Government of Western Australia
Department of Transport
and Major Infrastructure

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Generic Coastal Structures Inspection and Assessment Scope

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Prepared for Department of Transport and Major Infrastructure (DTMI)

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Version control

Version No.	Date	Prepared by	Revision or issue descriptions	Issues to
Draft	10/04/2025	M P Rogers & Associates	Combined Draft for DoT review.	DoT
0	15/05/2025	M P Rogers & Associates	Updated with Client comments and issued for Client use.	DoT
1	9/06/2025	DoT	Additional updates from internal review	DTMI

Amendment record

This guidelines document is reviewed to ensure its continuing relevance to the systems and process that it describes. A record of contextual revisions is listed in the following table.

Page No.	Context	Revision	Date

Contents

Formatting Key

[Throughout this template three text colours have been used to distinguish between the following items.]

1. Required content.
2. [Guidance notes for the user to be deleted prior to use.]
3. Example text to be edited by the user prior to use.

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Aim / Objectives

[The aim of this inspection and assessment is to determine items such as the current condition, remaining service life and recommended maintenance of the LGAs coastal structures. When providing a scope to a consultant, consideration should be made for any specific requirements of the structures or the LGAs asset management process, such as mapping, shapefiles and any internal asset condition rating systems used. Items such as these should be included in the scope.]

The aim of a coastal structure inspection and assessment is to determine its current condition and provide recommendations for any required maintenance or upkeep works. The objectives and purpose of the inspection and assessment are as follows.

- Identify the current condition of the coastal structure(s).
- Determine and provide recommendations on any required maintenance or upkeep works.
- Assess the remaining useful life of the coastal structures.

Extent

[Provide a map of the area and include a list of the structures to be inspected. If any of the structures overlap or are hidden, individual images showing specific extents could be included.

Coastal structures may include structures such as groynes, breakwaters, seawalls, access stairs and boat ramps.]

The LGA manages approximately XX km of coast, stretching from XX to XX. Along this section of coastline the LGA manages multiple coastal structures, of which the following are to be inspected as part of this project.

- Structure one. [Include the LGAs coastal structures]
- Structure two.
- Structure three.

The location of these structures can be found in the following figure.

Figure 1 Location of the LGA's Coastal Structures. [Example structure locations from the Town of Cambridge]

Background

[Provide brief background for each of the structures to be inspected, useful information is listed below.

- The purpose of the structure.
- When the structure was constructed.
- What the structure was constructed from.
- Details of any previous maintenance or upgrade work.
- Details of any structural condition inspections or detailed structure surveys previously undertaken.
- Design, maintenance and as-constructed drawings, to be mentioned and provided later.
- Details of any specific issues or observed damage.

The background of an example structure has been included below.]

The coastal structures to be inspected are currently managed by the LGA [and XX coastal manager/s where relevant], with available details outlined below.

Structure One Example (Floreat Groyne)

The Floreat Groyne is constructed from granite armour and can be found at the northern end of the City Beach area. This structure was originally constructed in 1957 by the state government to provide protection for swimmers and reduce longshore erosion at City Beach. Its construction and subsequent maintenance was originally the responsibility of the City of Perth. In 1994, the Town of Cambridge was formed and became responsible for maintenance of the Floreat Groyne.

The structure is believed to have undergone repairs in the late 1980s although details are unavailable at the time of writing. In 2008, repair works were completed by Italia Stone Group. The maintenance and repair works involved importing new armour rock and reworking of existing armour rock. The as-constructed survey from these works is available and included in Appendix XX.

In 2018, repairs to the groyne crest were completed. These works involved the placement of reinforced concrete along the outer 20 m of groyne and construction of a new ramp at the groyne's base. Additional maintenance was undertaken in 2025 by the Town with support of a Coastal Adaptation and Protection grant. These works entailed repacking and replacing of existing armour rock and core, as well as new armour rock to bolster the structure. This 2025 maintenance coincided with repairs and repointing of masonry and limestone at the City Beach seawall.

[Include other structures as applicable]

Tasks

[The tasks outlined in this section detail the required components of the inspections and assessment of the coastal structures.]

The following tasks are required to be completed by the Consultant to conduct a coastal structure inspection and assessment to determine the current condition and provide recommendations for any required repair, maintenance, upgrade, or replacement works.

1. Task 1 – Visual Inspection.
2. Task 2 (provisional) – Survey of the Structures.
3. Task 3 (provisional) – Divers Inspection.
4. Task 4 – Assessment and Reporting.

Task 1 – Visual Inspection

[The structures should be assessed by suitably qualified and experienced personnel. The person should be familiar with appropriate condition assessment methods such as the method outlined in the Coastal Engineering Manual (CEM) (USACW 2006, 2011) or The Rock Manual (CIRIA 1991). If the LGA has its own in-house structure condition rating system this could also be used here.

It is recommended that for rubble mound structures the method outlined in the CEM be used to assess their condition.

For other structures, it is recommended a five-level rating scale is used such as the one included below (Table 1).]

The Consultant is required to undertake a conventional visual inspection of the LGA's coastal structures using the Coastal Engineering Manual (CEM) method for rubble mound structures and the following five-level rating scale for other structures in Table 1.

Table 1 Structure Assessment Rating System

Condition Rating	Condition Name	Condition Description
NA	Not Assessed	Not Assessed
1	Excellent	Sound physical condition. No work required.
2	Good	Acceptable physical condition; minimal short term failure risk but potential for deterioration. No work required.
3	Average	Significant deterioration evident; failure unlikely in near future but further deterioration likely. Work required but asset is still serviceable.
4	Poor	Failure likely in the short term. Substantial work required in short term, asset barely serviceable.
5	Very Poor	Failed or failure imminent / safety risk. Major works or replacement required urgently.

The visual inspection should determine the condition of each section of each structure and identify areas that require maintenance works. The following key components should be considered when conducting the inspection.

- Undertake inspections during times of lower tides and favourable weather to ensure that as much of the structure is visible as possible.
- If areas of the structure are buried seasonally, try to conduct inspections during periods when the majority of the structure is visible.
- When conducting the visual inspection, the requirements for any maintenance works should be considered.
- The structure should be inspected in repeatable sections such as 20 m chainages, referenced to the overall geometry of the structure as measured/estimated where practicable.
- If areas appear to have significant damage or movement below the waterline that cannot be clearly observed, a divers' inspection should be considered.

- The structure should be assessed for both structural condition rating and its functional rating, helping to determine an overall condition rating.
- As a minimum, the condition assessment should examine, document, and scale the following.
  - Armour loss.
  - Interlocking.
  - Armour quality.
  - Slope defects.
  - Breach.
  - Core exposure.

Task 2 (Provisional) – Survey of the Structures

[Detailed surveys, including below water level where relevant, should be completed to quantify issues and change, along with forming a basis of design and maintenance.

The inclusion of high-resolution aerial imagery could also be included as part of the survey scope. This has been included in the example through bracketed writing in *italics*.

Survey options generally include photogrammetric, LiDAR, and Multibeam collected by way of UAV, vehicle, or on foot. Further details for the surveys can be found in their relevant scopes on the DoT website.]

The Consultant (or Sub-consultant) is to conduct topographic and hydrographic surveys *(and capture high resolution geolocated aerial imagery)* of the coastal structures identified in this scope. The following key components should be considered when conducting the survey.

- Conduct the topographic survey during times of lower tides and the hydrographic surveys at higher tides to ensure that as much of the structure is visible as possible during the respective surveys.
- Use the Geocentric Datum of Australia 2020 (GDA2020) and the Australian Height Datum (AHD) for the horizontal and vertical datums respectively.

(Captured aerial imagery tiles should be processed into single georeferenced orthomosaics for each structure, in addition to provision of a high-resolution point cloud and DEM of the structure.)

Task 3 (Provisional) – Underwater Inspection

[Where the structure includes significant underwater sections, underwater inspections should be considered. Underwater inspections should be undertaken by qualified divers with experience in conducting condition assessments of similar structures. There is a risk in underwater inspections that the visibility in the water could be low, limiting any potential inspection. A benefit of using divers over an Unmanned Underwater Vehicle (UUV) is that they can touch and feel the structure, finding defects and issues that the UUV could miss.]

If any portion of the structures are observed as having significant damage or issues confirmed through surveys that cannot be adequately assessed during the visual inspection, the Consultant (or sub-consultant) will be required to undertake an underwater inspection. The underwater inspection should be conducted by qualified and experienced divers and arranged to target identified areas from the visual inspection and surveys. The following components should be considered when conducting an underwater inspection.

- Undertake inspections during times of higher tide, lower wave energy and high water visibility to ensure as much of the structure is visible as possible.
- Divers should inspect the areas of concern identified during the visual inspection and include the immediate vicinity of these areas.

- Photographs and/or videos should be provided to document defects and verify condition rating rationale.
- A report detailing the results of the inspection and the condition rating of the structure including any identified issues.

Task 4 – Assessment and Reporting

[Provide a description of the report style and content required. It is expected that the report is to include appendices of relevant information from the assessment including provisional tasks, inspection notes and ratings. The Consultant should assess the condition of the structures, determine any maintenance requirements, their approximate costs and provide an estimate of each structure's remaining service life.]

The Consultant will assess each section of each structure and assign them a condition rating based on the visual inspection. A map showing the condition of each section of each structure should be developed. An example condition rating map is presented in Figure 2. Subsequently, an overall function rating of the structure will be assigned to each structure by the Consultant.

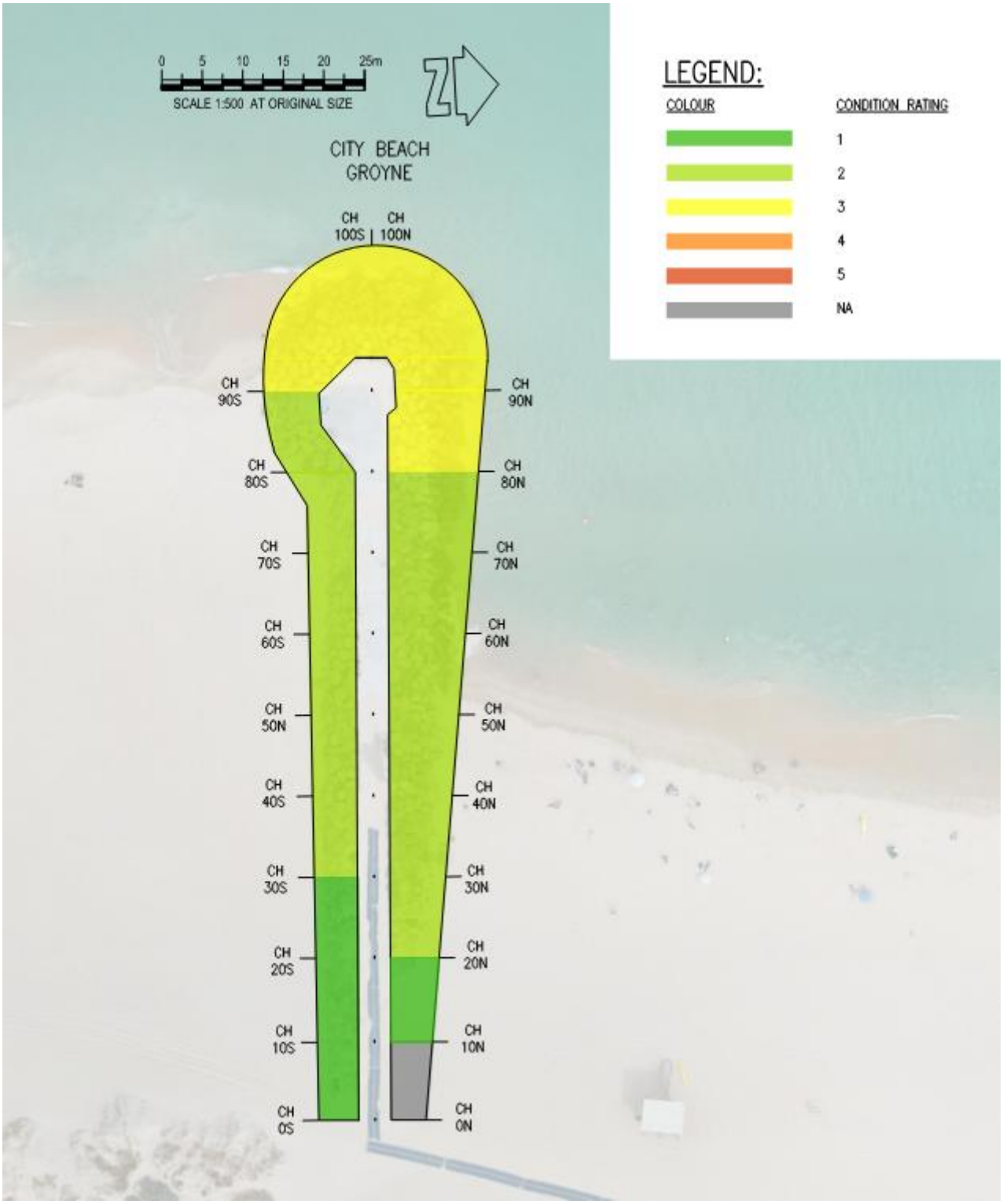

Figure 2 Condition Rating Map. [Example condition rating map from the Town of Cambridge]

Any areas that require maintenance should be identified with recommended works and indicative costs outlined. It is expected that as a minimum the following items are included.

1. Inspection and Assessment Methodology.
2. Visual Inspections results.
3. Survey and underwater inspection results [if applicable.].
4. Current condition of the structures.
5. Recommended maintenance works and costs.
6. Estimates of remaining useful service life.

Methodology

[Provide a brief overview of a methodology or request a detailed methodology for the inspection and assessment. The LGA should be cautious if prescribing a methodology as it may lead to additional costs and complications. The following methodology should be used as a guide.]

The Consultant is to develop a methodology for work to be approved by the LGA. The methodology is likely to include the following items, noting that the following is to be used as a guide for conducting the inspection(s) and assessment only and may include other work beyond what is defined below.

1. Review available background information, drawings and develop a chainage plan of the structures.
2. Confirm with the LGA if surveys of nominated coastal structures are required.
3. Engage surveyors and conduct surveys of the nominated structures, if required.
4. Arrange visual inspections to be conducted at low tide, liaising with the LGA over any access requirements or required approvals.
5. Conduct visual inspections, identifying areas with any issues above the waterline (being mindful of issues below the waterline where relevant) and the condition of each section. Condition and general comments are to be recorded for each section of the structures.
6. Confirm with the LGA if an underwater inspection and/or survey data is required for any nominated structures.
7. Engage surveyors and complete a structural survey using a nominated survey method (provisional).
8. Engage divers and complete an underwater inspection, if required (provisional).
9. Review the underwater inspection report alongside any survey data collected and update the condition assessment as required (provisional).
10. Identify areas that require maintenance and provide recommendations on required works and approximate costs.
11. Determine the remaining useful life of each coastal structure.
12. Provide risk-based prioritisation and recommendations to the LGA's own works program that combines (10) and (11) above by proposing one of four responses to each structure:
    a. Take no action.
    b. Maintenance of all or some portions of the structure.
    c. Repair all or some portions of the structure.
    d. Modify structure (upgrade/replace).

Deliverables

[In this section the LGA should consider any requirements of their internal asset management and include the requirements within the deliverables.]

The Consultant is required to provide the following deliverables.

1. Detailed condition assessment of each structure.
2. Survey *(and aerial images)* of the structures (provisional).
3. Underwater inspection report (provisional).
4. Detailed summary report including condition ratings, maps, remaining useful life, and recommended maintenance work program.
5. (Include any requirements specific to the LGA, including draft versions and rounds of review).

Timeframe

[Use this section to request a best estimate of the project's timeline. The LGA can include a project deadline if required.]

The Consultant is to provide details of the estimated timing of project component tasks outlined in the following table.

Table 2 Project Schedule

Project Component	Timing or Expected Completion Dates
Initiation meeting and selection of approved assessment method.	XX
Review of available background information and preparation of assessment sheets.	XX
Conduct visual above water inspection.	XX
Undertake survey of the coastal structures if required.	XX
Undertake divers inspection of areas of concern if required.	XX
Prepare and provide a draft report of the assessment.	XX
Allow for review of the report by the LGA.	XX
Update and provide final deliverables	XX

Documents and Files to be Provided

[This is where the LGA can provide details of any documents and files that will assist the Consultant in conducting the inspection and assessment. Examples of these documents are included below. If the LGA is not aware of the structure history/reports/drawings, consider instructing the Consultant to research and source these as part of the project.]

The following files and documents will be provided to the Consultant for use in the inspection and condition assessment.

- Design, as-constructed and past survey drawings.
- Details of any previous maintenance, including any drawings.
- Previous inspection and assessment reports or details.
- Existing maintenance work program. [if applicable.]
- Shapefile of the structures.
- Details of existing chainage plans.
- Details of any specific labelling requirements.
- Any other relevant documents the LGA has access to, such as previous underwater inspections.

Appendices

[Include any required documents these would likely include the following.

- LGA specific assessment rating system.
- List of coastal structures with specific naming conventions.
- Any report detailing current issues.
- Previous inspection report.]