

C7558 Terms of Reference for Review of Environmental Factors

(including Environmental Management Plan (Planning))

February 2023

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1 Introduction

This document specifies the standard of environmental assessment for Transport and Main Roads Infrastructure Projects. The Terms of Reference is categorised by Environmental Factor. The Environmental Management Plan (Planning) is generated from the Review of Environmental Factors and provides the recommendations to avoid, minimise and mitigate environmental risks associated with the project.

The *Terms of Reference for Review of Environmental Factors* is applicable to assessments completed both in-house or by external consultants.

1.1 Purpose of terms of reference

The purpose of *Terms of Reference for Review of Environmental Factors* is to standardise the scope and methodology of the environmental assessments for the Department of Transport and Main Roads to ensure the consistency, quality and fit-for-purpose assessments and deliverables.

1.2 Terms of reference structure

A list of assessment tasks and deliverables has been developed for each environmental and cultural heritage factor for:

- Desktop Assessment
- Standard Field Assessment, and
- High-Risk Field Assessment – where specific environmental or cultural heritage factors pose a high risk, these assessments are required for the respective factors.

Requirements for the Environmental Management Plan (Planning) (EMP(P)) are identified. The EMP(P) provides recommendations to be considered during the detailed design and construction of an infrastructure project, based on the findings for each relevant environment factor.

By considering each factor individually, the *Terms of Reference for Review of Environmental Factors* can be specifically tailored to an infrastructure project and the site's specific environment risks and uncertainties.

The decision of which level assessment should be completed shall be made based on the *Rapid Desktop Checklist*. A project may involve only targeted high-risk field assessments for specific factors that are high-risk risk (i.e. flora).

1.3 Relationship to Infrastructure Sustainability Rating

There is an overlap in the required assessments and documentation in Transport and Main Road's environmental management process and the requirements for an Infrastructure Sustainability Rating assessed by the Infrastructure Sustainability Council. In general, the environmental assessment process addresses the lowest benchmark for the relevant IS rating credits and to achieve the highest benchmark for credits requires additional assessments.

Where a project is getting an Infrastructure Sustainability Rating the additional requirements (studies and modelling) to support the rating process are highlighted with a green box. The name and code for the credit are listed and the additional assessment or reports are noted after.

The IS Rating version 1.2 credits which have an overlap with the environmental assessment are shown in Table 1.3.

Table 1.3 – Infrastructure Sustainability Credits that overlap environmental assessment process

Infrastructure Sustainability Credit	Section in this document
Energy and carbon monitoring and reduction (Ene-1)	Section 6.13
Renewable energy (Ene-2)	Section 6.13
Water use monitoring and reduction (Wat-1)	Section 6.11
Replace potable water (Wat-2)	Section 6.11
Receiving water quality (Dis-1)	Section 6.1
Noise (Dis-2)	Section 6.8
Vibration (Dis-3)	Section 6.8
Air quality (Dis-4)	Section 6.7
Light pollution (Dis-5)	Section 6.10
Previous land use (Lan-1)	Section 6.12
Conservation of on-site resources (Lan-2)	Section 6.2
Contamination and remediation (Lan-3)	Section 6.2
Ecological value (Eco-1)	Section 6.3
Habitat connectivity (Eco-2)	Section 6.3
Urban Design (Urb-1)	Section 6.10

1.4 Relationship with Engineering Consultants Functional Specification / SOA Technical Brief

The *Terms of Reference for Review of Environmental Factors* has been developed to work as an attachment to a technical brief of work such as the Consultants for Engineering Projects (CFEP) Functional Specification. The technical brief must nominate the required level of assessment for each factor to ensure the appropriate level of assessment is completed.

Where the *Terms of Reference for Review of Environmental Factors* has been used with a Functional Specification the level of assessment is defined in 'Table 1.3 Scope of Environmental Assessment' of the Functional Specification Annexure.

Where the *Terms of Reference for Review of Environmental Factors* has been used in another technical brief there will be a table in the brief that nominates the level of assessment.

1.5 Necessary qualifications and experience

All work undertaken for the REF must be performed by a qualified and experienced person for that specific environmental factor. A person is considered to be qualified and experienced if they meet at least the following criteria:

- Desktop Assessment - a person who possesses a degree in environmental science, environmental planning, environmental engineering or similar from a recognised tertiary institution, and has at least five years of relevant experience in environmental assessment for infrastructure project. If the person does not have five years relevant experience, they must be supervised, or all work reviewed, by a suitably qualified person that does.
- Standard Field Environmental Assessments – a person who possesses a degree in environmental science, environmental planning, environmental engineering or similar from a recognised tertiary institution, and has at least five years of relevant experience in environmental assessment for infrastructure projects. If the person does not have five years relevant experience, they must be supervised, or all work reviewed, by a suitably qualified person that does.
- High-Risk Field Assessments:
 - Shall require a person with qualifications and at least five years of experience in the specific environmental factor, and
 - For the following environmental assessments, the assessor shall be Suitably Qualified Person (SQP) to conduct the survey or complete the assessment for:
 - Soil and land (Contaminated Land) - Under the *Environmental Protection Act 1994*, an SQP (as per the administering authority's SQP declaration) is required for contaminated land site investigations, validation reports, draft site management plan or amendment or other function prescribed by regulation.
 - Biodiversity – Flora – Detailed flora surveys must be coordinated and led by a Suitably Qualified Person in accordance with administering authority's Flora Survey Guidelines – Protected Plants, self-assessment grading system in Table 1; or a person whom the Chief Executive has agreed in writing is a suitably qualified person.
 - Biodiversity – Fauna:
 - Terrestrial Fauna Survey – in accordance with the Queensland *Terrestrial Vertebrate Fauna Survey Guidelines* the qualifications of the assessor shall be "*an ecological scientist with appropriate qualifications and demonstrated experience in fauna survey and assessment*".
 - Aquatic Fauna Surveys shall be undertaken by a person with an ecological, zoology or a biology degree and who has experience undertaking aquatic fauna surveys.

- Breeding Place Assessment – Under the Nature Conservation (Wildlife Management) Regulation 2006, a survey for an animal breeding place is to be coordinated and led by a person experienced in conducting fauna surveys, wildlife ecology and/or environmental management, including the identification of animal breeding places for conservation significant species, special least concern or colonial breeding species.

The suitably qualified and experienced person must meet one or more of the following criteria:

- an ecological consultant with experience in conducting surveys for animal breeding places
- a person who possesses a degree in natural science or similar with experience in conducting surveys for animal breeding places, and/or
- a person who is a spotter-catcher under a rehabilitation permit issued under the *Nature Conservation Act 1992*.

Depending on the project specifics and the potential risks, fauna surveys may be broad across the entire project site or targeted to areas of interest and specific species.

- Air quality – Road traffic air quality assessments shall be overseen or conducted by a Certified Air Quality Professional (CAQP) and/or a Registered Professional Engineer (RPEQ) with appropriate experience in operational and construction infrastructure air quality assessment.

The EMP(P) must be prepared by a person who is considered a qualified and experienced person for the purpose of preparing a desktop assessment.

Submission of the REF must be accompanied by details, including relevant qualifications and experience, of the person who undertook the assessment, authored the report, and completed review or supervision.

2 Scope of REF

2.1 Purpose of the REF

The purpose of the REF is to:

1. review and verify assessment undertaken as part of the *Preliminary Environmental Assessment*
2. identify and assess existing environmental factors within the footprint and impact area of the project
3. identify and assess the potential impacts and opportunities of the project on these existing factors during the construction phase of the project and the ongoing operation of the infrastructure after construction
4. identify and assess the potential impacts or constraints on the infrastructure from the existing environment, and
5. identify and assess applicable legislative requirements including approval requirements triggered by the project.

The outcomes of the REF will form the basis for the development of the EMP(P)) which identifies mitigation measure options to avoid and/or minimise the projects potential impacts on environment constraints relating to the environment, and address legislative requirements.

2.2 Assessment scope

The area to be assessed in the REF shall include the full design footprint (project area) as well as a suitably sized buffer zone to allow for ancillary construction impacts and minor scope creep. Determination of a suitable buffer zone should also consider surrounding land uses that have potential to impact the project area, for example, contamination in groundwater. This area will be referred to as the assessment area. The report shall include a map of the assessment area showing the project area and buffer zone. The assessment area shall be altered where required under legislative requirements (for example flora survey trigger mapping survey).

Assessment should consider all actions required to complete the project during the design, construction and operational phases. This includes any pre-construction site investigations (such as geotechnical investigations and public utility relocations) as well as ancillary construction impacts (such as water extraction, screening and crushing, stockpile areas, side tracks, etc.).

The Contractor shall be responsible ensuring all necessary approvals and permissions are in place to undertake the assessments including access to property if required¹.

The Consultant shall where possible, undertake assessments at appropriate times to ensure opportunities for identifying environmental factors are optimised. The REF shall be specific, describing features by road distance from a fixed, readily identified location or landmark nominated in the district's traffic census.

Where possible the REF shall describe flora, fauna, habitats, and so on in both technical and non-technical terms. The REF shall use terminology that is readily understandable by the target audience which includes environmental experts, engineers, road designers, road construction Contractor's employees, maintenance Contractor's employees and the general public.

The REF shall consider impacts on and influences of the environment factors on the footprint of the project as well as areas likely to be utilised for construction (for example: sidetracks, stockpile sites, sediment basins and other relevant environmental parameters) and impacted upon by the project.

In completing the REF the Consultant is expected to undertake the necessary field assessments and studies. The most appropriate extent of field assessments and studies should be considered on a risk basis. The methodology utilised for undertaking the various desktop and field assessments for the environmental factors shall be based on the current industry-standard, environmental legislation and databases and mapping available at the time of the assessment. The methodology shall be documented in an Annexure to the REF.

¹ Department of Transport and Main Roads have powers to access land under s35 of the *Transport Infrastructure Act 1994* (TIA) for particular purposes. Notice of Entry (M727) and Authorisation to Enter Upon Land (F5163) forms must be completed in accordance with s36 of TIA. For further information, refer to <https://intranet.tmr.qld.gov.au/sites/ssc/Pages/NoticeOfEntry.aspx>. Additional permissions under other legislation may be required, for example, surveys in protected areas or state forest.

Where the Consultant identifies environmental factors or legislative triggers that require further assessment than is identified, the Consultant shall document and inform the Principal. The Principal will provide instruction on whether the scope of works shall be increased to incorporate the additional assessment.

Where required by legislation, the Consultant shall be responsible for ensuring that the REF is completed by a Suitably Qualified Person. The Consultant is responsible for ensuring that the necessary workplace health and safety requirements and management measures are in place for the environmental assessments.

2.3 Out of scope

Assessment of the following is considered out of scope of the REF:

- Cultural Heritage (covered by *C7559 Terms of Reference for Cultural Heritage Assessment*)
- Native Title
- soil assessment for construction suitability
- water quality assessment for construction suitability
- detailed hydrology assessments
- detailed hydraulic modelling
- geological investigations for engineering purposes, and
- detailed noise and vibration (these can be summarised in the REF but are scoped as separate assessments and reports. For more information see Section 6.8.

3 Report outputs

3.1 Report structure

The REF shall include with the following requirements:

- Executive summary of major and severe environmental and cultural heritage risks including approval requirements.
- Introduction
- Assessment scope
- Environmental factors, for each environmental factor:
 - existing values (including constraints and opportunities maps)
 - potential impacts (both on the environment and on the project)
 - risk assessment in accordance with Transport and Main Road's Risk Assessment and Ratings Matrix published on department's Risk Management Tools and Techniques intranet site, and
 - applicable legislative requirements.
- Appendix:
 - reference information
 - assessment methodology

- survey data, and
- qualifications and experience of personnel involved in the REF, including review.

The EMP(P) shall specify for each environmental factor:

- the risks identified
- the recommended management strategy or control, and
- the method of application to the project (that is, whether the management measure is design-related, construction specification-related or approval requirement.)

3.2 Mapping and spatial data

In all instances where the *C7558 Terms of Reference for Review of Environmental Factors* specifies the collection of spatial data, preparation of maps, preparation of spatial datasets and display of spatial coordinates the following requirements apply:

- *Queensland Government's WildNet Data Entry Form Guidelines* (Sept 2015).
- The Standard Australian Government Datum is to be used – GDA2020.
- Spatial data is to be supplied as either .shp (ArcGIS) or .tab (MapInfo) file, in the data structure specified by the department.
- The method used to derive the spatial data needs to be specified and the level of accuracy noted.
- Maps, figures, plans and aerial photos should include:
 - north point
 - GPS datum identifier
 - legend
 - labelled points / sites
 - data source and date
 - scale, and
 - a location key if necessary, where multiple photos / maps / plans / figures are spread along a route.

4 Legislative review and offsets

For the legislative review the terms Approval, Trigger and Obligation are defined as such:

- Approval: where permission must be obtained from a regulatory agency for the activity to be lawfully conducted.
- Trigger: the conditions that make a law come into effect.
- Obligation: mandatory requirements that make an action or activity legal.

The purpose of the legislative review in the REF is to identify what approvals, triggers and obligations that are present due to existing site conditions. For each factor the following must be identified:

- Act or Regulation

- Approval / Trigger / Obligation (for example, Waterway Barrier Works), and
- Regulatory Authority (if applicable).

The purpose of the legislative review in the EMP(P) is determine what actions need to be taken to ensure legislative compliance. This will include a more detailed legislative review to determine:

1. implications for the proposed project in relation to Commonwealth, State and, where applicable, local laws²
2. non-statutory approvals requirements (such as *State Government Supported Community Infrastructure Koala Conservation Policy*) as well as applicable self-assessable guidelines and codes (in accordance with State policy) that may also be applicable to the project
3. other obligations required for compliance with legislation, and
4. potential for environmental offsets triggered by the project.

The scope of the legislative review shall cover:

- Pre-construction investigations (for example, geotechnical, soil testing)
- Legislation related to design issues, and
- Legislation potentially related to construction activities and operations – these may be hypothetical as the construction methodology will not be known at the time. The intent of identifying potential construction-related legislation and approvals is to ensure Transport and Main Roads executes its responsibility for ensuring the contractor has the appropriate approvals at the time of the Environmental Management Plan(Construction) review.

This assessment should be limited to obligations where a project specific mitigation strategy is required. For example, there is no project specific mitigation strategy to address General Environmental Duty under section 319 of the *Environmental Protection Act 1994* so it should not be included.

The following information will be captured in the Legislative Compliance section of the EMP(P):

- Act or Regulation
- Approval, Trigger (for example, Waterway Barrier Works) or legislative obligation
- Mitigation measures or strategy for addressing the Approval, Trigger or legislative obligation
- Timeframes and costs associated with obtaining the approval, and
- Offset requirements.

The details of the mitigation strategy should be included in the relevant part of the EMP(P). This may include the following:

- additional investigations
- seeking pre-lodgement advice
- preparation of approval documents, and/or

² The department is exempt from complying with local laws under *Local Government Act 2009* and *City of Brisbane Act 2020*. The department is also exempt from having to obtain approval from local government for construction and maintenance of departmental infrastructure under *Planning Regulation 2017*.

- lodgement of approvals

For each action the person responsible must be identified.

Where further information is required to determine whether a permit, approval or obligation is applicable, the Contractor shall determine and document cost and timeframe to ascertain the necessary information. The Contractor shall then seek direction from the Principal as to further action required.

5 Other relevant manuals, standards, and systems

In addition to legislative obligations and requirements, the department also has internal standards, guidelines and procedures that need to be adhered to. Other departmental documents that provide environmental guidance include the technical publications listed in Table 5.

Table 5 – Summary of other departmental documents related to environmental assessment and management

Name	Description
Cultural Heritage Process Manual	This manual provides internal direction on: <ul style="list-style-type: none"> • statutory obligations • engagement with Indigenous people • roles and responsibilities • managing projects by incorporating processes for Indigenous cultural heritage into project management • entering agreements with Indigenous parties • processes to adopt for use in development projects.
Fauna Sensitive Road Design Manual (Vol 1)	This volume discusses the potential impacts of transport infrastructure on fauna. It includes a brief theoretical background to animal behaviour and the function of vegetated corridors to help the reader understand the challenges faced when designing infrastructure that is to accommodate fauna movement. Also included in this volume is a review of practices used in road designs to facilitate fauna movement.
Fauna Sensitive Road Design Manual (Vol 2)	The aim of this manual is to provide guidelines for preferred practices to reduce or eliminate the impact of road infrastructure on fauna. Specifically, this manual outlines preferred practices and provides recommendations to achieve fauna sensitive road design.
Road Drainage Manual	The Road Drainage Manual provides guidance in relation to the planning, design, construction, maintenance and operation of road drainage structures in all urban and rural environments for main roads in Queensland. One of the key aspects of the manual is the integration of environmental considerations with the hydraulic aspects of road drainage.
Road Landscape Manual	This manual aims to facilitate the understanding of, and procedures associated with, the assessment, design and management of roads as they affect the Queensland landscape.
Road Maintenance Code of Practice for the Wet Tropics World Heritage Area	This Code of Practice outlines requirements necessary to achieve best practice road maintenance that minimises negative environmental impacts on the Wet Tropics World Heritage Area.

Name	Description
Road Planning and Design Manual	<p>The purpose of this manual is to set the policy and framework for the planning and design of new and upgraded roads in Queensland. It is an agreed set of corporate standards that includes consideration of local circumstances.</p> <p>This manual refers to environmental assessment and management processes in departmental policy and manuals, as well as external influences and legislative requirements.</p>
Road Traffic Air Quality Management Manual	<p>The purpose of this manual is to provide guidance for the assessment and management of the impact of air pollutants from road traffic.</p>
Roads in Rainforests: Best Practice Guidelines for planning, design and management	<p>This document provides a set of principles and supporting guidelines for implementing best practice planning, design and management for ecologically sustainable roads within rainforests throughout Queensland.</p> <p>The intention of these Guidelines is to describe the particular aspects of rainforest environments that are unique and thus require particular consideration when designing and constructing roads in these habitats.</p>
Roads in the Wet Tropics Manual	<p>The goal of this manual is to improve the performance and management of road corridors within the wet tropics region by using current information and the latest technology in such a way that accounts for the costs and benefits to the environment, community, and economy. It assists in the implementation of best practice in the development and ongoing operation of roads in the wet-tropics region of North Queensland.</p>
Transport Noise Management Code of Practice	<p>The purpose of this Code of Practice is to provide guidance and instruction for the assessment, design and management of the impact of rail and road traffic noise and vibration for operation and construction.</p>

6 Review of environmental factors by individual factor

6.1 Water

Under the environmental factor of water, the REF shall consider freshwater, marine environments, hydrology and hydraulics as it relates to the environmental impacts on and from the project.

Desktop Assessment

- Provide desktop maps / aerial photographs showing location of rivers, creeks or other waterways in relation to the study area.
- Identify if there are any relevant Water Quality Objectives defined for the study area.
- Consider the operational phase stormwater quality risk to local waterways and advise whether operational phase stormwater quality management measures should be considered.
- For coastal projects, delineate on project maps the Coastal Management District boundaries, contours relating to Mean High Water Spring (MHWS), Highest Astronomical Tide (HAT), and marine parks boundaries proximate to the project, and
- Determine the construction water quality risk as defined in MRTS51 *Environmental Management*.

Standard Field Assessment

- Undertake field assessment of waterways within the proposed project area to verify desktop information and provide description of actual location, existing water quality based on one single insitu field test during site visit (dissolved oxygen, pH, turbidity, visual observations), bed and banks, substrate, existing erosion and sedimentation issues, basic hydrology and hydraulics. Document with photos and adjusted mapping if relevant.
- Compare field testing results to any relevant Water Quality Objectives, and
- If present, evaluate function of existing stormwater quality devices.

High-risk Field Assessment

- Undertake investigation of existing users of water resources (including recreational and industry purposes) within proposed project area and in areas potentially affected by the project and determine likely risk of impacts. Provide list of potentially impacted water users and their interest in the project.
- Conduct a surface water quality sampling program in accordance with the *Queensland Monitoring and Sampling Manual* which shall include the parameters of temperature, pH, dissolved oxygen, electrical conductivity, salinity, total dissolved solids, turbidity and transparency. Submit the details of the proposed sampling program as part of the tender including proposed locations, frequency, duration, number of samples, field or grab samples.
- Conduct groundwater quality sampling and assessment in accordance with the *Queensland Monitoring and Sampling Manual*, June 2018 of existing groundwater quality and quantity / depth, and
- Review the hydrologic and hydraulic modelling reports. Based on the reports and discussion with the hydraulic and hydrological experts, discuss the potential impacts from the project on both surface and groundwater. Identify issues that warrant further consideration by hydrological and hydraulic professions in relation to potential environmental impacts. Review should include impacts of changed hydrology and hydraulics on aquatic ecosystems immediately on site and downstream.

Projects that are getting an Infrastructure Sustainability Rating require the following assessments:

- Receiving water quality (Dis-1) – Water Quality Modelling (MUSIC), Quantity modelling of 1.5 year ARI event discharge.

6.2 Soil and land

Under the environmental factor of soil and land, the REF shall consider contaminated land, high risk soils³, topography and landscape features, and construction activity issues.

NOTE: If a landscape assessment has been engaged separate to the Review of Environmental Factors, ensure there is not duplication between the scopes of the assessments.

³ High Risk soils are defined as sodic / dispersive soils, saline soils, acid sulfate soils and potential acid sulfate soils, and contaminated soils.

Desktop Assessment

- Describe the topography within the study area, including any significant topographical features on maps especially waterways and ridge lines. Provide topographic map including contours.
- Provide descriptions of the dominate soil types in relation to erodibility, dispersivity and suitability for revegetation.
- Identify and delineate on a map and/or aerial photo of the study area:
 - soil types, in particular identify problem soils
 - any land that is listed on the Contaminated Land Register and Environmental Management Register, provide information on the potential contaminates
 - other potential contaminated land not listed on registers, include consideration of proximity to fire stations, airports, defence facilities (specifically including firefighting foam contaminants (PFAS/PFOA)), and
 - land that is likely to contain potential acid sulfate soils.
- Assess construction phase erosion potential in accordance with standard specification MRTS52 *Erosion and Sediment Control* considering soil type, level of surface disturbance, existing and final slopes, and rainfall intensity.
- Consider operational phase erosion potential on site.
- Describe potential impacts (should include discussion of negative impacts and opportunities for positive impacts). Should include discussion of soil characteristics and potential environmental problems in particular erosion, salinity, permeability, acid sulfate potential, contamination, and suitability for revegetation, and
- Determine the Construction Erosion risk as defined in MRTS52 *Erosion and Sediment Control*.

Standard Field Assessment

- Undertake field assessment of soil types to verify desktop data and identify any problem soil types. Field assessment is to include observations of existing erosion, location, type of erosion, and causes of erosion.
- Conduct targeted soil testing on the soil units identified as dispersive from the desktop review. Field tests only of representative soils, including subsoils. Document results by soil type, location (GPS point) and depth of sample. Interpret results and describe implications for the project.
- In areas of potential acid sulfate soils, undertake a preliminary investigation in accordance with the *Queensland Acid Sulfate Soil Technical Manual*. Interpret results and describe implications for the project.
- In areas of identified or suspected contaminated land, undertake a preliminary investigation to determine the level and type of contamination (SQP not required to undertake this work as this is preliminary verification of potential risk to determine if a contaminated land investigation is required).
- Correlate and compare the field assessment findings with the desktop information. Based on both the desktop and field assessment findings provide recommendations for soil treatment.

- Where applicable, assessment shall extend to proposed gravel and fill extraction sites, and
- Provide location map of field testing locations in relation to the project features.

High-Risk Field Assessment

- Develop and submit for approval a comprehensive soil sampling program in accordance with Technical Specification MRTS16 *Landscape and Revegetation Works*. The program shall include laboratory testing across various soil types, including subsoils. Upon departmental approval, undertake the comprehensive soil sampling program. The soil testing suites described in MRTS16 *Landscape and Revegetation Works* for topsoil and subsoil should be used. Include a Soil Investigation Report as part of the Review of Environmental Factors.
- Document and report the soil sampling methodology, sample grid map with locations and depths.
- Where dispersive and slaking soils have been identified as high risk, a Soil Management Plan – Planning shall be prepared by a Certified Practitioner of Soil Science (CPSS). The Soil Management Plan shall identify the nature of the soils and subsoils on site and the likely risks from exposure and utilisation in earth fill embankments. The Soil Management Plan – Planning shall outline the proposed design recommendations for managing the risks of soils on site as well as outline the amelioration regime for each of the soil types.
- Conduct a detailed site investigation of contaminated land in accordance with current industry guidelines. This work is to be carried out by a Suitably Qualified Person (SQP) as per the guidelines.
- Conduct a detailed ASS investigation in accordance with *National acid sulfate soils sampling and identification methods manual*.
- Where identified in the functional specification or technical brief, prepare a Concept Erosion and Sediment Control Plan and estimate of quantities in accordance with Transport and Main Roads Technical Specification MRTS52 *Erosion and Sediment Control*. This plan should be developed by an appropriately qualified person in accordance with MRTS52 *Erosion and Sediment Control*, and
- Interpret results and describe implications for the project.
- For major projects with high erosion risk, consider whether provisional sum method would be most appropriate for the contract.

Projects that are getting an Infrastructure Sustainability Rating require the following assessments:

- Conservation of on-site resources (Lan-2) – quantify the amount of topsoil pre-existing on the site, and
- Contamination and remediation (Lan-3) – Soil Management Plan (Contaminated Land Report, Remediation Action Plan) includes Sustainability appraisal of remediation options.

6.3 Ecosystems and habitats

Under the environmental factor of ecosystems and habitats, the REF shall consider breeding places, fish passage, fish habitat areas, protected ecosystems (state and commonwealth), protected habitat (state and federal) and wetlands.

Desktop Assessment

- Desktop review of relevant reports, databases, and mapping.
- Description of vegetation communities within the study area and immediately adjacent including regional ecosystems, and particularly noting any Threatened Ecological Communities (TEC).
- Description of waterways⁴ and Declared Fish Habitat Areas intersected by the study area and within the downstream impact area.
- Description of any wetlands⁵, including Convention on Wetlands of International Importance Especially as Waterfowl Habitat (RAMSAR) wetlands within the study area and within the downstream impact area.
- Description of essential habitat within the study area and immediately adjacent, and
- Description of other habitat features based on desktop assessment (culverts, tree hollows, rocky outcrops and so on).

Standard Field Assessment

- Field assessment to confirm the vegetation communities and ecosystems present on site. Where field assessment results contradict the desktop mapping, for example regional ecosystem mapping, document the supporting evidence for modifying the desktop mapping / information and propose the recommended new environmental value based upon the characteristics found during the field survey (example, reclassifying a regional ecosystem).
- Observation of habitat present, including aquatic habitat, and discussion of value (that is, is it degraded or high value).
- Record of observed breeding places including species where possible (both active and potential), and
- Inspect waterways to confirm fish passage requirements.

High-risk field Assessment

- BioCondition assessment of each terrestrial vegetation unit in the study area in accordance with *BioCondition Assessment Manual Version 2.2*, Queensland Herbarium⁶.
- Produce maps of the field validated boundaries of regional ecosystems and Threatened Ecological Communities within the study area.

⁴ Queensland Government Queensland Waterways for Waterway Barrier Works.

⁵ Areas of permanent or periodic/intermittent inundation, whether natural or artificial, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6 m as per *Queensland Wetland Definition and Delineation Guideline*.

⁶ Where BioCondition assessments, detailed flora survey and / or fauna surveys are required, resources should be compiled to maximise efficiency and cost-effectiveness of the assessment.

- Produce maps of field validated critical habitat for conservation significant species (under the *Environmental Protection and Biodiversity Conservation Act 1999*).
- Produce maps of field validated essential habitat for EVNT species (under the *Nature Conservation Act 1992*).
- For aquatic ecology, undertake assessment in accordance with the Department of Environment and Science's *Terms of Reference Guideline for Aquatic Ecology*, and
- Significant impact assessment under the *Environmental Protection and Biodiversity Conservation Act 1999* to be conducted for any Threatened Ecological Community's that may be impacted by the project.

Projects that are getting an Infrastructure Sustainability Rating require the following assessments:

- Ecological value (Eco-1) – Ecological Value Calculator (Greenstar Building Council Australia) OR Ecological Impact Assessment (EclA) EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems, and
- Habitat connectivity (Eco-2) – Assessment of habitat connectivity and if require offset reports.

6.4 Flora

Under the environmental factor of flora, the REF shall consider protected flora (state and commonwealth).

Desktop Assessment

- Desktop review of relevant reports, databases, and mapping on terrestrial and aquatic species and populations in the study area. Review should focus on any conservation significant species⁷ under State and Commonwealth legislation.
- Provide a list and image of conservation significant species identified by database searches and habitat type as potentially occurring within the study area. Include information on the conservation status, habitat requirements and an assessment of the likelihood of presence.
- Provide maps of known locations of conservation significant species and the *Protected Plants Flora Survey Trigger* mapping for the study area and surrounds including the 100 m buffer required under the *Nature Conservation Act 1992*. Provide an assessment of 'in the wild' under the *Nature Conservation Act 1992*.
- Identify and assess potential impacts and opportunities for individual conservation significant plants and populations listed under State and Commonwealth legislation, and
- Provide a recommended species list for rehabilitation of disturbed areas and batters. Species lists should consider clear zones and ensure frangible species only within these distances from the road.

⁷ Includes species with a conservation status of Critically Endangered, Endangered, Vulnerable and Near Threatened under *Nature Conservation Act 1992*, or Critically Endangered, Endangered or Vulnerable under *Environmental Protection and Biodiversity Conservation Act 1999* (Threatened flora – MNES).

Standard Field Assessment

- Conduct a simple field assessment to determine the presence or absence of the species identified in the desktop assessment. The field assessment should include both terrestrial and aquatic vegetation, and
- Update the list of conservation significant species and mapping for the study are based on the field assessment results A species list in accordance with the *WildNet Data Entry Form Guidelines* for conservation significant species records within the study area.

High-Risk Field Assessment

- Conduct a flora survey in accordance with the current version of the Queensland Government's *Flora Survey Guidelines – Protected Plants* for the study area. The inventory of flora species present should be provided for each vegetation unit in the study area including aquatic vegetation. Details shall include location (of individual or polygon of population), species and conservation status.
- Prepare a separate report for submission to the administering authority as required by the *Flora Survey Guidelines – Protected Plants*.
- A Significant Impact Assessment under the *Environmental Protection and Biodiversity Conservation Act 1999* shall be conducted for EBPC-listed flora species.
- All conservation significant species shall have spatial data recorded in accordance with departmental requirements and *WildNet Data Entry Form Guidelines* and at least one photograph.
- The locations of conservation significant species will be displayed on maps including 100 m buffer area.
- The health of individuals and populations of conservation significant species will be assessed and threatening processes discussed, and
- Provide details of any monitoring required to assess the success of measures to minimise impacts.

6.5 Fauna

Under the environmental factor of fauna, the REF shall consider protected fauna (state and commonwealth).

Desktop Assessment

- Desktop review of relevant reports and databases for terrestrial and aquatic fauna species and populations in the study area. Review should focus on conservation significant species listed under State⁸ and Commonwealth⁹ legislation.

⁸ Includes species with a conservation status of Critically Endangered, Endangered, Vulnerable, Near Threatened or Special Least Concern under *Nature Conservation Act 1992*. Colonial breeding species should also be listed for the purpose of identifying requirements for a high-risk Species Management Program.

⁹ Fauna listed as a Matter of National Environmental Significance. Includes species with a conservation status of Critically Endangered, Endangered, Vulnerable or Conservation dependent, and listed migratory species under *Environmental Protection and Biodiversity Conservation Act 1999*.

- Provide a list of conservation significant species identified as potentially occurring within the study area. Include information on the conservation status, habitat requirements and an assessment of the likelihood of presence.
- Provide maps of known locations of conservation significant species. Maps are also to note related habitat and habitat features.
- Include an assessment of known threats and potential threats to the conservation significant species which have been identified in the study area, and
- Identify and assess potential impacts of the proposed activity on conservation significant individuals and populations listed under State and Commonwealth legislation (should include discussion of negative impacts and opportunities for positive impacts).

Standard Field assessment

- Conduct a standard field assessment to determine the presence or likelihood of the conservation significant species identified in the desktop assessment. Field assessment should be direct observation of individuals, traces (scats or marks), calls (such as acoustic meters) or spot-lighting. The field assessment should consider both terrestrial and aquatic fauna, and should also identify other species that may be present based on ecosystems and habitat within the study area, and
- Update the list of conservation significant species and mapping for the study area based on the field assessment results. A species list in accordance with the *WildNet Data Entry Form Guidelines* for conservation significant species within the road corridor must be provided in an Appendix.

High-Risk Field Assessment

- Conduct:
 - broad fauna surveys in accordance with *Terrestrial Vertebrate Fauna Survey Guidelines for Queensland* (2018) Queensland Herbarium
 - targeted fauna survey in accordance with Queensland *Targeted Species Survey Guidelines* (Source: <https://www.qld.gov.au/environment/plants-animals/biodiversity/vertebrate-survey#download>) and Commonwealth Government's *Threatened Species Survey Guidelines*, and/or
 - an aquatic fauna surveys will be conducted by a suitably qualified person.
- A Significant Impact Assessment under the *Environmental Protection and Biodiversity Conservation Act 1999* shall be conducted for EPBC listed species located within the study area and identified as being impacted by the proposed works.
- Provide species description, image of at least one individual, description of species "use" of the study area (breeding, foraging, traversing), evaluation of the health of the population (locally and regionally), and potential impacts on the species (individual or population).
- Identify locations of fauna connectivity within or adjacent to the study area, and
- All conservation significant species shall have spatial data recorded. This may be location of individuals or specific habitat. Locations must be displayed on location map with the study area.

6.6 Biosecurity matters

Under the environmental factor of biosecurity matters, the REF shall consider biosecurity zones, restricted and prohibited matters, and other biosecurity matters.

Desktop Assessment

- Identify known biosecurity matters in the study area. Also include adjacent areas where there is the potential for spread into the study area.
- Identify any 'environmental' weeds that occur in the study area including locally identified emerging weeds.
- Identify what biosecurity zones the study area is within or adjacent to.
- Provide maps of known locations of biosecurity matters. Maps are also to note biosecurity zones, and
- Identify and assess potential impacts of the proposed activity on biosecurity matters.

Standard Field assessment

- Conduct a simple field assessment to determine the presence or absence of biosecurity matters identified in the desktop assessment.
- Provide a table of the location of identified biosecurity matters.
- List biosecurity matters (pest animals) which have been identified as present from the fauna surveys, and
- Where biosecurity matters have been identified as a threatening process for flora or fauna species (highlighted in Flora or Fauna section) identify both the weed / pest species and the impacted species.

High-Risk Field Assessment

Investigate prohibited biosecurity matters within and adjacent to the study area where the study area is potential habitat.

6.7 Air

Under the environmental factor of Air, the REF shall consider environmental nuisances such as dust, vehicle emissions and smoke.

Desktop Assessment

- Undertake desktop review of aerial photographs to identify the nearest air quality sensitive receptors. Aerial photographs must be included in the report. Sensitive receivers shall be in accordance with Transport and Main Roads *Road Traffic Air Quality Management Manual*.
- Describe the current values on site in relation to air quality.
- Proximity of critical facilities, infrastructure and utilities.
- Identify the activities on site that are high risk for air quality and identify the locations of these activities on a site plan including the locations of the identified sensitive receivers.
- Identify prevailing wind directions.

- Evaluate the risk of impacts to sensitive receivers for air quality. Consider both construction phase and operational phase impacts.

Standard Field Assessment

- Predict potential construction emissions and assess whether construction emissions are likely to adversely impact upon receptors.

High-Risk Field Assessment

- Undertake a Construction Air Quality Impact Assessment in accordance with Section 6.8 of the Transport and Main Roads' *Road Traffic Air Quality Management Manual*.

Projects that are getting an Infrastructure Sustainability Rating require the following assessments:

- Air quality (Dis-4) – no additional assessments are required but required reports should address the criteria for the credit provided that the high-risk field assessment is completed.

6.8 Noise and Vibration

Detailed assessment of the environmental factor of Noise and Vibration is not directly within the REF scope. The scope of noise and vibration assessments is directly related to the development of the project, so the assessment requirements are detailed in Functional Specification C7522, C7523 or C7524. The following is a summary of what should be completed for each project development stage:

Business Case (C7522)

- Noise and Vibration Assessment

Preliminary Design (C7523)

- Operational Noise Assessment
- Construction Vibration Assessment

Detailed Design (C7524)

- Operational Noise Assessment
- Construction Vibration Assessment

Under the heading of Noise and Vibration, the REF should summarise and cross reference the relevant reports that have been completed.

Projects that are getting an Infrastructure Sustainability Rating require the following assessments:

- Noise (Dis-2) – no additional assessments are required but required reports should address the criteria for the credit.
- Vibration (Dis-3) – no additional assessments are required but required reports should address the criteria for the credit.

6.9 Amenity

Under the environmental factor of Amenity, the REF shall consider potential impacts to local aesthetics and community expectations for commuter experience include driver and active transport.

Desktop Assessment

Broadly describe existing landscape character and visual values within and adjacent to the corridor. Describe in terms of:

- general landscape character (urban / rural / woodland / forest) and location / extent of these areas
- views to surrounding landscapes (for example, hinterland, rivers and other major waterbodies, ocean, distant city / destination, industrial areas) that may influence the layout design of landscape and revegetation (for example, framing / maintaining views, screening negative views)
- elements of functional landscapes (median / roundabout planting, shade trees to pedestrian paths, significant trees and so on)
- in urban contexts, identify if there are any maintenance Memorandums of Understanding (MOU) in place with local government
- regional ecosystems descriptions and dominant species in the area
- any local government street tree / landscape guides or associated reference information that may of use to the designer
- any existing urban design elements, theming or enhanced finishes to existing infrastructure, and
- any other aspects of landscape or urban design worth noting that may have community value.

Standard Field Assessment

- Include photographs representative of existing landscape character elements and visual values within and adjacent to the proposed project area that may be affected.
- Identify opportunities for impact mitigation measures and aesthetic improvements for community health and wellbeing benefits.
- Identify areas to enhance, views to frame or screen.
- In urban contexts identify if there are any existing irrigation systems operated by the local authority.

NOTE: Detailed assessment management of landscape and aesthetic values will be managed through the landscape design in accordance with Chapter B3 of the *Road Landscape Manual* and is separate to the REF process.

Projects that are getting an Infrastructure Sustainability Rating require the following assessments:

- Light pollution (Dis-5) - lighting desktop study (modelling or calculations), and
- Urban design (Urb-1) – Urban and Landscape Design Plan.

6.10 Resource use and management (including waste)

Under the environmental factor of resource use, the REF shall consider implications for the proposed project in relation to gravel, water and other construction material consumption and waste generation, recycling and reuse including waste water.

Desktop Assessment

- Utilise the Transport and Main Roads Waste and Recycling Calculator to generate an estimate of waste volumes generated from the project and volumes available for re-use and recycling. The Calculator is available for download from <https://www.tmr.qld.gov.au/business-industry/Technical-standards-publications/Project-waste-reporting>. Output estimates from the Waste and Recycling Calculator shall then be recorded in Review of Environmental Factors report as well as emailed to projectwasteregister@tmr.qld.gov.au for data collation.
- List major types of waste created from the project and identify onsite management requirements and offsite disposal requirements in accordance with State legislation. Specifically identify any regulated waste that will be produced during the project.
- Identify nearby waste facilities that may be able to accept the various waste streams.
- Review of the local Government Planning Scheme to determine the Operational Works triggers for filling of properties outside the road reserve, and potential implications for spoil disposal options.
- Identify any declared catchments within the assessment area. Review applicable catchment management plans for water sourcing requirements that will be relevant to the project.
- Identify potential sources of construction water and any bores that are located within the project area.
- If applicable, determine in consultation with the department, the likely source/s of construction material sourced by the project (gravel, rock, sand and so on). Determine whether approvals would be required to source various construction materials based on estimated volumes (provided by the department's Project Manager), and
- Identify Waste Reporting for the project to comply with any departmental Waste Plan reporting requirements.

Standard Field Assessment

- Propose measures to minimise waste creation and identify disposal methods, sites and treatments for remaining waste, and
- Assess the potential impacts from sourcing construction materials in relation to environment.

High-Risk Field Assessment

- Undertake a comparison of construction material options, construction methodology options and if relevant design options, in relation to sustainability measurements. Provide a recommendation of the preferred material and methodology based on greenhouse gas emissions.

Projects that are getting an Infrastructure Sustainability Rating require the following assessments:

- Water use monitoring and reduction (Wat-1) - Water Use Modelling Report
- Replace potable water (Wat-2) - Water balance, Potable water replacement initiatives
- Materials footprint measurement and reduction (Mat-1) - Materials Lifecycle Modelling Report, and
- Waste management (Was-1) – requirements covered in Desktop Assessment (use of Waste and Recycling Calculator).

6.11 Special areas and land tenures

Under the environmental factor of special areas and tenures, the REF shall consider implications for the proposed project in relation to Commonwealth, forestry, State-owned lands and world heritage, protected and recreational areas, nature refuges and private conservation estates.

Desktop Assessment

- Undertake desktop identification of the land tenure within the study area. Determine legislative triggers and implications associated with impacted tenures.
- Identify through desktop assessment, areas of conservation value that are not identified through tenure. For example nature refuges, offset areas, and areas identified in international treaties (example, RAMSAR), and
- Review of maps / aerial photographs and site visit if required, to identify current land use within and adjacent to the area of study area.

Standard Field Assessment

- Identify and assess potential changes in land use during construction and operation phases of the proposed project. Determine and document potential implications for the project, and
- Identify priority development areas within the study area. Review the relevant land use plan and summarise implications for the project.

Projects that are getting an Infrastructure Sustainability Rating require the following assessments:

- Previous land use (Lan-1) - Mapping showing before and after land uses with calculations.

6.12 Climate Change

There are currently no requirements in the standard environmental assessment process for projects for the factor of Climate Change. Climate change impacts and mitigation are currently assessed at an organisation level.

Projects that are getting an Infrastructure Sustainability Rating require the following assessments:

- Energy and carbon monitoring and reduction (Ene-1) and Renewable energy (Ene-2) - Energy use and Greenhouse Gas Assessment.

7 Environmental Management Plan (Planning) (EMP(P))

The findings of the REF shall be utilised to prepare an (EMP(P)). The management actions from other specialist reports for Factors such as Noise and Vibration or for Cultural Heritage should also be included in the EMP(P) when these reports are completed. The EMP(P) provides recommendations for legislative compliance, planning and design, and construction contract documentation that will avoid and mitigate the environmental and cultural heritage risks identified during assessment. The EMP(P) also includes an estimate of time and cost for future actions, and identification of project work items for contract management purposes.

The EMP(P) should divide recommendations into those for:

1. Legislative compliance - including approvals / permits, general obligations, record and reporting, and offsets. EMP(P) should include details of any likely permit actions that may extend past the project finalisation, for example, ongoing maintenance of offset sites, monitoring and close out reports.
2. Planning and Design - to be considered during the development phase, specifically design, to ensure risks associated with the location, design and/or operation of the infrastructure are minimised, and
3. Construction Contract – details recommendations for contract documentation (including Annexure clauses and project work items) to ensure construction activities are managed in a way to minimise risk.

The recommendations shall be cross-referenced to the risks identified during assessment, and recommendations should involve multi-disciplinary consideration.

Recommendations should also align with the specific objectives and guidelines in various departmental policies / manuals¹⁰ including:

- *Road Planning and Design Manual*
- *Road Drainage Manual*
- *Road Landscape Manual*
- *Transport Noise Management Code of Practice Manual Volume 1 and 2*
- *Fauna Sensitive Road Design Manual Volume 2, and*
- *Road Traffic Air Quality Management Manual.*

Maintenance requirements for all permanent environmental control devices designed into the project shall be appended to the EMP(P).

The REF and EMP(P) may be delivered as a single combined document, or as separate deliverables.

¹⁰ <http://www.tmr.qld.gov.au/business-industry/Technical-standards-publications.aspx>

8 Glossary

Explains technical and unfamiliar words, but not abbreviations, used in a publication.

Term	Description
Biosecurity matters	As defined within the <i>Biosecurity Act 2016</i>
Factors	parts of the natural and built environment that are included in the department environmental assessment process
HAT	Highest Astronomical Tide
Hydraulics	In relation to environmental assessment, the following hydraulic characteristics are considered in scope. It is intended that the environmental assessment include basic consideration of the following and highlight issues to be considered by hydraulic experts as they may have environmental impacts: <ul style="list-style-type: none"> • changes to cross-sectional area of flow • changes to bed and bank substrate or formation • addition or modification of instream structures (piers and so on), and • realignment of waterways.
Hydrology	In relation to environmental assessment, the following hydrological characteristics are considered in scope. It is intended that the environmental assessment include basic consideration of the following and highlight issues to be considered by hydrological experts as they may have environmental impacts: <ul style="list-style-type: none"> • modification to catchment size • changes to flow characteristics – sheet flow, channelized flow • changes that may impact the time of runoff from the catchment (for example the removal of areas of runoff detention or inclusion of areas of runoff detention), and • creation of new flow paths.
MHWS	Mean High Water Springs - the long-term mean of the heights of two successive high waters during those periods of 24 hours (approximately once a fortnight) when the range of tide is greatest, during full and new moon.
Protected plant	As defined within the <i>Nature Conservation Act 1992</i>
RAMSAR	An international treaty for the conservation and sustainable use of wetlands.
WildNet	WildNet
EMP(P)	Environmental Management Plan (Planning)
CfEP	Consultants for Engineering Projects
SQP	Suitably Qualified Person
REF	Review of Environmental Factors
ARI	Annual Recurrence Interval
CPSS	Certified Professional of Soil Science
TEC	Threatened Ecological Communities
EBPC	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
MOU	Memorandums of Understanding

