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# The Ecological and Cultural Heritage standards

## 1 Purpose

This manual establishes the guidelines by the Swedish Transport Administration with regard to how state roads and railways are to be adapted to preserve and maintain the function of the landscape. The Guideline contributes to the achievement of the goal of delivering quality *‘Environment and Health’*<sup>1</sup>. The Guideline also contributes to a uniform approach, which creates the necessary conditions for infrastructure adapted to the landscape, and which can be measured, reported and monitored.

The manner in which requirements shall be handled and measured is specified in respective tutorials (see Annex 2, ‘A Compilation of Environmental Phenomena in this Guideline’).

## 2 Regulatory Requirements, Societal Objectives and Internal Requirements

When planning, building and maintaining infrastructure, the Swedish Transport Agency shall comply with the regulatory requirements outlined in the Swedish Environmental Code and the Swedish Cultural Heritage Act, and any other applicable legislation as well as requirements expressed in, for example, court decisions, admissibility and exemptions, not detailed in this manual.

The Roads Act and the Railway Construction Act also specify a requirement that ‘An aesthetic design shall be sought<sup>2</sup>’ and that ‘Consideration shall be given to the urban and landscape profile and to natural and cultural heritage qualities’<sup>3</sup>.

However, these regulatory requirements alone are not sufficient to ensure that the infrastructure as a whole is adapted to the landscape and contributes to the fulfilment of the transport policy objective. The Swedish Transport Administration's objectives for

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<sup>1</sup> See the Swedish Transport Administration’s 2017 Annual Report, page 12, pages 20-24.

<sup>2</sup> The Roads Act SFS 1971:948 § 4 and the Railway Construction Act, Chapt 1, § 3.

<sup>3</sup> The Roads Act SFS 1971:948 § 13 and the Railway Construction Act, Chapt 1, § 4.

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landscape adaptation are therefore based on the integration of nature, culture and architecture, with:

- The Swedish Transport Administration's Objectives 2030<sup>4</sup>
- Sweden's Environmental Quality<sup>5</sup> objectives to be achieved by the year 2030
- the national objectives for historic environment initiatives<sup>6</sup>
- the national architectural policy objectives ('designed habitats'<sup>7</sup>)
- The European Landscape Convention (ELC)<sup>8</sup>.

Thereby this Guideline is designed to meet a more ambitious goal: to contribute to the achievement of the environmental quality objectives and the consideration of ecosystem services and green infrastructure, resulting in an infrastructure that is truly adapted to the landscape.

The Swedish Government has declared Sweden's commitment<sup>9</sup> to integrating the importance of biodiversity and the value of ecosystem services into economic positions, political considerations and other societal decisions, wherever this is relevant.

The Swedish Government has tasked the Swedish Transport Administration with adapting the installation and management of the transportation infrastructure into a functional green infrastructure, such that its activities contribute to the achievement of Sweden's environmental quality objectives.<sup>10</sup>

The national objectives for historic environment initiatives were established in 2014, with the aim of promoting a living cultural heritage that is preserved, used and developed. The Swedish Government and the Swedish Parliament have stated that the national objectives for historic environment initiatives shall also guide cultural environmental work at the regional and municipal level. The cultural environmental perspective is incorporated into the environmental quality objectives. This means that the transport policy objective for the environment refers to the national objectives for historic environment initiatives via the environmental quality objectives.

In 2018 the Swedish Parliament adopted national objectives for architecture, form and design. The overarching objective states that 'architecture, form and design shall contribute to a sustainable, equal and less segregated society with carefully designed habitats, where all people are given good opportunities to influence the development of the common environment'.

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<sup>4</sup> Accessibility in a Sustainable Society - Objective 2030. Publication number: 2018:235

<sup>5</sup> <https://www.naturvardsverket.se/Miljoarbete-i-samhallet/Sveriges-miljomal/>

<sup>6</sup> Summary of Government Bill 2012/13:96

<sup>7</sup> Government Bill 2017-18:110

<sup>8</sup> <https://www.raa.se/samhallsutveckling/internationellt-arbete-och-eu-samarbete/europaradet/europeiska-landskapskonventionen/>

<sup>9</sup> Government Decision M2012/1171/MA (2012-04-26).

<sup>10</sup> Spending authorisation for the 2016 financial year concerning the Swedish Transport Administration, within expense category 22 (Communications). Government Decision 2015-12-18.

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### 3 Knowledge Requirements

To ensure that the landscape is taken into account, relevant data is required for new construction, operation and maintenance, such as an integrated landscape character assessment (ILKA)<sup>11</sup>, landscape analysis<sup>12</sup>, ecological analysis, cultural heritage analysis and natural quality assessment.

The supporting documents shall provide a basic understanding of the characteristics and cultural contexts of the landscape, as well as the existence and importance of environmental phenomena, including the natural and cultural qualities of the infrastructure. The landscape assessment shall provide an understanding of the conditions in the landscape, and shall constitute a basis both for co-planning with municipalities and other stakeholders, and for location selection and the design of infrastructure measures.

Landscape analyses lay a foundation for the planning of landscape measures and for design programmes. Landscape analyses shall also be used for the planning of targeted environmental measures<sup>13</sup> that strengthen the natural and cultural environmental values of the infrastructure and/or landscape. Landscape analyses shall form the basis for the measures proposed, and shall serve as a means of communicating knowledge about the landscape. Well-thought-out analyses (comprehensive and fleshed out in an environmental impact assessment) shall constitute the basis for trade-offs between various aspects, characteristics and values.

### 4 Scope

This Guideline covers the interaction of roads and railways with the landscape, as well as their impact on the landscape. This includes planning as well as investment, reinvestment, operation and maintenance. The Guideline shall influence the development of both early strategic planning documents and more detailed documents for planning, design, operation and maintenance, as well as the processes that are used to carry out this work.

### 5 Definitions

See Annex 1 - Definitions

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<sup>11</sup> Landscape As An Arena – Integrated Landscape Character Assessment – Method Description. The Swedish Transport Administration's publication 2017:158.

<sup>12</sup> Landskapsanalys för planläggning av vägar och järnvägar, En handledning. (Landscape Analysis for the Planning of Roads and Railways: A Tutorial). The Swedish Transport Administration's publication: 2016:033

<sup>13</sup> Targeted environmental measures relate to the action area 'Environmental Investments in Existing Infrastructure' in the National Transport Plan.

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## 6 Application

### 6.1. Overall Performance Requirements: Landscape

#### 6.1.1. All infrastructure shall be adapted to the landscape

This entails the following:

- The Swedish Transport Administration shall plan, build and manage roads and railways based on its knowledge of the landscape and its functions, in order to achieve the transport policy objectives.<sup>14</sup>
- The Swedish Transport Administration shall employ the right expertise within its areas of activity, in order to manage the development of the infrastructure and its impact on the landscape, and to plan, build and manage functional, well-designed and sustainable environments for people and animals.
- The Swedish Transport Administration shall address lack of landscape adaptation in existing transportation infrastructure.

### 6.2. Knowledge-Building: Landscape

#### 6.2.1. Landscape adaptation measures shall be improved through continuous knowledge-building

This entails the following:

- The Swedish Transport Administration shall retain current and quality-assured knowledge of the landscape values of the national infrastructure resources.
- The Swedish Transport Administration shall be a learning organisation that builds knowledge in a conscious manner through systematic monitoring and the continuous improvement of processes and guidelines based on real experience.

### 6.3. Performance Requirements for Natural Environments

The decisive impact of the transport infrastructure on nature and biodiversity<sup>15</sup> shall be addressed through the following adaptations:

- Safe and functional passageways for animals shall be provided.
- Serious noise disturbances from traffic in ecologically important natural habitats shall not occur.
- Habitats rich in biodiversity shall be created, managed and developed, and biotope losses shall be avoided.
- Invasive species shall be combated.

<sup>14</sup> Government Bill 2008/09:93: Objectives for the Travel and Transport of the Future.

<sup>15</sup> Transportinfrastrukturens påverkan på biologisk mångfald. (The Impact of the Transport Infrastructure on Biological Diversity). TRV Publication 2015:210.

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### 6.3.1. Safe and functional passageways for animals shall be provided

Safe passageways for animals shall be created, in order to:

- ensure that animals are not killed in traffic or during construction, maintenance activities and operation
- counteract barrier effects and maintain habitat connectivity
- improve traffic safety and journey-time reliability
- reduce the costs to society

This entails the following:

6.3.1.1. *Knowledge of serious conflicts between infrastructure and animals shall be determined in studies using established methodologies.<sup>16</sup>*

In existing infrastructure:

6.3.1.2. *Areas of conflict along existing infrastructure shall be identified according to the established methodology<sup>17</sup> for the following animal groups:*

- a) large mammals
- b) medium-sized mammals
- c) bats
- d) amphibians and reptiles
- e) aquatic species

6.3.1.3. *Targeted environmental measures shall be implemented in response to any identified areas of conflict, for the following animal groups:*

- a) large mammals
- b) medium-sized mammals
- c) bats
- d) amphibians and reptiles
- e) aquatic species

In management and maintenance:

6.3.1.4. *All passages for animals shall be managed and maintained according to maintenance instructions, such that they function appropriate.*

6.3.1.5. *Animal collisions shall be handled in a manner that avoids secondary animal collisions caused by carcasses left to lie on the road/railway.<sup>18</sup>*

<sup>16</sup> TDOK 2014:0232 2.0 Miljöwebb Landskap - IT-stöd för miljöföreteelser. (Miljöwebb Landskap - IT Support for Environmental Phenomena).

<sup>17</sup> See Annex 2

<sup>18</sup> Djurpåkörning på väg och järnväg (Animal Collision on Roads and Railways), TDOK 2012:149.

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When constructing new infrastructure or altering existing infrastructure:

6.3.1.6. *The installation shall be designed in a manner that minimises the risk that animals will receive an electric shock, collide with wiring or barriers, or be trapped in the infrastructure installation.*

6.3.1.7. *The design shall mitigate the effects of unavoidable habitat fragmentation (such as bisecting clearly visible glens) through the provision of a suitable passage for large mammals.*

6.3.1.8. *In the event of the new construction and major alteration of bridges over watercourses that are important for animal migration, a passage for large mammals shall exist in these cases:*

- a) Roads with annual average daily traffic of over 4,000 vehicles<sup>19</sup> and a signposted speed limit of 90 km/h or more.
- b) Railways with over 120 trains<sup>20</sup> per day.
- c) The road or railway is fenced.

6.3.1.9. *The design shall accommodate suitable passage for large mammals in the following situations:*

- a) Roads with annual average daily traffic of over 4,000 vehicles<sup>21</sup> and a signposted speed limit of 90 km/h or more;
- b) Railways with over 120 trains<sup>22</sup> per day;
- c) Where the road or railway is fenced.

This is particularly important where the infrastructure crosses watercourses that are important as wildlife migration routes.

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<sup>19</sup> Refers to forecast years.

<sup>20</sup> In this case, 'trains' refers to a locomotive and its carriages. Rail traffic regulations, Module 1 Terms. Module for TDOK 2015:0309.

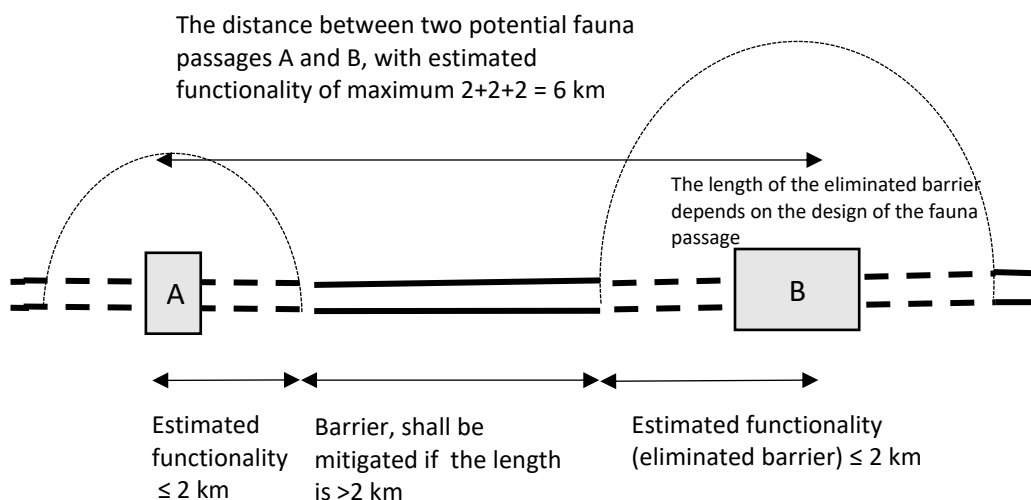
<sup>21</sup> Refers to forecast years.

<sup>22</sup> In this case, 'trains' refers to a locomotive and its carriages. Rail traffic regulations, Module 1 Terms. Module for TDOK 2015:0309.

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Depending on the local circumstances and the effectiveness of the passage for animals, the maximum distance between passages may vary from the target value of 4 km to the threshold value of 6 km.<sup>23</sup>



6.3.1.10. *The design shall accommodate suitable passages for medium-sized mammals in the following situations, where new bridges are planned over watercourses:*

- a) Roads with annual average daily traffic of over 400 vehicles and a signposted speed limit of 70 km/h or more.
- b) Railways with over 35 trains<sup>24</sup> per day.

6.3.1.11. *When altering bridges over watercourses, and for parallel culverts with a total diameter of more than 2 metres, a passage for medium-sized mammals shall exist in these cases:*

- a) Roads with annual average daily traffic of over 1,000 vehicles<sup>25</sup> and a signposted speed limit of 70 km/h or more.
- b) Railways with over 35 trains<sup>26</sup> per day.

<sup>23</sup> 'Analys av infrastrukturens permeabilitet för klövdjur – en metodrapport' ('Analysis of the Infrastructure's Permeability for Ungulates – A Method Report'). The Swedish Transport Administration's publication 2015:254

<sup>24</sup> In this case, 'trains' refers to a locomotive and its carriages. Rail traffic regulations, Module 1 Terms. Module for TDOK 2015:0309.

<sup>25</sup> Refers to forecast years.

<sup>26</sup> In this case, 'trains' refers to a locomotive and its carriages. Rail traffic regulations, Module 1 Terms. Module for TDOK 2015:0309.



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- 6.3.1.12. *In addition to points 6.3.1.9 and 6.3.1.10, grade-separated passages for medium-sized mammals shall be provided, according to the needs indicated in a landscape assessment or other supporting documentation.<sup>27</sup>*
- 6.3.1.13. *Appropriate provision shall be provided to allow aquatic animals to pass without hindrance by the installation, particularly where roads or railways cross watercourses.*
- 6.3.1.14. *The design shall make suitable provision for amphibians and reptiles in areas of conflict identified during site surveys, according to the applicable methods<sup>28</sup>.*
- 6.3.1.15. *The design of cable wells required for the railway system shall include opportunities for the evacuation of amphibians and reptiles.*

### **6.3.2. Serious noise disturbances from traffic in ecologically important natural environments must be avoided**

Serious noise disturbances from traffic in ecologically important natural environments must be avoided.

This entails the following:

- 6.3.2.1. *Appropriate surveys and assessments shall be undertaken to ensure a knowledge base is acquired and maintained regarding any potential locations for serious conflict points between infrastructure and ecologically important natural environments.*

For existing infrastructure:

- 6.3.2.2. *Ecologically important natural environments with serious noise disturbances shall be identified according to the approved method.<sup>29</sup>*
- 6.3.2.3. *Targeted environmental measures to mitigate noise disturbances in ecologically important natural environments shall be carried out on identified conflict sections.*

In management and maintenance:

- 6.3.2.4. *All measures introduced for the mitigation of noise disturbances in ecologically important natural habitats shall be managed in such a way as to ensure their proper functioning according to the requirements laid down in the guideline 'Noise and Vibrations from Traffic on Roads and Railways' (TDOK 2014:1021).*

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<sup>27</sup> See Annex 2.

<sup>28</sup> See Annex 2.

<sup>29</sup> See Annex 2.



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When constructing new infrastructure and altering existing infrastructure:

6.3.2.5. *In the event of new construction and alterations, the Swedish Transport Administration shall implement measures to address identified conflict points between infrastructure and ecologically important natural environments, such that the requirements of the guideline 'Noise and Vibrations from Traffic on Roads and Railways' (TDOK 2014:1021) are fulfilled.*

### **6.3.3 A plan for maintaining and developing the biodiversity of infrastructure habitats shall be included, and biotope losses avoided**

Existing infrastructure habitats rich in biodiversity shall be managed and developed, and new habitats shall be created in order to strengthen support for green infrastructure within the landscape and to avoid biotope losses. For tree-lined avenues, cultural environmental objectives also apply.

This entails the following:

6.3.3.1 *The total area of road and railway habitats rich in biodiversity shall increase. Road and railway environments shall promote biodiversity in the landscape ecology.*

6.3.3.2 *A complete database of existing road and railway habitats rich in biodiversity<sup>30</sup> shall be acquired and maintained.*

6.3.3.3 *A complete database of potential road and railway habitats<sup>31</sup> shall be acquired and maintained.*

For existing infrastructure:

6.3.3.4 *Road and railway habitats rich in biodiversity shall be developed and created based on existing ecological conditions, and shall contribute to the provision of Green infrastructure.*

6.3.3.5 *The Swedish Transport Administration's tree-lined avenues shall be varied in terms of expression, form, age and species composition, and shall be represented in different types of landscapes and reflect regional characteristics.*

6.3.3.6 *Tree-lined avenues that are designated as being of 'very high quality' or 'high quality' shall not decrease in number or range. Compensation shall be provided in the event of the unavoidable loss or damage to these designations.*

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<sup>30</sup> See Annex 2

<sup>31</sup> See Annex 2

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6.3.3.7 *The natural and cultural qualities of the tree-lined avenues shall be developed on the basis of known shortcomings, and high natural, cultural and experience qualities shall be achieved.*

6.3.3.8 *The tree-lined avenues shall be developed and created based on existing ecological conditions, contribute to green infrastructure and support historical connections.*

6.3.3.9 *Where necessary, targeted environmental measures shall be implemented in order to achieve good management status for tree-lined avenues and for road and railway habitats rich in biodiversity.*

In management and maintenance:

6.3.3.10 *Tree-lined avenues, solitary roadside trees, and road and railway habitats rich in biodiversity shall be managed in such a way as to achieve good management status without constituting a traffic hazard.*

For new construction and alterations:

6.3.3.11 *In the event that , ecologically important natural habitats that are destroyed in the course off new construction and alteration, the loss must be documented and an appropriate area of compensatory habitat of equivalent quality, or with the potential to be manged to achieve the required level of quality, shall be provided.. Irreplaceable habitats<sup>32</sup> shall not be damaged.*

6.3.3.12 *In the event of new construction or the alteration of existing infrastructure, the side surfaces shall be designed based on prevailing geological and ecological conditions. Road and railway habitats rich in biodiversity shall be developed and created based on existing ecological conditions, and shall contribute to the provision of green infrastructure.*

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<sup>32</sup> 'Icke förhandlingsbara biotoper' ('Non-Negotiable Biotopes'), the Swedish Transport Administration's publication 2015:211.

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#### 6.3.4 Invasive species shall be combated

Invasive species shall be combated in order to counteract continued proliferation and new establishment.

This entails the following:

6.3.4.1 *The species listed in the checklist TDOK 2015:0469<sup>33</sup> shall be combated. The management and construction of roads and railways must not permit or facilitate the establishment and spread of any non-native, invasive species listed in the checklist.*

### 6.4. Performance Requirements for Cultural Heritage and Historic Sites

Cultural heritage refers to all material and intangible expressions (traces, remnants, objects, structures, environments, systems, structures, activities, traditions, naming customs, knowledge, etc.) of human impact. Historic environment refers to the whole environment that people have influenced, that is to say, how varying degrees of human enterprises and activities<sup>34</sup> have helped to shape the landscape.

The transport infrastructure uses, influences and reshapes landscapes, installations and settlements in many ways. In the management and development of national infrastructure the Swedish Transport Administration supports the national objectives for historic environment initiatives. The Guideline reinforces support for the cultural heritage sector's objectives regarding cultural environmental integration in infrastructure.<sup>35</sup>

The decisive impact of transport infrastructure on cultural heritage and historic sites shall be addressed through the following adaptations:

1. Support for a sustainable society with a great variety of historic sites that are preserved, used and developed
2. Promotion of public participation in historic environment initiatives and provision of opportunities (*for the public or Trafikverket?*) to understand and take responsibility for the historic environment
3. Promotion of an inclusive society, with the cultural environment as a common source of knowledge, education and experiences
4. A holistic approach to the management of the landscape, where the cultural environment is taken into account in social development

<sup>33</sup> Invasiva arter som ska bekämpas (Invasive Species that must be Combated) TDOK 2015:0469

<sup>34</sup> <http://www.raa.se/kulturarvet/>

<sup>35</sup> 'Transportinfrastruktur – strategi för kulturmiljöintegrering' ('Transport Infrastructure – Strategy for Cultural Environmental Integration') is currently being developed by the Swedish National Heritage Board

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#### **6.4.1. A sustainable society with a great variety of historic sites that are preserved, used and developed**

Evaluation and prioritisation are a prerequisite for the use and development of historic sites.

The Swedish Transport Administration shall evaluate and prioritise historic sites in order to provide the basis for effective decision-making (by the Swedish Transport Administration and others) regarding conservation, use and development. All decisions shall be transparent.

Investments in historic sites are resource management activities that increase the ecological, economic and social benefits of a sustainable society. The Swedish Transport Administration shall foster a sustainable society through investments in historical sites.

This entails the following:

*6.4.1.1. Long-term, sustainable resource management involves the conservation, strengthening and development of historical sites. Such investments provide and increase ecological, economic and social benefits and improve the overall cost-effectiveness in a sustainable society.*

*6.4.1.2. Methods of work that promote these objectives shall be used. The Swedish Transport Administration ensures that expertise is implemented in an integrated manner, both in the area of landscape (architecture, culture and nature) as well as between the landscape area and other areas of technology and economics, in order to achieve smart and sustainable solutions throughout the processes. It is particularly important that the integration of expertise occurs in a sustainable way throughout all stages, from early strategic planning through the activities of other processes to the long-term maintenance of infrastructure.*

*6.4.1.3. Historic sites shall be used without losing their prioritised content.*

Cultural routes, historical railway sites and historical bridges shall be of a good standard and shall be used without distorting, reducing or eliminating their designated values.

For existing infrastructure and in the event of management and maintenance:

- a) For cultural routes, this must be taken into account in the choice of road surface, materials and workmanship, among other decisions.
- b) For historical railway sites, this requires certain choices of materials, execution and walkways within the railway site, among other decisions.
- c) For historical bridges, this requires certain choices of bridge railings and banisters, materials, colour and carrying capacity, such that the bridge's architectural integrity and construction techniques and historical quality can be maintained without reducing road safety.

For new construction and alterations:



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- d) In the event of new construction and alteration of roads and railways, the cultural quality of the landscape shall be used as an asset. Structures of the Landscape structures, human movement patterns, connections, and qualities of the landscape shall be used, re-established or further developed.

6.4.1.4. *The quality and integrity of the historical site shall be assessed, understood and protected. Opportunities shall be taken to integrate the new scheme into the landscape and to enhance the setting of the historical feature.*

For existing infrastructure:

- a) The Swedish Transport Administration's designated cultural routes, historical railway sites and historical bridges, as well as road and railway-related historical objects are not to be reduced in number.

For existing infrastructure and in the event of management and maintenance:

- b) The Swedish Transport Administration's designated cultural routes, historical railway sites and historical bridges, as well as road and railway-related historical objects shall be managed and restored such that their designated qualities are maintained or strengthened. Restorations and targeted environmental measures shall be implemented according to established methodology and on the basis of identified shortcomings.

For new construction and alterations:

- c) In the event of new construction and the alteration of roads and railways, the cultural qualities of the landscape shall be developed further. Landscape structures and passages shall be developed or adapted to make it possible to maintain and further develop agriculture and forestry. Here existing land consolidations/existing holdings should be taken into account.

6.4.1.5. *The diversity of historical sites shall be preserved and developed through our choices about how to recount human history on different scales in the course of our infrastructure work.*

For new construction and alterations:

- a) In the event of new construction and the alteration of roads and railways, areas and phenomena with considerable historical qualities shall be clarified and preserved, with opportunities taken to developed and enhance the setting, where appropriate. Cultural heritage analysis shall be used to assess and prioritise sites, and shall be implemented according to established methodology and stored according to established principles. The methodology for cultural heritage analysis includes the cultural historical dimensions of both the landscape and the infrastructure installations.

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6.4.1.6. *Historical railway sites shall be preserved and developed in order to tell the story of the transport infrastructure over time.*

For existing infrastructure:

- a) Designated cultur routes shall be preserved from all eras and road types scattered throughout the country, and shall reflect regional characteristics.
- b) Designated cultural-historical railway environments of all types and from all eras shall be retained and protected throughout the country, and shall reflect regional characteristics.
- c) Designated historical bridges of all types and from all eras shall be retained and protected throughout the country.
- d) Road-related historical objects representing different eras and reflecting regional characteristics shall be retained and protected throughout the country.
- e) Railway-related historical objects representing different eras and reflecting regional characteristics shall be retained and protected throughout the country.

6.4.1.7. *In exceptional cases, reconstruction may be considered in order to restore important structures and connections that have been broken, where cultural qualities have been severely distorted, lost or obliterated.*

#### **6.4.2. Public participation in historic environment initiatives and opportunities to understand and take responsibility for the historic environment**

Participation requires knowledge and active dialogue. Knowledge of cultural and historical qualities shall underpin all of the Swedish Transport Administration's activities. The Swedish Transport Administration shall communicate and acquire knowledge of the role of the cultural environment.

As part of a sustainable society, the Swedish Transport Administration shall understand and take responsibility for historical sites by maintaining adequate control over the effects and consequences of its activities.

This entails the following:

6.4.2.1. *The Swedish Transport Administration shall internally and externally communicate relevant knowledge and results regarding cultural heritage and historical qualities that are produced in the course of its activities. This communication shall be achieved via public information channels, information sheets, and environmental training, as well as through targeted strategies for media and communication.*

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6.4.2.2. *The Swedish Transport Administration shall acquire relevant knowledge of historic environment in order to add value to its activities. In particular, this shall be accomplished by identifying and using sources of knowledge and experiences, as well as by taking into consideration the ways in which others relate to the landscape and their needs of the landscape as a resource. The Administration shall also exchange knowledge internationally, work strategically with research and development, and engage in open dialogue and consultation processes with citizens and experts.*

6.4.2.3. *The Swedish Transport Administration shall maintain adequate control over the effects and consequences of historic environment in a sustainable society – from early planning to investment measures and maintenance. It is particularly important that the historic environmental work be conducted as a flow throughout all stages, from early strategic planning through the activities' other processes to the long-term maintenance of the infrastructure.*

**6.4.3. An inclusive society is promoted, with the cultural environment as a common source of knowledge, education and experiences**

Knowledge of historic environment is used both for decision-making processes and for experience and information purposes.

The Swedish Transport Administration shall produce, document, store, maintain and provide information and knowledge that are important for the cultural environment and for its activities. This knowledge shall be disseminated throughout the organisation to inform and flow through all relevant processes.

The Swedish Transport Administration shall strengthen experiences and understanding of the historical and cultural qualities of the landscape and the infrastructure through geographical availability and information. The perspectives of both the traveller and the citizen are important.

This entails the following:

6.4.3.1. *The knowledge process shall be clear, and knowledge shall be accessible. This applies both to decision-making processes and their associated stages, and to experience and information purposes with their associated stages.*

6.4.3.2. *Knowledge processes*

- a) The Swedish Transport Administration shall produce, document, store, maintain and provide information and knowledge that is important for management of historical sites and the activities of the Swedish Transport Administration.
- b) Knowledge produced and developed through the Swedish Transport Administration's activities shall be carried over to the next stages. It is



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particularly important that the knowledge process be conducted as a flow throughout all stages, from early strategic planning through the activities' other processes to the long-term maintenance of the infrastructure.

- c) According to the evaluation and selection principles of the cultural environmental work, knowledge bases and documentation must be interpreted in such a way that decision-making processes and the choices that are made are transparent.
- d) The information shall be quality-assured and stored in an accessible, user-friendly and secure manner that enables the efficient use and reuse

#### 6.4.3.3. *Experience Processes*

- a) The Swedish Transport Administration shall strengthen its own internal experience and understanding of historical qualities of the landscape and the infrastructure, such that the landscape as a whole (with its aspects of importance, functions and connections) can be clearly read and interpreted in an educational manner. This is accomplished through the Swedish Transport Administration's active work with:
  - geographical accessibility to the landscape ('Cultural Environment' is one of the objectives of the transport infrastructure.)
  - opportunities to gain outlooks and experiences, both from the traveller's perspective and from the perspective of residents and land users
  - informative accessibility in digital and analogue forms.

#### 6.4.4. **A holistic approach to the management of the landscape, where the cultural environment is taken into account in social development**

- 6.4.4.1. *The perspective of historical environment shall contribute to the social development work of the Swedish Transport Administration. Cultural environment work shall be an integral part of the Swedish Transport Administration's processes, to inform the authority's activities and landscape management, as well as to ensure the preservation of the cultural environment. The Swedish Transport Administration shall follow an agreed historical environmental strategy and continuously reassess and update its action plans for heritage -related issues.*



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## 6.5. Performance requirements for the form and scale of the landscape

The landscape and the form, structure and content of the built environment together affect people's experience, and the management and use of the landscape should therefore be regarded as a public interest. It is important that the design of the infrastructure installation is integrated with a full understanding and appreciation of the adjacent environment to ensure the creation of sustainable landscapes of high aesthetic quality. The development of the infrastructure installations shall be informed by local conditions and an assessment and understanding of the local landscape and visual qualities. The Swedish Transport Administration shall plan and design infrastructure installations on the basis of knowledge of the form and scale of the local landscape, as well as people's perceptions, experience and use of the landscape. This means that:

- Pursuant to the Swedish Transport Administration's publication *Landscape as an Arena*<sup>36</sup>, measures and projects aimed at the new construction or upgrading of infrastructure installations are based on high-quality information, and are preceded by landscape analysis according to the documents *Landscape Analysis for the Planning of Roads and Railways*<sup>37</sup> and *Integrated Landscape Character Analysis (ILKA)*.
- Measures to protect, develop and safeguard the landscape's identified qualities (with regard to the shape and scale of the landscape) shall be summarised in a design programme. This document is based on the Swedish Transport Administration's policy for architecture<sup>38</sup> and is produced in accordance with the document *Manual for Design Work and Design Programmes in Infrastructure Projects* (TRV 2014/78881).

### 6.5.1. Infrastructure installations are planned and designed in a manner that safeguards and develops the values of the landscape and the built environment

For the Swedish Transport Administration's infrastructure installations, a comprehensive design is sought that meets functional requirements, takes full account of the qualities of the existing environment, and utilises the opportunity to develop and enhance the landscape, whether the installation is proposed for the rural or built environment.

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<sup>36</sup> Landscape As An Arena – Integrated Landscape Character Assessment – Method Description. The Swedish Transport Administration's publication 2017:158.

<sup>37</sup> Landskapsanalys för planläggning av vägar och järnvägar – En handledning (Landscape Analysis for the Planning of Roads and Railways – A Tutorial). The Swedish Transport Administration's publication 2016:033

<sup>38</sup> The Swedish Transport Administration's architecture policy TDOK 2017:0636

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This means that:

6.5.1.1. *The Swedish Transport Administration shall ensure that the qualities of the landscape and the built environment are taken into account in all planning, design, and construction processes, as well as in ongoing management and administration.*

6.5.1.2. *Measures to protect, develop and safeguard the landscape's identified qualities shall be developed through an open and inclusive process, and shall be summarised in a design programme.*

6.5.1.3. *The design work shall be initiated at an early stage and shall continue throughout the implementation process – from the planning stage, through design and construction and into the management phase. Important design issues shall be identified and considered starting at the strategic planning and early spatial planning stages.*

## **6.5.2. Good design helps maintain and develop the landscape's visual character and create new qualities**

The transport infrastructure must be developed in a holistic manner, in which all elements are carefully designed in a democratic and inclusive process in which conclusions relating to the assessment of environmental quality, analyses, priorities and decisions made are robust and transparent. The Swedish Transport Administration's installations shall utilise and develop the landscape's conditions in the design of the installation, which shall represent and support Best Practice design<sup>39</sup>.

This entails the following:

6.5.2.1. *Good design shall characterise all of the Swedish Transport Administration's construction works and installations<sup>40</sup>.*

6.5.2.2. *The transport infrastructure shall be formed in interaction with the landscape, such that road users, travellers and the surrounding population are offered positive experiences in a beautiful and well-functioning environment.*

6.5.2.3. *The Swedish Transport Administration shall ensure that the form and scale of the landscape are taken into account in all planning, design, and construction processes, as well as in ongoing management and administration.*

<sup>39</sup> Government Bill 2017-18:110. Politik för gestaltad livsmiljö (Policy for Designed Habitats).

<sup>40</sup> Handbok för gestaltningsarbete och gestaltningsprogram i infrastrukturprojekt (Manual for Design Work and Design Programmes in Infrastructure Projects). Reg no: 2014/78881.



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6.5.2.4. *The Swedish Transport Administration shall design environments that promote accessibility, support the use of public transport and provide conditions for walking and cycling. The Swedish Transport Administration shall provide safe and comfortable infrastructure environments for pedestrians and cyclists. Through good design, environments shall be created so that they are accessible to all and are perceived as attractive and safe.*

## 7 Results and Documentation

The requirements of this manual shall be addressed in the Swedish Transport Administration's processes – from early strategic planning to management and operation – such that the transportation infrastructure can be adapted to the landscape. Landscape adaptation is part of the Swedish Transport Administration's delivery quality *Environment and Health*<sup>41</sup>, which is to be reported in a measurable and monitorable manner.

## 8 Deviations from the Requirements

If any of these requirements are not met, a written justification is required. Decisions are rendered by the Head of the Planning Activity Area.

## 9 Related Documents

Action Plans:

- Action Plan for the Implementation of the Landscape Guideline (TDOK 2015:0323, reference number TRV 2015/108632)

Procedures:

- Procedure: Animal Collisions on Roads and Railways (TDOK 2012:149)

Tutorials:

- Manual for Design Work and Design Programmes in Infrastructure Projects, reference number TRV 2014/78881.

Other Tutorials:

(See Annex 2)

Requirements and Advice:

- Installation Requirements: Requirement 09 101 VGU
- Installation Requirements: Requirement 09 102 VGU
- Installation Requirements: Advice 09 101 VGU

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<sup>41</sup> See the Swedish Transport Administration's 2017 Annual Report, page 12 + pages 20-24.



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- Standard Description: Roads (SBV)<sup>42</sup>
- Outsourcing Description: Railway (EB)
- Description of Commission for Consultancy Commissions (UB)
- Technical Description (TB)
- Technical System Standard 'New Generation: Railway', 4.0 (TSS)
- Installation Requirements: Railways (AKJ)
- Installation Requirements: Roads (AKJ)

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<sup>42</sup> <https://www.trafikverket.se/for-dig-i-branschen/vag/underhall-vag/Entreprenorsdokument/Kontraktsdokument/>

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## Version log

Adopted version	Document date	Amendment	Name
Version 1.0	2016-02-02	First version	
Version 2.0	2018-11-14	Change of classification and template.	Mats Holmberg, Ev.
Version 3.0	2019-03-15	<p>In connection with the application of Ver 1.0, a few ambiguities were discovered that gave rise to uncertainties and discussions about interpretation and importance. Clarification and simplification have therefore been requested. This work has also included changing the structure to make it easier to break down the text according to the structure of the Swedish Transport Administration's main and support processes. This division will occur as soon as the details of these systems are decided. Otherwise, no changes have been made.</p>	Ulrika Lundin, Plkvm

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## Annex 1 - Definitions

*Aquatic animals:* fish and aquatic organisms. Otters are not included.

*Barrier effect:* when a physical obstacle, such as a road or railway, means that animals and/or plants are hindered from seeking necessary rest, food, locations for reproduction, etc. and are thus prevented from surviving in viable and/or manageable populations.

*Cultural environmental integration:* the national cultural environment objectives shall be integrated into the activities of public authorities.

*Culture route:* a road with high cultural values that represents a part of the development of road history and/or road technology, from antiquity to the present day<sup>43</sup>.

*Ecologically important natural environment:* includes environments listed in the Inventory of Nature Conservation Value (NVI), SS 199000:2014, regarding biodiversity as Class 1 – 3: road and railway habitats rich in biodiversity, tree-lined avenues, important bird environments and irreplaceable natural environments.

*Glen:* a pronounced, elongated deepening in the surface of the earth which is delimited by prominent heights, rock walls or soil-covered slopes.

*Good management status:* based on an overall assessment of the following factors. The management status is assessed according to a three-degree scale: *good*, *medium*, and *poor*.

A infrastructure habitat rich in biodiversity with good management status is characterised by the following:

- *In road environments:* grassy vegetation in balanced succession, with a visible abundance of flowering plants  
*In railway environments:* ruderal vegetation with a visible abundance of flowering plants and designated habitats
- value elements (key structures) are preserved and serve an appropriate function
- absence of/only a negligible amount of undesirable woody vegetation, invasive species and other harmful factors (such as non-native species [in the case of road environments], highly nitrogen-enriched land areas, macadamisation, dumping, etc.)
- habitats rich in biodiversity that has been status-assessed within the last five years.

*Historical bridge:* a bridge which, regardless of its age, is a clear and representative exponent of the historical or technological development of bridges in the country.

*Historical railway site:* a site comprising several railway-related culhistorical objects and/or functional areas as well as their coherence, and which clearly demonstrates part

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<sup>43</sup> Inventory Method: Culture Routes

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of the development of railway history and/or railway technology, from the introduction of the railway in the country to the present.<sup>44</sup>

*Interaction with landscapes:* addresses how the infrastructure interacts with ecological and cultural-historical connections in the landscape. The concept stems from the delivery quality *Environment and Health*.

*Invasive non-native species:* a species which, with human help (deliberately or unintentionally), have been disseminated outside its natural habitat and whose introduction or spread has been found to threaten or adversely affect biological diversity and related ecosystem services.

*Landscape:* is an area that is experienced by people, and whose character is the result of the influence and interaction of natural and/or human factors<sup>45</sup>.

*Landscape analysis:* The Swedish Transport Administration places particular emphasis on the methods LCA<sup>46</sup>, HLC<sup>47</sup> och ILKA<sup>48</sup>, which meet the requirements for landscape analysis under the European Landscape Convention. The Swedish Transport Administration has developed methods applicable to infrastructure activities, such as landscape analysis, cultural heritage analysis and ecological landscape analyses related to infrastructure.

*Large mammal:* all ungulates and a group of large predators including bears, wolverines, lynx and wolves.

*Medium-sized mammals:* Mammals smaller than deer.

*National heritage building:* buildings, parks or other state-owned installations that are most valuable from a cultural-historical point of view have been declared as national heritage buildings ('statliga byggnadsminnen', SBM) and are protected by the Regulation (2013:558) on National Heritage Buildings, etc. The Swedish National Heritage Board is the supervisory authority.

*Passage for animals:* a safe passage that complies with the technical regulations of the Swedish Transport Administration for the animal group in question (aquatic animals, amphibians and reptiles, medium-sized or large mammals). The term *fauna passage* is used synonymously.

*Potentially road and railway habitat:* an environment that has the geological and natural prerequisites to meet the conditions for road and railway habitats rich in biodiversity, and which is situated in a location that provides good opportunities to strengthen the dissemination of species in the landscape or otherwise contribute to improved ecological functionality in the landscape (strengthened 'green infrastructure').

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<sup>44</sup> Inventering av järnvägens kulturmiljö (Inventory of the Railway's Cultural Environments). The Swedish Transport Administration's publication 2017:214

<sup>45</sup> Acc. to the European Landscape Convention

<sup>46</sup> LCA = Landscape character assessment

<sup>47</sup> HLC = Historic landscape characterisation

<sup>48</sup> Landscape As An Arena – Integrated Landscape Character Assessment – Method Description. The Swedish Transport Administration's publication 2017:158.

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*Proprietary value:* is an environmental phenomenon in the Swedish Transport Administration's installation, e.g., a milestone or a roadside rich in biodiversity. The concept stems from the delivery quality *Environment and Health*.

*Railway-related historical object:* a phenomenon along a railway and/or in a railway environment, located adjacent to the railway and/or in its vicinity. It has a historical and/or technological connection to the railway and its function. Examples: Water stops, poles, bridges, signals, turnouts, signs, stone walls, outbuildings, stations, and lineman's cottages.<sup>49</sup>

*Road and railway habitat rich in biodiversity:* surfaces, structures and lateral areas that fulfil at least one of the following criteria:

- harbours red-listed species, species of national responsibility, rare species and/or indicator species
- has a special species composition based on complex soil and structural properties, and/or has a particularly high species richness or frequency of indicator species
- constitutes a significant ecological resource for, e.g., reproduction, life cycle, protection or food
- constitutes an important environment and has geological and ecological conditions for species dispersion and connectivity within the landscape.

*Road-related historical objects:* a historic object located along state road, in the road area or its vicinity, and possessing a historical and/or technological connection to the road and its function. Examples: Milestones, kilometre posts, signpost stones, road maintenance stones, memorial stones and remnant stones.

*Serious noise disturbances:* noise disturbances from traffic in ecologically important natural habitats that exceed the requirements set forth in the guideline 'Noise and Vibrations from Traffic on Roads and Railways' (TDOK 2014:1021).

*Tree-lined avenue:* Deciduous trees planted in a single or double row consisting of at least five trees along a road or what has previously been a road, or in an otherwise open landscape. The trees shall predominantly consist of mature trees.

*Secondary animal collision:* collision with an animal that was eating (an)other animal(s) that was/were killed on the road or railway, e.g., scavengers as corvids, raptors and predatory mammals, which have a very well-developed sense that allows them to quickly locate carcasses.

*Shoreline passage:* a passage that allows animals to pass along the shoreline of a watercourse, via a bridge or culvert, under a road or railway. The passage must be placed above the mean height water (MHW) level, such that the passage is dry for most of the year.

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<sup>49</sup> Inventering av järnvägens kulturmiljö (Inventory of the Railway's Cultural Environments). The Swedish Transport Administration's publication 2017:214





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*Solitary trees:* stand-alone trees that are individual or which comprise a smaller group of up to five trees along a road or railway.

*Stone wall:* a construction of stones laid on top of each other in a clear, elongated design. It serves/has served some sort of function in the landscape, for example as a protective barrier or as a demarcation between agricultural parcels.

*Watercourses:* naturally occurring flows of water of a permanent nature. This primarily refers to watercourses that run along natural depressions (e.g., streams, brooks, or rivers), but these may be heavily influenced by ditching and realignment.

*Watercourses important for animal migration:* watercourses that are documented as important thoroughfares for animal migration and dissemination (documented through inventories, game accident statistics, killed animals, etc.).

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## Annex 2 - Compilation of environmental phenomena

In cases where references to manuals, advice, etc. are lacking, contact the Swedish Transport Administration's environmental specialists for an expert assessment. The goal is to provide references for all indicators.

<b>Delivery Quality</b> <b>PROPRIETARY VALUES</b>	<b>References</b> <b>(Manuals, advice, etc.)</b>
Tree-lined avenues and solitary trees with good status	<p>'Trädarter för alléplanteringar' (Tree Species for Avenue Plantings') The Swedish Transport Administration's publication 2010:046</p> <p>'Plantering och etablering av alléträd' (The Planting and Establishment of Avenue Trees') The Swedish Transport Administration's publication 2010:056</p> <p>'Kontroll och skötsel av alléplanteringar' ('Control and Management of Avenue Plantings') The Swedish Transport Administration's publication 2010:050</p>
Road habitats rich in biodiversity in good standing	'Metod för översiktlig inventering av artrika vägkantsmiljöer' (Method for the Comprehensive Inventory of Species-Rich Roadside Environments') The Swedish Transport Administration's publication 2012:149
Habitat rich in biodiversity with a harmful amount of invasive species (number)	<p>'Metod för översiktlig inventering av artrika vägkantsmiljöer' (Method for the Comprehensive Inventory of Species-Rich Roadside Environments') The Swedish Transport Administration's publication 2012:149</p> <p>'Checklista Invasiva arter som ska bekämpas' ('Checklist: Invasive Species that must be Combated') TDOK 2015:0469.</p>
Railway habitats rich in biodiversity with good status	'Inventeringsmanual för biologisk mångfald vid järnvägsstationer' (Inventory Manual for Biological Diversity at Railway Stations') The Swedish Transport Administration's publication 2015:253
Historic objects with good status in the road system	Miljöwebb landskap
Historical bridges: roads with good status Historical bridges: railways with good status	<p>'Våra broar en kulturskatt' ('Our Bridges: A Cultural Treasure') The Swedish Transport Administration's publication 99109</p> <p><i>The mapping of values is ongoing</i></p> <p>National and regional conservation plans</p>
Culture routes with good status	The manual 'Inventeringsmetod av kulturvägar med koppling till Miljöwebb Landskap' ('Inventory Method for Culture Routes Associated with Miljöwebb Landskap') is under development.

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Historical railway sites with good status	'Inventering av järnvägens kulturmiljö' ('Inventory of the Railway's Cultural Environments') The Swedish Transport Administration's publication 2017:214
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<b>Delivery Quality</b> <b>INTERACTION with the Landscape</b>	<b>References</b> <b>(Manuals, advice, etc.)</b>
Rectified amphibian and reptile passages Measures needed: amphibian and reptile passages	'Metod för identifiering av konfliktsträckor för groddjur längs befintlig infrastruktur' ('Method for the Identification of Conflict Sections for Amphibians Along Existing Infrastructure') The Swedish Transport Administration's publication 2017:097  'Metod för uppföljning av groddjursåtgärder vid väg' ('Method for the Monitoring of Amphibian Measures Along Roads') The Swedish Transport Administration's publication 2017:130
Rectified passages for medium-sized mammals Measures needed: passages for medium-sized mammals	
Rectified passages for aquatic animals Measures needed: passages for aquatic animals	
Rectified passages for large mammals Measures needed: passages for large mammals	'Analys av infrastrukturens permeabilitet för klövdjur – en metodrapport' ('Analysis of the Infrastructure's Permeability for Ungulates – A Method Report'). The Swedish Transport Administration's publication 2015:254  'Ekologisk uppföljning av planskilda passager för landlevande däggdjur - principer och metoder för väg och järnväg' ('Ecological Monitoring of Grade-Separated Passages for Land-Dwelling Mammals - Principals and Methods for Roads and Railways'). The Swedish Transport Administration's publication 2015:173
Rectified bat conflicts Measures needed: bat conflicts	
Rectified disturbed ecologically important natural habitats Measures needed: ecologically important natural habitats	'Trafikbuller i värdefulla naturmiljöer – Metodbeskrivning' ('Traffic Noise in Valuable Natural Environments – Method Description'). The Swedish Transport Administration's publication 2016:036
Rectified infrastructure habitats rich in biodiversity- roads Measures needed: infrastructure habitats rich in biodiversity - roads	'Metod för översiktlig inventering och identifiering av artrika vägkanter' ('Method for the Comprehensive Inventory and Identification of Species-Rich Roadsides') The Swedish Transport Administration's publication 2012:149



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Rectified infrastructure habitats rich in biodiversity - railways Measures needed: infrastructure habitats rich in biodiversity - railways	'Inventeringsmanual för biologisk mångfald vid järnvägsstationer' (Inventory Manual for Biological Diversity at Railway Stations') The Swedish Transport Administration's publication 2015:253
Compensated natural habitats of particular value Destroyed natural habitats of particular value Destroyed irreplaceable habitats	'Checklista lcke-förhandlingsbara biotoper' ('Checklist: Non-Negotiable Biotopes') TDOK 2015:0490