossing such as zebra crossing or signalised pedestrian crossing overhead. b) Pedestrian bridge. c) Sidewalk/Walkway. d) Covered walkway. NOTE. 1 mark for each type of pedestrian access, maximum marks is 2.	1 1 1 1	i) Consider how a new road will impact the existing or planned pedestrian networks and integrate design elements with other facilities to mitigate overall impacts. This may mean providing connection or adaptability for future pathways, sidewalks and crossings within pedestrian networks. ii) Design the road to accommodate existing new and planned pedestrian facilities. References i) *Nota Teknik* (J) 18/97 ii) *Manual Fasiliti Keselamatan Jalan*, JKR	A. Design Evaluation Stage i) Related engineering drawings B. Verification Scoring Stage i) Related as-built drawings; or ii) Photo evidence
4	**Motorcyle lane** **New road/Upgrading existing road**	a) Paved shoulder, non-exclusive motorcycle lane and end treatment at junction. b) Exclusive motorcycle lane.	1 1	i) Consider how a new road project will impact the existing or planned motorcycle lane networks and integrate design elements with other facilities to mitigate overall impacts. This may mean	A. Design Evaluation Stage i) Related engineering drawings; or ii) Related documents

Criteria 4: Access and Equity					
No. (AE)	**Descriptions**	**Requirements**	**Mark**	**Guideline**	**Proof documents**
	Provide safe motorcycle lane within the project right of way.	c) Overhead motorcycle bridge. d) Motorcycle shelter. NOTES: 1. 1 mark for each type of motorcycle lane, maximum marks is 2. 2. If this criteria are not related to the project, it will be counted as not applicable.	1 1	providing connection or adaptability for future motorcycle lanes, crossings or other facilities within motorcycle lane network. ii) Design the road to accommodate existing new and planned motorcycle lane facilities. <u>References</u> i) *Nota Teknik (J) 33/2015* ii) STD DRW/S9 (Pindaan 2014) Standard Drawing for Road Works Section 9: Motorcycle Lane iii) *Arahan Teknik (J) 35/2018*	B. <u>Verification Scoring Stage</u> i) Related as-built drawings; or ii) Photo evidence
5	**<u>Access to rest area</u>** **New road/Upgrading existing road** Provide access to public rest area facilities	Provide or maintain existing access to public rest area facilities. NOTE: If this criteria are not related to the project, it will be counted as not applicable.	2	i) Survey existing routes and ask stakeholders for suggestions on how to improve access to existing transit facilities during the public involvement process. ii) Consider how a new roadway will impact the existing or planned pedestrian network and integrate design elements with other facilities to mitigate overall impacts. iii) Locate enhancements to transit stations/stop amenities at more than 20 % of the stations/stops along 200 m right of way (ROW).	A. <u>Design Evaluation Stage</u> i) Related engineering drawings B. <u>Verification Scoring Stage</u> i) Related as-built drawings; or ii) Photo evidence

Criteria 4: Access and Equity					
No. (AE)	**Descriptions**	**Requirements**	**Mark**	**Guideline**	**Proof documents**
				iv) Provide extra ROW width to accommodate transit shelters References i) Local authority's policy and requirements.	
6	**Cycle track** **New road/Upgrading existing road** Promoting cycling in communities by providing dedicated cycling facilities within project right of way	a) Implement new or improved existing operation for cycle facilities (e.g. added signages, resurfacing existing cycle track or adding new cycle storage facilities). b) Implement physical or constructed changes to the roadway structure, dimensions, or form that provide cycle-only facilities with dedicated access (such as cycle track). Lanes shared with motorised vehicles do not meet this requirement.	1 2	i) Design cycle track as required by design standards, or community transportation plans, or by community request. Reference i) *Arahan Teknik (J) 10/86.*	A. Design Evaluation Stage i) Related engineering drawings B. Verification Scoring Stage i) Related as-built drawings; or ii) Photos evidence

6.5 Construction Activity (CA)

Table 10. Criteria requirements for CA

Criteria 5: Construction Activity					
No. (CA)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
1	**Requirement for road work design** **New road/Upgrading existing road** Improve construction quality by using a contractor that has a formal project quality management system.	MS ISO 9001 (latest version) certification for main contractor.	3	Main contractor-certified to MS ISO 9001. Reference MS ISO 9001.	A. Design Evaluation Stage Not applicable B. Verification Scoring Stage Valid MS ISO 9001 certificate
2	**Occupational Health and Safety Management System (OHSMS)** **New road/Ugrading existing road** Improve occupational health and safety management system by using a contractor that has a formal project OHSAS management system.	Design stage: a) Provision for implementation of OSHMS in the contract document. Verification stage: a) MS ISO 45001 (latest version) certification for main contractor; b) Appointment of site safety and health officer (SHO) registered with DOSH; OR c) Appointment of Site Safety Supervisor (SSS) registered with DOSH.	1 2 1 1	i) Main contractor certified to MS ISO 45001. ii) Main contractor shall appoint safety and health officer registered with DOSH. iii) Main contractor shall appoint Site Safety Supervisor registered with DOSH. Reference MS ISO 45001.	A. Design Evaluation Stage Bill of Quantities (BQ) B. Verification Scoring Stage i) Valid MS ISO 45001 certificate;or ii) SHO certificate; or iii) SSS certificate

Criteria 5: Construction Activity					
No. (CA)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
		NOTE: If this criteria are not related to the project, it will be counted as not applicable.			
3	**<u>Waste management</u>** **New road/Ugrading existing road** Preparation and implementation of waste management plan for waste material.	Design stage: a) Establish, implement and maintain a waste management plan. b) Provision for Waste Management in the contract document. Verification stage: a) Provide a designated location to segregate waste on-site. b) Disposal of waste according to relevant waste regulations.	 2 2 1 1	To ensure all waste generated on site shall be managed in accordance with the *Solid Waste and Public Cleansing Management Act 2007* or Local Authority requirements and *Environmental Quality (Scheduled Wastes) Regulations 2005.* <u>References</u> i) Environmental Quality (Scheduled Wastes) Regulations 2005. ii) Environmental Quality Act 1974 (Act 127). iii) Solid Waste and Public Cleansing Management Act 2007. iv) Standard Specification for Building Works, JKR. v) JKR/SIRIM 3. vi) Local authority's policy and requirements.	A. <u>Design Evaluation Stage</u> i) Bill of Quantities (BQ) B. <u>Verification Scoring Stage</u> i) Construction waste management plan (CWMP); or ii) Photo evidence
4	**<u>Traffic management</u>** **New road/Upgrading existing road**	Design stage: a) Design a traffic control plan (TCP)	 2	i) Include the traffic management plan in agency contract documents, specifications and construction drawing.	A. <u>Design Evaluation Stage</u> i) Related engineering drawings.

Criteria 5: Construction Activity					
No. (CA)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
	Develop traffic management for road project	Verification stage: a) Establish and implement a traffic management plan (TMP) during Construction Stage. b) Appointment of Traffic Management Officer (TMO)	3 1	ii) Revise and review traffic management plan to suit project site condition. iii) Include itemised quantities in tender documents. <u>References</u> i) *Arahan Teknik (J) 2C/85* ii) JKR/SPJ/2017-S19	ii) Bill of Quantities (BQ) B. <u>Verification Scoring Stage</u> i) Audit report (RSA report stage 4 Part 1) ii) TMP document
5	**<u>Routine maintenance</u>** **New road/Upgrading existing road** To implement a proper-routine maintenance for road project	Establish and implement routine maintenance during construction.	2	i) Prepare site routine maintenance programme which consists of regular maintenance works to keep site in order and safe throughout the construction phase. ii) Ensure the provision of maintenance works in the contract. iii) Keep records as evidence of works being carried out properly. <u>References</u> i) Standard Operating Procedure (SOP) *Senggara Jalan*, JKR ii) JKR/SPJ/2015-S1.	A. <u>Design Evaluation Stage</u> i) Bill of Quantities (BQ)/ Need Statement B. <u>Verification Scoring Stage</u> i) Periodic maintenance works records

Criteria 5: Construction Activity					
No. (CA)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
6	**<u>Housekeeping</u>** **New road/Upgrading existing road** To ensure the site is neat, tidy and accessible	a) Establish and implement housekeeping during construction. OR b) Provision for housekeeping implementation in the contract document/BQ.	2 2	i) Include housekeeping requirement in the bill of quantities (preliminary item). ii) Periodic inspection. iii) Keep record of site photo to be included in the progress report. <u>Reference</u> i) Solid Waste and Public Cleansing Management Act 2007 (Act 672)	A. <u>Design Evaluation Stage</u> i) Contractual requirements for the implementation of housekeeping plan (Preliminary item) B. <u>Verification Scoring Stage</u> i) Progress report;or ii) Photos evidence
7	**<u>Sustainable construction</u>** **New road/Upgrading existing road** To ensure a proper erosion and sediment control plan (ESCP) on road project and machineries are regularly maintained for optimal operation that contribute to reduce carbon emission to the environment (e.g. air, land, water, noise)	Design stage: a) Provision for EPW including ESCP in the contract document. Verification stage: a) Perform scheduled maintenance of construction machineries/equipments. b) Use environmental friendly machineries/equipment. c) Sustainable construction methods.	3 2 3 3	i) Preparation and submission of Environmental Management Plan (EMP). ii) To use machineries/equipment with low fuel consumption and/or emit low carbon/noise. iii) Use sustainable construction methods to ensure minimal impact to the existing natural environment during construction. <u>Reference</u> i) JKR/SIRIM 3.	A. <u>Design Evaluation Stage</u> i) Bill of Quantities (BQ) ii) EPW Drawing iii) EMP B. <u>Verification Scoring Stage</u> i) Maintenance schedule records. ii) Any evidence showing the environmental friendly machineries/ equipment used on site.

Criteria 5: Construction Activity					
No. (CA)	**Descriptions**	**Requirements**	**Mark**	**Guidelines**	**Proof documents**
					iii) Method statement of works.

6.6 Material Resources (MR)

Table 11. Criteria requirements for MR

Criteria 6: Material Resources					
No. (MR)	**Descriptions**	**Requirements**	**Mark**	**Guideline**	**Proof documents**
1	**<u>Material reuse</u>** **New road/Upgrading existing road** Optimise construction material and reduce carbon footprint	New road: a) Earthwork balance. b) Fiber roll netting using biodegradable material at site for erosion control (e.g. wooden dust, coconut fiber). c) To use reusable formwork for structure (e.g. steel/ fiber formwork). d) Reuse of existing material other than the above. Upgrading existing road: a) Reuse at a minimum of 30 % of existing pavement materials and soil by estimated volume. b) To use reusable formwork for structure (e.g. steel/ fiber formwork). c) Reuse of existing material other than the above.	 1 1 1 1 2 1 1	i) Use in place recycling techniques such as hot in-place recycling, cold in-place recycling and full depth reclamation. These methods qualify as reuse because the material has not crossed project boundaries. ii) Reuse of excavated rock materials on site for the road construction (e.g. crushed rock for rock base). iii) Reuse suitable cut material for filling work. iv) Where any element is determined to be unsuitable for reuse, consider salvaging it or deconstructing it for use on another project or purpose (e.g as road furniture). <u>Reference</u> JKR/SPJ/2020-S2	A. <u>Design Evaluation Stage</u> i) Design report ii) Bill of Quantities (BQ) iii) Related engineering drawings B. <u>Verification Scoring Stage</u> i) Final progress report ii) Record of material reuse iii) Photos evidence
2	**<u>Green product</u>** **New road/Upgrading existing road**	a) Green Products Scoring System (GPSS) - achieve 70 % - 100 %. OR	4	The application of the Green Product Scoring System (GPSS) is to encourage project teams to specify the use of green products in their projects. It is also to	A. <u>Design Evaluation Stage</u> i) GPSS Scorecard (design stage)

Criteria 6: Material Resources					
No. (MR)	**Descriptions**	**Requirements**	**Mark**	**Guideline**	**Proof documents**
	Usage of green products in the construction industry	b) Green Products Scoring System (GPSS) - achieve 50 % - 69 %. OR c) Green Products Scoring System (GPSS) - achieve 40 % - 49 %. OR d) Green Product Scoring System (GPSS) achieve < 40 %.	3 2 1	educate and create awareness among the stakeholders on the environmentally friendly products and services and to encourage manufacturers to apply for green certification for their products. <u>References</u> i) JKR/SIRIM 1 ii) SIRIM Eco-Labeling Scheme - Criteria Documents iii) MyHijau Directory - http://www.myhijau.my iv) JKR Material Approval List (JMAL) - https://www.jkr.gov.my	B. <u>Verification Scoring Stage</u> i) GPSS Scorecard (construction stage)
3	**<u>Road inventories</u>** **New road/Upgrading existing road** Documentation and records of road assets for future references.	New road: a) Establish a master inventory of road assets/warranty of materials/ products after completion of road works. Upgrading existing road: a) Updated master inventory of road assets/warranty materials/products of existing road (Ugrading existing road project)	 1 1	i) Establish or update the master inventory based on the road works done.	A. <u>Design Evaluation Stage</u> Not applicable B. <u>Verification Scoring Stage</u> i) Updated road master inventory after completion of road works

Criteria 6: Material Resources					
No. (MR)	**Descriptions**	**Requirements**	**Mark**	**Guideline**	**Proof documents**
4	**<u>Efficient road lightings and/or traffic signal system</u>** **New road/Upgrading existing road** Optimal usage of energy through installation of energy efficient and energy saving devices for road lightings and/or traffic signal system	All systems should be designed to use energy efficient road lightings and/or traffic signal systems, while complying with standards and specifications. a) Road lighting solar LED. OR b) Road lighting LED. AND/OR c) Traffic signal systems high flux LED. NOTE. Maximum score is 5.	 3 2 2	i) Design road lightings and/or traffic signal systems that comply with JKR specifications, MS 825 Part 1 or latest edition, and other relevant standards. ii) Incorporate latest energy efficient road lighting solar LED,LED and energy saving device technologies. iii) Incorporate latest energy efficient traffic signal systems (high flux LED) and energy saving device technologies. <u>References</u> i) *Nota Teknik (J) 29/2015* ii) JKR/SPJ/2011-S7 iii) JKR/SPJ/2008-S8. iv) MS IEC 60364 v) MS 825: Part 1	A. <u>Design Evaluation Stage</u> i) Related Specifications ii) Related Engineering drawings iii) Bill of Quantities (BQ) B. <u>Verification Scoring Stage</u> i) Related as-built drawings ii) Catalogue

6.7 Innovation (IN)

Table 12. Criteria requirements for IN

Criteria 7: Innovation					
No (IN)	**Descriptions**	**Requirements**	**Mark**	**Guideline**	**Proof documents**
1	**Innovation** **New road/Upgrading existing road** Innovation / technology for sustainable road design and construction practices	A design or construction best practice for road that is not currently included in pH JKR and is more sustainable than standard or conventional practices. NOTE. An innovation will contribute 3 marks and the maximum score is 5.	5	i) Approaches and strategies in achieving the said innovation/technology for sustainable road (e.g. processes, systems, materials and plans). ii) Usage of specialty mix pavement.	A. Design Evaluation Stage i) Proposal innovation report ii) Specifications of innovative ideas iii) Bill of Quantities (BQ) B. Verification Scoring Stage i) Innovation report ii) Photo evidence iii) Related as-built drawings

Annex A
(informative)

Abbreviations and Acronyms

A.1 There are a number of terms abbreviated to facilitate the assessment of this document. This is also based on the habits of industry.

Assessor	Appointed JKR officers from various discipline to evaluate the design and verification assessment stage
BMP	Best Management Practice
CASKT	*Cawangan Alam Sekitar dan Kecekapan Tenaga*
CJ	*Cawangan Jalan*
CKC	*Cawangan Kejuruteraan Cerun*
CKE	*Cawangan Kejuruteraan Elektrik*
CKG	*Cawangan Kejuruteraan Geoteknik*
CPC	Certificate of Practical Completion
CWMP	Construction waste management plan
CoAs	Approval conditions
DOSH	Department of Occupational Safety and Health Malaysia
DLP	Defect Liability Period
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMR	Environmental Monitoring Report
ESA	Enviromentally Sensitive Area
ESCP	Erosion Sediment Control Plan
EPW	Environmental Protection Works
Facilitator	Competent person
GPSS	Green Product Scoring System
MSMA	*Manual Saliran Mesra Alam*
KSAS	*Kawasan Sensitif Alam Sekitar*
P2M2s	Pollution prevention and mitigation measures
pH JKR	*Penarafan Hijau* JKR
QMS	Quality Management System
RSA	Road Safety Audit
Secretariat	*Unit Penarafan Hijau*, CASKT
TMP	Traffic Management Plan
VA	Value Assessment
VE	Value Engineering
VM	Value Management
VR	Value Review

Annex B
(normative)

Registration Form

Registration form pH JKR

Project name : _____
_____

Developer name and address : _____
_____

Location/ project address : _____
_____

Poscode : _____
City : _____
State : _____

pH JKR facilitator information
Name : _____
Company : _____
Telephone no. : _____
Fax no. : _____
Email : _____

Project details (Tick ✔ where applicable) : Type of development: New road ☐ Upgrading existing road ☐

Road length : _____ m

Road categories	
A (Expressway and highway)	☐
B (Federal roads)	☐
C (State roads)	☐
D (Local authority roads)	☐
E (Rural roads)	☐
NOTE. Refer Clause 4.4 of JKR/SIRIM 5, pH JKR for road.	

Supporting document	1. Project summary	☐
	2. Site plan/ location	☐
	3. Other related documents (please state) …… ……	☐

"I agree that the information listed above is true"

……
(Project Team Leader)

Name : ……
Position : ……
Telephone no. : ……
Fax no. : ……
Email : ……
Date : ……

Company stamp

Annex C
(normative)

pH JKR Assessment Scoring Form

Project name				
pH JKR registration number				
Type of development (Tick ✔ where applicable)	**New road**	☐	**Upgrading existing road**	☐
Road categories (Tick ✔ where applicable)	**A** (Expressway/ Highway)	☐		
	B (Federal road)	☐		
	C (State road)	☐		
	D (Local authority road)	☐		
	E (Rural road)	☐		
Design evaluation date (Stage 2)				
Verification evaluation date (Stage 3)				
Validation evaluation date (Stage 4)* *If applicable				

pH JKR Scorecard for Design Stage

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Design Stage (Stage 2)	
SM	**Sustainable Site Planning and Management**								
SM1	Requirement for road work design	A, B, C, D, E	5		A, B, C, D, E	7		i) Reports/records/ data that support the requirement of road works design ii) Traffic Study Report iii) Site Investigation Data/Report iv) Flood records from Jabatan Pengairan Saliran/ Information from resident v) Response/complaints/requests Bridge assessment report/ Inventory card vi) VM report vii) Survey Data/Drawing viii) Pavement evaluation report ix) As built drawings x) K 27 for accident reports xi) Forensic Report	
SM2	Road alignment	A, B, C, D, E	6		A, B, C, D, E	6		i) Related engineering drawings ii) Relevant authority letter OR iii) *Rancangan Fizikal Negara (RFN)/Rancangan Struktur (RS)/*	

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Design Stage (Stage 2)	
								Rancangan Tempatan Daerah (RTD) OR iv) EIA report/EMP	
SM3	Site vegetation	A, B, C, D, E	3		A, B, C, D, E	3		i) Bill of Quantities (BQ)	
SM4	Noise mitigation	A, B, C, D	2		A, B, C, D	2		i) Bill of Quantities (BQ)	
SM5	Services for disabled users	B, C, D	3		B, C, D	3		i) Bill of Quantities (BQ) ii) Related engineering drawings	
SM6	Noise control	A, B, C, D	2		A, B, C, D	2		i) Related engineering drawings ii) Bill of Quantities (BQ)	
TOTAL MARKS (SM)			**21**			**23**			

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Design Stage (Stage 2)	
PT	**Pavement technologies**								
PT1	Existing pavement evaluation	N/A	N/A		A, B, C, D	3		i) Pavement Evaluation report; or ii) Related engineering drawings	
PT2	Permeable pavement	A, B, C, D, E	2		A, B, C, D, E	2		i) Permeable pavement design report. ii) Bill of Quantities (BQ) iii) Related engineering drawings	

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Design Stage (Stage 2)	
PT3	Pavement performance tracking	N/A	N/A		A, B, C, D	N/A		Not applicable	
PT4	Pavement design life	A, B, C, D, E	7		A, B, C, D, E	7		i) Design report ii) Related engineering drawings	
TOTAL MARKS (PT)			**9**			**12**			

Code	Criteria	Road Category	New road		Road Category	Upgrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Design Stage (Stage 2)	
EW	**Environment and Water**								
EW1	Enviromental Management System (EMS)	A, B, C, D, E	1		A, B, C, D, E	1		i) Bill of Quantities (BQ)	
EW2	Stormwater management	A, B, C, D, E	2		A, B, C, D, E	2		i) Erosion Sediment Control Plan (ESCP) ii) Drainage design report iii) Bill of Quantities (BQ)	
EW3	Ecological connectivity (Elective Criteria)	A, B, C, D, E	5		A, B, C, D, E	5		i) Approved EIA report ii) Related drawings iii) Bill of Quantities (BQ) iv) Related authority letter	
TOTAL MARKS (EW)			**8**			**8**			

Code	Criteria	Road Category	New road		Road Category	Upgrading		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Design Stage (Stage 2)	
AE	**Access and Equity**								
AE1	Safety audit	A, B, C, D, E	5		A, B, C, D, E	5		i) RSA Report, Designer's Response report and decision of meeting for Stage 1 to Stage 3; or ii) RSA Stage 3 Compliance Report; or iii) any exemption* of any stages of audit (to be issued only by the authorised party).	
AE2	Scenic views	A, B, C, D, E	2		A, B, C, D, E	2		i) Related engineering drawings; or ii) Need Statements/Terms of Reference	
AE3	Pedestrian access	B, C, D	2		B, C, D	2		i) Related engineering drawings	
AE4	Motorcycle lane	A, B, C, D	2		A, B, C, D	2		i) Related engineering drawings; or ii) Related documents	
AE5	Access to rest area	A, B	2		A, B	2		i) Related engineering drawings	
AE6	Cycle track	D	3		D	3		i) Related engineering drawings	
TOTAL MARKS (AE)			**16**			**16**			

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Design Stage (Stage 2)	
CA	**Construction activity**								
CA1	Requirements for road work design	A, B, C, D, E	N/A		A, B, C, D, E	N/A		Not applicable	

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Design Stage (Stage 2)	
CA2	Occupational Health and Safety Mangement System (OHSMS)	A, B, C, D, E	1		A, B, C, D, E	1		Bill of Quantities (BQ)	
CA3	Waste management	A, B, C, D, E	4		A, B, C, D, E	4		Bill of Quantities (BQ)	
CA4	Traffic management	A, B, C, D, E	2		A, B, C, D, E	2		i) Related engineering drawings ii) Bill of Quantities (BQ)	
CA5	Routine maintenance	A, B, C, D, E	2		A, B, C, D, E	2		i) Bill of Quantities (BQ)/ Need Statement	
CA6	Housekeeping	A, B, C, D, E	2		A, B, C, D, E	2		i) Contractual Requirements for the implementation of Housekeeping plan (Preliminary item)	
CA7	Sustainable construction	A, B, C, D, E	3		A, B, C, D, E	3		i) Bill of Quantities (BQ) ii) EPW Drawing iii) EMP	
TOTAL MARKS (CA)			**14**			**14**			

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Design Stage (Stage 2)	
MR	**Material resources**								
MR1	Material reuse	A, B, C, D, E	4		A, B, C, D, E	4		i) Design report; or ii) Bill of Quantities (BQ); or iii) Related engineering drawings	

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Design Stage (Stage 2)	
MR2	Green product	A, B, C, D, E	4		A, B, C, D, E	4		i) GPSS Scorecard (design stage)	
MR3	Road inventories	A, B, C, D, E	N/A		A, B, C, D, E	N/A		Not applicable	
MR4	Efficient road lightings and/or traffic signal systems	A, B, C, D, E	5		A, B, C, D, E	5		i) Related specifications ii) Related engineering drawings iii) Bill of Quantities (BQ)	
TOTAL MARKS (MR)			**13**			**13**			

Code	Criteria	Road Category	New road		Road Category	Upgrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Design Stage (Stage 2)	
IN	**Innovations**								
IN1	Innovation	A, B, C, D, E	5		A, B, C, D, E	5		i) Proposal innovation report; or ii) Specifications innovative ideas; and iii) Bill of Quantities (BQ)	
TOTAL MARKS (IN)			**5**			**5**			

pH JKR Scorecard for Verification Stage

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Verification Stage (Stage 3)	
SM	**Sustainable Site Planning and Management**								
SM1	Requirement for road work design	A, B, C, D, E	N/A		A, B, C, D, E	N/ A		Not applicable	
SM2	Road alignment	A, B, C, D, E	6		A, B, C, D, E	6		i) Related as-built drawings	
SM3	Site vegetation	A, B, C, D, E	3		A, B, C, D, E	3		i) Photo evidence	
SM4	Noise mitigation	A, B, C, D	2		A, B, C, D	2		i) EMP ii) Environmental monitoring report (EMR)	
SM5	Services for disabled users	B, C, D	3		B, C, D	3		i) Photo evidence ii) Related as-built drawings	
SM6	Noise control	A, B, C, D	2		A, B, C, D	2		i) Related as-built drawings ii) Sound Testing report iii) Photo evidence	
TOTAL MARKS (SM)			**16**			**16**			

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Verification Stage (Stage 3)	
PT	**Pavement technologies**								
PT1	Existing pavement evaluation	N/A	N/A		A, B, C, D	N/A		Not applicable	
PT2	Permeable pavement	A, B, C, D, E	2		A, B, C, D, E	2		i) Permeable pavement installed (processes) on the project (Photos/Progress Report)	

								ii) Permeable pavement mix design record iii) Related testing report	
PT3	Pavement performance tracking	N/A	N/A		A, B, C, D	2		i) Test report	
PT4	Pavement design life	A, B, C, D, E	7		A, B, C, D, E	7		i) Material approval record ii) Related as-built drawings iii) Photo evidence	
TOTAL MARKS (PT)			**9**			**11**			

Code	**Criteria**	**Road Category**	**New road**		**Road Category**	**Ugrading existing road**		**Proof of Document** **Verification Stage (Stage 3)**	**Comment by Assessor**
			Maximum point	**Assessment point**		**Maximum point**	**Assessment point**		
EW	**Environmental and Water**								
EW1	Enviromental Management System (EMS)	A, B, C, D, E	3		A, B, C, D, E	3		i) Valid MS ISO 14001 certification from the main contractor ii) EO appointment letter	
EW2	Stormwater management	A, B, C, D, E	2		A, B, C, D, E	2		i) Water quality monitoring report	
EW3	Ecological connectivity (Elective Criteria)	A, B, C, D, E	5		A, B, C, D, E	5		i) Related as-built drawings ii) Photo evidence	
TOTAL MARKS (EW)			**10**			**10**			

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Verification Stage (Stage 3)	
AE	**Access and Equity**								
AE1	Safety audit	A, B, C, D, E	5		A, B, C, D, E	5		i) Road Safety Audit (RSA) Report and Contractor's Response report for Stage 4 to Stage 5. ii) Additional Audit Report for TMWZ	
AE2	Scenic views	A, B, C, D, E	2		A, B, C, D, E	2		i) Related as-built drawings ii) Photo evidence	
AE3	Pedestrian access	B, C, D	2		B, C, D	2		i) Related as-built drawings; or ii) Photo evidence	
AE4	Motorcycle lane	A, B, C, D	2		A, B, C, D	2		i) Related as-built drawings; or ii) Photo evidence	
AE5	Access to rest area	A, B	2		A, B	2		i) Related as-built drawings ii) Photo evidence	
AE6	Cycle track	D	3		D	3		i) Related as-built drawings; or ii) Photo evidence	
TOTAL MARKS (AE)			**16**			**16**			

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Verification Stage (Stage 3)	
CA	**Construction activity**								
CA1	Requirements for road work design	A, B, C, D, E	3		A, B, C, D, E	3		Valid MS ISO 9001 certificate	
CA2	Occupational Health and Safety	A, B, C, D, E	3		A, B, C, D, E	3		i) Valid MS ISO 45001 certificate; or	

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Verification Stage (Stage 3)	
CA	**Construction activity**								
	Mangement System (OHSMS)							ii) SHO certificate; or iii) SSS certificate	
CA3	Waste management	A, B, C, D, E	2		A, B, C, D, E	2		i) Construction waste management plan (CWMP); or ii) Photoevidence	
CA4	Traffic management	A, B, C, D, E	4		A, B, C, D, E	4		i) Audit report (RSA report stage 4 Part 1) ii) TMP	
CA5	Routine maintenance	A, B, C, D, E	2		A, B, C, D, E	2		i) Periodic maintenance works records	
CA6	Housekeeping	A, B, C, D, E	2		A, B, C, D, E	2		i) Progress report; or ii) Photo evidence	
CA7	Sustainable construction	A, B, C, D, E	8		A, B, C, D, E	8		i) Maintenance schedule records ii) Any evidence showing the environmental friendly machineries/equipments used on site iii) Method statement of works	
TOTAL MARKS (CA)			**24**			**24**			

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Verification Stage (Stage 3)	
MR	**Material resources**								
MR1	Material reuse	A, B, C, D, E	4		A, B, C, D, E	4		i) Final progress report ii) Record of material reuse iii) Photo evidence	
MR2	Green product	A, B, C, D, E	4		A, B, C, D, E	4		i) GPSS Scorecard (construction stage)	
MR3	Road inventories	A, B, C, D, E	1		A, B, C, D, E	1		i) Updated road master inventory after completion of road works	
MR4	Efficient road lightings and/or traffic signal systems	A, B, C, D, E	5		A, B, C, D, E	5		i) Related as-built drawings ii) Catalogue	
TOTAL MARKS (MR)			**14**			**14**			

Code	Criteria	Road Category	New road		Road Category	Ugrading existing road		Proof of Document	Comment by Assessor
			Maximum point	Assessment point		Maximum point	Assessment point	Verification Stage (Stage 3)	
IN	**Innovations**								
IN1	Innovation	A, B, C, D, E	5		A, B, C, D, E	5		i) Innovation report; or ii) Photo evidence; or iii) Related as-built drawings	
TOTAL MARKS (IN)			**5**			**5**			

Scorecard Summary pH JKR for Road

Type Of Development		New Road				Upgrading Existing Road			
Stage		Design Stage		Verification Stage		Design Stage		Verification Stage	
Percentage By Criteria		Maximum Point	Assessment Point	Maximum Point	Assessment Point	Maximum Point	Assessment Point	Maximum Point	Assessment Point
SM	Sustainable Site Planning and Management	21		16		23		16	
PT	Pavement Technologies	9		12		9		11	
EW	Environment and Water	8		10		8		10	
AE	Access and Equity	16		16		16		16	
CA	Construction Activities	14		24		14		24	
MR	Material and Resources	13		14		13		14	
IN	Innovation	5		5		5		5	
TOTAL		**86**		**97**		**88**		**96**	

ASSESSMENT SCORE:		
Total Score		
Percentage		
Penarafan pH		
Rating *Penarafan*		
★★★★★	80-100	Global excellence
★★★★	70-79	National excellence
★★★	50-69	Best management practice
★★	40-49	Potential recognition

VERIFIED BY:

.....

Name:
Position:
Date:

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Acknowledgements

SIRIM Berhad would like to thank the members of the Project Committee on *Penarafan Hijau JKR (pH JKR)* for Road who have contributed their ideas, time and expertise in the development of this standard.

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