



OPW

Oifig na
nOibreacha Poiblí
Office of Public Works

National Coastal Erosion Hazard Mapping

**Engineering Consultancy
Services**

Requirements and Specification

Project Information:

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GLOSSARY

Cliffmetrics	A programme, developed by SAGA-GIS, which automatically delineates the estimated cliff top and other cliff metrics from Digital Terrain Models (DTMs).
Climate Change Timeline	Projections of future sea-level rise in Ireland, broadly reflecting Illustrative emission scenarios – or Shared Socio-economic Pathways - as described within the “ <i>IPCC Sixth Assessment Report</i> ”.
Coastal Aerial LiDAR and Imagery Survey (CALS)	A national survey commissioned by the OPW to capture high-resolution LiDAR and aerial imagery at the coast, with survey undertaken between 2021 and 2025.
Coastal Erosion Hazard Mapping (CEHM)	Spatial data mapping the location and potential extent of future coastal erosion.
Coastal Feature Line	The position of the coastline, based on CALS data, which acts as a proxy to both measure historic coastal change against and to project future coastal change from.
Confidence Rating	A rating to measure the relative level of confidence in the assessment undertaken, reflecting the level of uncertainty associated with the data and methods used.
Digital Shoreline Analysis System (DSAS)	Digital Shoreline Analysis System (DSAS) is an automated standalone software package, developed by the US Geological Survey (USGS), used to assist in estimating the historic rate of coastal change over a period of time.
Frontage	A length of coast which is expected to behave in a similar way based primarily on physical characteristics (e.g. hardness, topography, orientation, and the presence of manmade coastal defences).
Geographical Information System (GIS)	Computer-based system that creates, manages, analyses and maps various types of spatial data.
Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report	A comprehensive evaluation of the latest scientific knowledge on climate change, published by the Intergovernmental Panel on Climate Change between 2021 and 2023.
Isostatic Rebound	The gradual rise or rebound of the Earth’s crust after the melting of glaciers, restoring the crust toward its original level.
Management Approach	A hypothetical scenario that considers how existing manmade coastal defences may be managed in the future, in relation to their maintenance and replacement.

Manmade Coastal Defence

An engineered structure, located at the backshore and parallel to the coast, built to protect the coastline against coastal erosion. This excludes an engineered structure which is perpendicular to the coastline (e.g. groynes) or offshore (e.g. breakwaters).

Sea Level Rise

The long-term increase in the average height of the ocean, primarily driven by global warming.

Time Period

A specific duration of time in years, from a defined start point to a defined end point, over which potential future coastal erosion is measured.

ACRONYMS

CEHM	Coastal Erosion Hazard Mapping
CFERM	Coastal Flooding and Erosion Management
GSI	Geological Survey Ireland
ICPSS	Irish Coastal Protection Strategy Study
ISM	Integrated Spatial Model
LiDAR	Light Detection and Ranging
NCEHM	National Coastal Erosion Hazard Mapping
NMA	National Mapping Agreement (2017)
OPW	Office of Public Works
PCEHM	Predictive Coastal Erosion Hazard Mapping
SG	Steering Group
TAG	Technical Advisory Group
TE	Tailte Éireann
TMN	Technical Methodology Note

1 BACKGROUND AND OBJECTIVES

1.1 INTRODUCTION

The Office of Public Works (OPW) is commissioning a project to produce National Coastal Erosion Hazard Mapping (NCEHM) for the coastline of Ireland (see Section 1.4), hereafter referred to as the 'NCEHM Project'.

The proposed methodologies for mapping coastal erosion were developed during the Predictive Coastal Erosion Hazard Mapping (PCEHM) Pilot Study and were subsequently formalised into the Coastal Erosion Hazard Mapping (CEHM) Technical Methodology Note (TMN). The NCEHM Project shall use the CEHM TMN to develop national-scale coastal erosion hazard mapping to ensure consistency and quality of deliverables produced during this Project.

The mapping developed under the NCEHM Project will enable the identification of areas at potentially significant risk from coastal erosion, both now and in the future, and will help inform decisions on the management of coastal change risks, including the need for interventions, and the long-term planning for the management of potential future change.

This document outlines the requirements and specifications for the NCEHM Project.

1.2 BACKGROUND

Currently, there is no ongoing national assessment or mapping of Ireland's changing coast that encompasses the future hazards and risks associated with coastal erosion. The OPW completed the Irish Coastal Protection Strategy Study (ICPSS) in 2013 which was a national study that provided strategic coastal erosion maps for the national coastline to the year 2050. However, the projected erosion assessment was based on a 'look back' of changes to the coastline during the previous 30 years only, without consideration of the potential acceleration in the rates of erosion due to the impacts of climate change. The presence and condition of defences were also not considered due to a lack of available data at that time.

An Interdepartmental Group (IDG) consisting of the Department of Housing, Local Government and Heritage, the OPW and others published a report titled "Report of the Inter-Departmental Group on National Coastal Change Management Strategy" in 2023, in which a number of recommendations were proposed. Recommendation 6(a) of the report outlined the need to develop national-scale coastal erosion hazard mapping and an associated risk assessment using the latest available data and methodologies. In 2024, the PCEHM Pilot Study was progressed as an outcome of this report and it tested and developed suitable methodologies to inform national-scale coastal erosion hazard mapping to deliver the requirements of Recommendation 6(a).

On completion of the PCEHM Pilot Study, the OPW assessed the lessons learned and developed the CEHM TMN, which sets out the detailed methodology for the development of coastal erosion hazard mapping in Ireland, including data to be used, the assessment to be undertaken, and the outputs to be produced.

1.3 OBJECTIVES

The primary objective of the NCEHM Project is to develop national-scale coastal erosion hazard mapping for the Irish coastline, contributing to the delivery of Recommendation 6(a) of the Report of the Inter-Departmental Group on National Coastal Change Management Strategy.

In order to achieve this objective the following tasks have been identified to maximise the value of the NCEHM Project in relation to wider coastal change management in Ireland:

1. Develop an understanding of historic coastal change and the current position and nature of the coastline at the frontage level, including the identification of key coastal features and processes at the coastal sub-cell level;
2. Develop an Integrated Spatial Model (ISM) (see Section 1.5.2.2 and 3.1) to enable a standardised and repeatable assessment of coastal erosion and to enable future updates of coastal erosion hazard mapping in an efficient manner;
3. Produce national-scale coastal erosion hazard mapping, using the above integrated spatial model to help inform the management of coastal change in Ireland;
4. Identify opportunities for further development of the existing methodologies, or the acquisition of additional data, to help inform future updates to the national-scale coastal erosion hazard mapping produced in the NCEHM Project (this Project).

The OPW will use the CEHM developed within the NCEHM Project to support a national-scale risk assessment that identifies communities and coastal areas potentially at significant risk of coastal erosion, both now and in the future.

In addition, the mapping will support the preparation and publication of spatial planning guidelines to provide policy direction in coastal areas that may be subject to coastal change, and to avoid inappropriate new development in at-risk coastal locations.

1.4 STUDY AREA

The NCEHM Project shall include the development of coastal erosion hazard mapping for the coast with the exception of sheltered waterbodies and estuaries and some small islands where coastal erosion is deemed to be a very low or negligible risk. The extent of the coastline to be assessed by the Consultant as part of the NCEHM Project is illustrated in Figure 1-1 and the associated spatial data is provided with this Requirements and Specification document.

A total estimated coastline length of 5,923 kilometres (based on the Tailte Éireann High Water Mark dataset, derived from relevant 6 inch and 25 inch Ordnance Maps) is to be assessed as part of the NCEHM Project. This coastline which extends from Wicklow Head on the east coast clockwise to Lough Foyle on the north coast (including islands), shall be the responsibility of, and carried out by, the Consultant as part of the NCEHM Project.

Separately, the preparation of CEHM for an estimated coastline length of 304 kilometres, extending from Carlingford Lough to Wicklow Head on the east coast, shall be the responsibility of, and carried out by, the OPW in parallel with the NCEHM Project (see Table 1-1).

Table 1-1 Coastline extents to be assessed under the NCEHM Project and separately by the OPW

Responsibility	Estimated Coastline Length	Coastline Extent
OPW	304 km	Carlingford Lough to Wicklow Head
Consultant (NCEHM Project)	5,923 km	Wicklow Head to Lough Foyle



Figure 1-1 - Spatial extent of coastline included in the NCEHM Project

As set out within the CEHM TMN, the assessment of coastal change is undertaken on a frontage by frontage basis. The work required for each frontage varies depending on whether it is hard or soft, and if manmade coastal defences are present. The exact number and type of frontages cannot be provided by the Client in advance of the NCEHM Project, as it is influenced by the Coastal Feature Line that is to be developed by the Consultant as part of the NCEHM Project.

The Consultant shall be responsible for determining the level of work required to deliver the NCEHM Project, the price of this work, and any assumptions associated with this, during the tender stage.

The details in Tables 1-2, 1-3, and 1-4 are provided for **information purposes only** to assist the Consultant in quantifying the work required to deliver the NCEHM Project.

Table 1-2 provides an estimated breakdown of the entire coastline into dominant substrata types based on “The Relative Lengths of Seashore Substrata around the Coastline of Ireland as Determined by Digital Methods in a Geographical Information System” (Neilson, B. and Costello, M., 1999). This was based on a digitisation of the line of mean high water at 1:126,720 (0.5 inch to one mile) scale.

Table 1-3 provides an estimated breakdown of the entire coastline by asset type (natural and manmade) based on the population of the OPW Coastal Defence Asset Database. The Coastal Defence Asset Database has been populated primarily based on 2003 oblique imagery commissioned by the OPW.

Table 1-4 provides details of the number of frontages and the typical length of frontages assessed in the recently completed Predictive Coastal Erosion Hazard Mapping Pilot Study.

Table 1-2 Breakdown of the Irish coastline based on the dominant substrata type, derived from Table 1 of Neilson and Costello (1999)

	Estimated Percentage* of Coastline Length (including no seashore)	Estimated Percentage* of Coastline Length (excluding no seashore)
Cliff	4.8%	5.1%
Rock	38.7%	41.1%
Stone	8.6%	9.1%
Sand	31.7%	33.6%
Mud	10.1%	10.7%

	Estimated Percentage* of Coastline Length (including no seashore)	Estimated Percentage* of Coastline Length (excluding no seashore)
Saltings and marsh	0.3%	0.3%
No seashore**	5.8%	-

*Percentages based on the relative length of each substrata type and the total length of all substrata types.

**'No seashore' meant no seashore was evident on Admiralty Charts (used to identify and categorise seashore substrata in the study). This was attributed to the existence of a man-made structure such as a pier, the absence of a significant tidal range, a vertical seashore not steep enough to be categorised as cliff, or the area not being mapped in the charts. Refer to Neilson and Costello (1999) for further information.

Table 1-3 Breakdown of the Irish coastline based on asset type, derived from the Coastal Defence Asset Database

	Number of Assets	Length of Assets
All	20,503	4,285 km
Natural Assets	11,053	3,607 km
Manmade Coastal Defences*	5,294	373 km
Other Manmade Asset**	2,914	41 km
No Asset Present	1,242	264 km

*Manmade coastal defences running parallel to the shore: embankments, engineered high ground, walls, and quays.

** Other manmade coastal assets not included in CEHM: breakwaters, groynes, piers, ramps, slipways, steps.

Note:

- The figures in Table 1-3 related to populated and approved data in the Coastal Defence Asset Database as of 5 August 2026.
- Figures primarily cover the coastline from County Cork to County Donegal (inclusive). County Louth to County Waterford (inclusive) are not populated and approved at the time of tender issue;
- Revetments are not specifically covered in the above figures but are typically found in conjunction with another manmade coastal defence (e.g. embankments, engineered high ground, walls, and quays).

Table 1-4 Breakdown of the Predictive Coastal Erosion Hazard Mapping Pilot Study based on coast type, derived from the approved Coastal Feature Line

	Number of Frontages	Total Length of Frontages	Average Length of Frontage	Range of Frontage Lengths
All Frontages	242	118.18 km	0.49 km	0.01 to 3.66 km
Natural Frontages	202	111.28 km	0.55 km	0.01 to 3.66 km
Manmade Coastal Defences	40	6.91 km	0.17 km	0.01 to 1.51 km
Hard Frontages	47	26.31 km	0.56 km	0.06 to 2.91 km
Soft Frontages	183	88.63 km	0.48 km	0.01 to 3.66 km
Soft to Hard Frontages	12	3.24 km	0.27 km	0.07 to 0.42 km

1.5 PROJECT STRUCTURE AND PROGRAMME

1.5.1 PROJECT STRUCTURE

The OPW is the Contracting Authority and the “Client” for the purposes of the NCEHM Project. A consultant will be appointed to undertake this Project and shall carry out the requirements outlined in this document.

A **Steering Group (SG)** will be established and will be comprised of representatives from the Client, the Consultant and other key stakeholders if deemed necessary by the Client.

A **Technical Advisory Group (TAG)** shall also be established. The TAG will be chaired by the Client and will act as a forum within which staff involved in the technical delivery of the NCEHM Project, and other stakeholders or experts as deemed appropriate by the Client, can raise technical issues for discussion and to propose any amendments to the CEHM TMN where it does not fully cover the issues encountered during the NCEHM Project. Any decision to accept a proposed amendment or otherwise rests solely with the Client.

1.5.2 PROJECT PROGRAMME

The Project programme shall strictly adhere to the programme tendered by the Consultant (see NCEHM Request for Tenders, Section 3.3.1.B2), and approved by the Client at the Commencement meeting. The finalised programme must incorporate all defined review periods detailed in Section 1.5.2.1. The Consultant shall execute the services in strict accordance with the following milestones and programme requirements:

- i. It is anticipated that the NCEHM Project will commence in December 2026.
- ii. The draft Methodology Statement for the NCEHM Integrated Spatial Model (see Section 1.5.2.2) shall be provided within 2 months of the Commencement Date.
- iii. The draft NCEHM Integrated Spatial Model and associated draft Coastal Erosion Hazard Mapping for the “pathfinder” (see Section 1.5.2.2) coastline shall be provided within 6 months of the Commencement Date.
- iv. The final NCEHM Integrated Spatial Model, and associated final Coastal Erosion Hazard Mapping for the “pathfinder” coastline, shall be provided within 9 months of the Commencement Date.
- v. The draft Coastal Erosion Hazard Mapping for the entire study area (Section 1.4) shall be provided within 18 months of the Commencement Date.
- vi. The final Coastal Erosion Hazard Mapping for the entire study area (Section 1.4) shall be provided within 21 months of the Commencement Date.
- vii. The NCEHM Project shall be completed within 24 months of the Commencement Date.

The Consultant shall execute the services in line with the above milestone and programme requirements with opportunities for earlier delivery incorporated into the programme, where possible, without compromising any other requirements set out in this document.

The OPW shall provide the data listed in Appendix 1 at the time of Contract Award, unless otherwise stated in Section 1.5.2.3 or Appendix 1. There are a number of additional datasets currently under development that will be issued to the Consultant after Contract Award. Certain

elements of the NCEHM Project, or certain locations within the study area, cannot be commenced until these datasets are issued to the Consultant. These datasets, along with the dates the Consultant can assume the Client will issue them, are detailed in Section 1.5.2.3.

1.5.2.1 Review Periods

Table 1-5 sets out defined periods for client review of deliverables, draft and final, required as part of the NCEHM Project and that shall be provided for by the Consultant in the Project Programme. Where a deliverable is not listed, a **two week** period for Client review shall be assumed. The Consultant shall respond to all feedback provided with details of how the comments have been addressed.

The Consultant shall deliver GIS deliverables and Coastal Erosion Hazard Mapping on a staggered, Coastal Cell basis, as work is completed rather than a single consolidated submission (all Coastal Cells at once). This incremental delivery approach is a mandatory requirement to facilitate continuous client review and prevent project programme slippage.

Table 1-5 OPW Review Periods on Deliverables

Deliverable	Review Period
Methodology Statement for the NCEHM Integrated Spatial Model	2 Weeks
Draft NCEHM Integrated Spatial Model and associated draft Coastal Erosion Hazard Mapping for the “pathfinder” coastline	4 Weeks
Final NCEHM Integrated Spatial Model and associated final Coastal Erosion Hazard Mapping for the “pathfinder” coastline	3 Weeks
Draft Stakeholder Engagement Plan	2 Weeks
Technical Workshop Material (e.g. presentation slides, etc)	1 Week
Minutes (Steering Group, Technical Advisory Group and Technical Workshop)	2 Weeks
Progress Report and Programme updates	2 Weeks
GIS Deliverables – Draft Coastal Feature Line and Frontages, and Draft Historic Coastal Change Assessment Data, Draft Manmade Coastal Defence Data	4 Weeks (up to 2 Coastal Cells)

Deliverable	Review Period
	6 Weeks (greater than 2 Coastal Cells)
	4 Weeks (up to 2 Coastal Cells)
Draft Coastal Erosion Hazard Mapping and Reports	6 Weeks (greater than 2 Coastal Cells)
	2 Weeks (up to 2 Coastal Cells)
Final Coastal Erosion Hazard Mapping and Reports	4 Weeks (greater than 2 Coastal Cells)

1.5.2.2 Pathfinder and NCEHM Integrated Spatial Model

As part of the NCEHM Project, the Consultant shall develop an NCEHM Integrated Spatial Model which will automate many, but not all, components of the assessment and spatial mapping required by the NCEHM Project. The purpose of the NCEHM Integrated Spatial Model is to realise efficiencies in delivery, ensure consistency, and enable means for coastal erosion hazard mapping to be reviewed and updated efficiently by the OPW in the future. The Integrated Spatial Model shall specifically perform the following components of the assessment:

- Future Coastal Change Assessment (Section 6 of the CEHM TMN)
- Manmade Coastal Defences Assessment (excluding the assignment of the Defence Condition and Performance Standard) (Section 7 of the CEHM TMN)
- Combining Recession and Defence Timelines (Section 8 of the CEHM TMN)
- Mapping Outputs (Section 9 of the CEHM TMN)

The NCEHM Integrated Spatial Model shall not perform the creation of the Coastal Feature Line and Frontages (Section 4 of the CEHM TMN) or the Historic Coastal Change Assessment (Section 5 of the CEHM TMN). These elements will instead be undertaken by the Consultant, independently of the NCEHM Integrated Spatial Model, and the outputs will be required inputs to the NCEHM Integrated Spatial Model.

To help facilitate the creation of the NCEHM Integrated Spatial Model, and to demonstrate a robust understanding of the CEHM TMN and the scope of services, the Consultant shall also accelerate the delivery of a “pathfinder” length of coastline (see Section 3.2 for further detail).

1.5.2.3 Programme Constraints

It should be noted that certain datasets are still in the process of being developed by the OPW or other external parties and will not be available until after Contract Award. These are summarised below:

- New OPW oblique imagery has been commissioned and shall be provided by the end of March 2027 (see Section 2.4 for further details).
- GSI vegetation lines are currently being manually digitised and shall be provided by the end of June 2027, with earlier delivery for certain counties (see Section 2.4 for further details).

The NCEHM Project programme shall align with these identified programme constraints and, as far as possible, incorporate additional flexibility to accommodate any delay in the receipt of this data. The Consultant shall proactively manage the programme and liaise with the OPW on the same to minimise the impact of any potential delays in the receipt of data on the overall programme as far as possible.

The Consultant shall set out the sequencing of the project tasks and deliverables in the programme and present the programme in PDF format. The programme shall clearly set out all timelines and dates for all activities, along with the critical path. The programme shall be reviewed monthly, showing all amendments, revisions and slippage relative to both the programme approved by the Client at the Commencement meeting (Section 1.5.2) and the previous version submitted. The programme will be a key element of the Project Management services.

2 PROJECT MANAGEMENT

2.1 GENERAL MANAGEMENT

2.1.1 STEERING GROUP MEETINGS

Steering Group (progress) meetings will be attended by all members of the Steering Group and other key stakeholders as deemed necessary by the Client. The Commencement meeting shall be held within two weeks of appointment.

Most Steering Group meetings shall be held via video conferencing, with screen sharing technology, every **four weeks**. Every third Steering Group meeting shall be held in person at the OPW office at 1 George's Quay, Dublin. At a minimum, the Consultant's Project Manager and the technical lead at the relevant project stage shall attend Steering Group meetings.

The Consultant shall organise and minute Steering Group meetings with a draft agenda to be provided not less than **two working days** prior to each meeting and draft minutes to be provided not more than **five working days** following each meeting. The Consultant shall provide a monthly progress report and updated programme a minimum of **five working days** prior to each Steering Group meeting. The progress report shall outline progress achieved in the month prior, potential delays and planned work for the month ahead (see also Section 2.1.3).

2.1.2 TECHNICAL ADVISORY GROUP MEETINGS

Technical Advisory Group meetings will be attended by relevant technical staff from within the OPW and Consultant Project team. The Consultant shall assign a minimum of three representatives (including the Project Manager) to attend each Technical Advisory Group (TAG) meeting. These representatives may change over the course of the NCEHM Project, depending on the issues being discussed and the stage of the project. Additional technical staff from the Client, and key stakeholders invited by the Client, may also attend TAG meetings on an as-needed basis.

TAG meetings shall be arranged on an as required basis, to discuss and resolve key technical issues that arise during the project. TAG meetings can be called by the Client, or requested by the Consultant. The Consultant shall assume TAG meetings are held every eight weeks for the duration of the NCEHM Project. This is in addition to the Steering Group meetings and Technical Workshops detailed in Sections 2.1.1 and 2.1.5 respectively.

TAG meetings shall be held via video conferencing, with screen sharing technology, unless they are scheduled on the same day as the in person Steering Group meetings (at the OPW office at 1 George's Quay, Dublin). In these circumstances, TAG members who sit on the Steering Group shall attend in person. Dial in will be made available for TAG members who do not sit on the Steering Group (and are therefore not required to attend in person).

The Consultant shall organise and minute TAG meetings with a draft agenda to be provided not less than **two working days** prior to each meeting and draft minutes to be provided not more than **three working days** following each meeting. The Consultant shall provide an issue log and any relevant presentation material and papers a minimum of **five working days** prior to each Technical Advisory Group meeting outlining issues identified for discussion, the

potential impact, possible options to reduce the impact of or resolve the issue and potential opportunities for added benefit arising.

2.1.3 PROGRESS REPORT

Monthly progress reports shall be produced by the Consultant and will include all technical and managerial aspects of the NCEHM Project. The progress reports shall outline the work undertaken during the period since the previous progress report was submitted, and the planned work for the upcoming period. The progress report shall highlight critical dates for delivery of information, decisions or other inputs from the Steering Group, Technical Advisory Group, or other parties.

Each progress report shall include:

- Progress in the previous reporting period;
- Planned work for the upcoming reporting period;
- Key deliverables and milestones for the next three months, including any required input from the SG, TAG, or other parties;
- A summary of key issues and risks encountered or foreseen and their impact / potential impact on the NCEHM Project;
- A summary of any significant delays (> 1 week) to tasks and activities identified in the Project Programme;

Each Progress Report shall be accompanied by up-to-date versions, highlighting any changes made since the previous version, of the following documents:

- Project Programme, including a clear indication of all critical path tasks;
- Project Risk Register (a document setting out risks to the success of the NCEHM Project in meeting the defined objectives on time, along with indicators of likelihood, consequence and risk, proposed or enacted mitigation measures, and who is responsible for managing the risk);
- Issues and Decisions Log (see Section 2.1.8)
- Data Register (shall include all relevant data identified with a brief description, data owners, responsibility and required date for collection, etc.);

In addition to the monthly progress report, a separate Finance Report shall be issued solely to the Client. This report shall include, but not be limited to, expenditure, invoices, change orders, forecasts, and other relevant financial data.

2.1.4 STAKEHOLDER ENGAGEMENT

Coastal local authorities in Ireland have a critical role to play in the NCEHM Project, including sharing local knowledge and information, providing relevant data to support the assessment, and reviewing project outputs.

A number of staff from the coastal local authorities will be invited to sit on the SG and TAG. However, it is not envisaged that the SG or TAG will be used for observations and review of individual frontages or coastal cells, for example. As such, all coastal local authorities will not be represented on the SG and TAG.

That aside, it is essential that the Consultant engages effectively with coastal local authorities and this shall be undertaken through the following means:

- A Stakeholder Engagement Plan shall be developed by the Consultant and approved by the SG;
- The OPW shall develop a web-based portal (the OPW NCEHM Consultation Portal) to enable the review of all spatial data (including data attribution) produced by the NCEHM Project by the coastal local authorities;
- A series of technical workshops (Section 2.1.5), to be held in-person but with video conferencing facilities for remote access, if needed, shall be held at key milestones on the NCEHM Project.

For information, the OPW anticipate holding a quarterly progress update call with relevant coastal local authorities. The Consultant is not required to attend these calls.

2.1.5 TECHNICAL WORKSHOP(S)

The Consultant shall organise and minute a series of technical workshops as part of the NCEHM Project to ensure effective stakeholder engagement with the SG, TAG, and coastal local authorities. The technical workshops are outlined in Table 2-1.

Table 2-1 Technical Workshop Requirements

Workshop Name	Attendees	Location	Duration (days)	Notes
Integrated Spatial Model 1	TAG	Remote	0.5	Following Submission of draft CEHM Integrated Spatial Model Methodology Statement
Integrated Spatial Model 2	TAG	Remote	0.5	Following Submission of draft CEHM Integrated Spatial Model
Coastal Feature Line and Frontages	TAG	1GQ	1	Following submission of the draft Coastal Feature Line and Frontages. Data to be uploaded on consultation portal following workshop
Historic Coastal Change Assessment	TAG and Local Authorities	In Person at four regional locations	1 day each	Following submission of the draft Historic Coastal Change Assessment and upload onto consultation portal ¹
Manmade Coastal Defence Assessment	TAG and Local Authorities	Remote (4 Nr)	1 day each	Following submission of the draft Manmade Coastal Defences data (including Asset Condition and Performance Standard) and upload onto consultation portal ¹

Workshop Name		Attendees	Location	Duration (days)	Notes
Draft Erosion Mapping	Coastal Hazard	TAG and Local Authorities	In Person at four regional locations	1 day each	Following submission of the draft Coastal Erosion Hazard Mapping and upload onto consultation portal ¹
Final Erosion Mapping ²	Coastal Hazard	TAG and Local Authorities	Hybrid (In Person and Remote) at a centralised location	1 day	Following submission of the Final Coastal Erosion Hazard Mapping and upload onto consultation portal ¹

¹Where technical workshop follows upload of data onto consultation portal, technical workshops must be held no sooner than two weeks after the corresponding data is uploaded

²Consultant required to attend in person for hybrid meeting.

The purpose of the technical workshops is to ensure a timely discussion on the associated material in each case, raising awareness of and inviting comments on the assessment undertaken, the suitability and limitations of the assessment undertaken, and the adequacy and accuracy of the outcomes.

The deliverable to which the technical workshop (e.g. the draft ISM, the draft CEHM, etc) relates shall be issued not less than **ten working days** prior to the technical workshop. Any additional material (e.g. presentation slides, etc) to be presented by the Consultant in the technical workshop shall be issued not less than **five working days** prior to the technical workshop and minutes will be provided not more than **five working days** following each technical workshop.

2.1.6 SITE VISITS

There is no requirement for the Consultant to undertake site visits as part of the NCEHM Project. If this is deemed necessary or beneficial by the Client or the Consultant, to acquire additional knowledge or data on site-specific areas of particular complexity or where there is a lack of available data or a lack of confidence in the available data, the Client shall instruct and approve the change in advance.

2.1.7 TEAM CHANGES

The Consultant will notify the Client in advance of any intended changes to core members of their team (those named in the tender submission) to the Client, and shall furnish the Client with CVs of suggested replacement members for examination. The Client shall communicate approval or otherwise to the Consultant within **five working days** of receipt of the notice of intent to change.

2.1.8 ISSUES AND DECISIONS LOG

The Consultant is required to produce and maintain a log of issues and decisions for the duration of the NCEHM Project, issued with the Progress Report in advance of Steering Group meetings and kept live during the NCEHM Project.

The purpose of the issues and decisions log is to foster collaborative working and reduce the risk of abortive work. The issues and decisions log shall include:

- Unique identifier for each issue;
- Date the issue was raised;
- Who the issue was raised by and the source (meeting, email, etc);
- Description of the issue;
- Priority (High, Medium, or Low);
- Description of potential impact on cost, programme, and quality;
- If the issue should be included in the Project Risk Register;
- Any discussion, action, decision required;
- The need for discussion at SG or TAG level or in another forum;
- Summary and date of progress / decision made;
- Status (Open or Closed).

2.1.9 PROJECT RISK REGISTER

The Consultant is required to produce and maintain a project risk register for the duration of the NCEHM Project, issued with the Progress Report in advance of Steering Group meetings and kept live during the NCEHM Project.

The purpose of this is to maintain a register of risks encountered or foreseen over the course of the NCEHM Project. Project risks will typically graduate from the Issues and Decisions Log if they cannot be managed or mitigated without an impact on project programme, cost, or quality – and if the likelihood or scale of that impact meet the threshold defined by the Steering Group.

Project risks shall be discussed at the Steering Group meetings, prioritised according to their actual or potential likelihood of occurrence and impact. All project risks in the register must include details of the ownership of the risk, likelihood of occurrence and a quantifiable assessment of their impact on cost (in euro) or programme (in days) where relevant.

It is acceptable for the project risk register and issue and decisions log to be merged into a single document, subject to prior approval of the proposed template by the Client.

2.2 SAFETY, HEALTH AND WELFARE

2.2.1 GENERAL AND LEGAL OBLIGATIONS

Full compliance with the requirements of the Safety, Health and Welfare at Work Act 2005, and its revisions, and with all other safety, health and welfare legislation, regulations, codes of practice and standards, and their revisions, is required from all parties (including sub-consultants, specialists and contractors) involved in the NCEHM Project.

The Consultant shall advise the Client on any matters of Health and Safety, particularly in relation to current law, which may have implications for the Client, or require action by, or on behalf of, the Client in connection with the NCEHM Project.

If site visits are deemed necessary or beneficial by the Client or the Consultant, to acquire additional knowledge or data on site-specific areas of particular complexity or where there is a lack of available data, appropriate health and safety documentation shall be prepared and submitted for review in advance.

2.2.2 DUTY OF DESIGNERS

The NCEHM Project is not a design project, therefore PSDP/Designer duties are not required.

2.3 REPORTING STANDARDS AND QUALITY ASSESSMENT

2.3.1 REPORTING STANDARDS AND FORMATS

All reports, draft and final, submitted to the Client by the Consultant shall be written in an appropriate technical manner, be detailed and clear, and laid out in a logical structure.

The Consultant shall check and proof-read all material prior to submission to eliminate any technical, grammatical or typographical errors. Reports and deliverables shall:

- Provide full and comprehensive descriptions of topics covered.

- Detail any assumptions made, including the requirement for the assumption and the justification for the assumption made.
- Support any statements made with relevant discussion and justification.
- Provide (in appendices) all data, maps and information pertinent to the topics covered.
- Provide clear references (via footnotes or other) the first time a key concept, equation or fact is introduced.

The Consultant shall provide all reports and other documentation in both the editable file format and a PDF-compatible print-ready format.

2.3.2 PROJECT DATA GENERATION

In addition to reporting, the NCEHM Project will require collation and storage of data and/or other digital information on the assessment undertaken during, and the findings of, the NCEHM Project. All data generated during the NCEHM Project shall be provided to the Client upon request and in a complete, organised format upon completion of the NCEHM Project.

The Consultant shall provide all spatial datasets with associated metadata in conformity with the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0.

2.4 DATA PROVISION

Upon Commencement of the NCEHM Project, the Consultant shall establish, and subsequently maintain throughout the NCEHM Project, a Data Register that shall identify any information, data, reports or other items (such as those noted herein) that are relevant to the NCEHM Project, and shall record relevant metadata, dates of request and provision, etc.

2.4.1 DATA TO BE PROVIDED BY THE CLIENT

All datasets to be provided by the Client at or after Contract Award are listed in Appendix 1, along with current release dates. Appendix 1 details the status, file type, spatial type and key attributes.

The OPW will digitise and provide a spatial dataset which can be used to help identify the seaward edge of the terrestrial vegetation, based on the ortho-rectified aerial imagery that was captured as part of the OPW Coastal Aerial LiDAR and Imagery Survey (CALS) project. This shall be used as an initial Back of Beach, representing the Coastal Feature Line, for soft non-cliffed coasts. The spatial data has been produced using automated methods and will be subject to review and refinement by the Consultant as part of the NCEHM Project. This data will be provided on Contract Award.

It should be noted that certain datasets are still in the process of being developed by the OPW or other external parties and will not be available until after Contract Award. Section 2.4.1.1 to Section 2.4.1.2 below provides details of these datasets.

2.4.1.1 GSI Vegetation Lines

GSI are manually digitising the historic vegetation line (Back of Beach) for all soft coasts based on available Tailte Éireann vertical aerial imagery between 2000 and 2021 (inclusive) depending on location. Whilst digitisation is complete for all counties from County Wicklow clockwise to County Waterford (inclusive) and will be issued at Contract Award, the digitisation is not yet complete for all counties from County Cork clockwise to County Donegal (inclusive).

It is anticipated that the GSI Vegetation Lines for County Cork to County Donegal (inclusive) will be made available for use on the NCEHM Project as follows:

- End of March 2027: Counties Clare, Kerry, and Sligo
- End of June 2027: Counties Cork, Donegal, Mayo, Galway and Leitrim

These vegetation lines shall be used to:

- Develop the Coastal Feature Line and Frontages;
- Undertake the Historic Coastal Change Assessment for all soft coasts.

This data is not publically available and will be provided by the Client directly when available.

2.4.1.2 OPW Oblique Imagery

A new, high-resolution oblique imagery survey of the entire coast of Ireland has been commissioned by the OPW. It is anticipated that oblique imagery will be made available for use on the NCEHM Project in March 2027. This oblique imagery shall be used to:

- Identify new (and review existing) manmade coastal defences;
- Assess the condition of all manmade coastal defences and support the assessment of performance standard of all manmade coastal defences;
- Support the Historic Coastal Change Assessment for all hard, cliffed coasts.

While the imagery will capture the majority of the study area of the NCEHM Project, a minority of locations will not be covered by the survey. The spatial coverage of the oblique imagery survey can be viewed using shapefile '2509_SHP_ObliqueImagerySurveyExtent_1.0' provided with this Requirements and Specification document (see Appendix 1).

2.4.2 EXISTING COASTAL EROSION RISK MANAGEMENT STUDIES

A number of additional site-specific studies have been carried out at various locations along Ireland's coastline in past years.

A list of known, existing Coastal Erosion Risk Management Studies which have been commissioned and completed (or substantially completed) by local authorities is provided in Appendix 3. The studies will be made available to the Consultant following Contract Award, for use on the NCEHM Project, for information, by each of the relevant local authorities.

2.4.3 TAILTE ÉIREANN MAP INFORMATION

Tailte Éireann (TE) datasets will be made available to the Consultant, at the scales and formats for which the OPW holds a licence for upon Commencement of the NCEHM Project. Datasets include National Aerial Imagery (1995-2023); high-resolution base maps, and boundary data; which are delivered in WMS text format upon submission of a National Mapping Agreement (2017) request form.

In the event individual tiles (rather than mosaics) are required, these can be provided by the OPW on request at Contract Award. The Consultant shall display the TE licence and disclaimers on all maps and materials that incorporate TE data.

3 SCOPE OF SERVICES

The Consultant shall undertake such studies, analysis, assessments and other work as necessary to meet the Project Objectives (Section 1.3) in accordance with the CEHM TMN and this Requirements and Specification document.

The scope of services set out in the following sections shall supplement the detail contained within the CEHM TMN, and includes detail of any services required by the NCEHM Project which are not contained within the CEHM TMN.

Should any technical issue be encountered which is not fully covered by the CEHM TMN or this Requirements and Specification document, the Consultant shall raise the technical issue identified via the issues and decisions log (Section 2.1.8) and the TAG (Section 2.1.2).

3.1 NCEHM INTEGRATED SPATIAL MODEL

As part of the NCEHM Project, the Consultant shall develop an NCEHM Integrated Spatial Model (ISM) which will automate many, but not all, components of the assessment and spatial mapping required by the NCEHM Project. The purpose of the ISM is to realise efficiencies in delivery, ensure consistency, and enable means for coastal erosion hazard mapping to be reviewed and updated efficiently by the OPW in the future.

For the avoidance of doubt, all IPR title and interest in the ISM itself and all reports, data manuals and/or other materials related to the ISM, produced for the purposes of the NCEHM Project, shall vest in the Client. The Client will grant the Consultant a non-exclusive, perpetual, irrevocable, royalty free licence to use the ISM.

The functions and analysis to be performed by the Integrated Spatial Model that shall be developed by the Consultant are shown in Figure 3-1. Outputs shall be delivered in compliance with the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0.

The concept is summarised as below:

- a) The Consultant shall develop the Coastal Feature Line and Frontages (Section 3.4) and the Manmade Coastal Defences (Section 3.7.4) spatial data, in accordance with the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0, independently of the ISM. This shall include all necessary technical assessment and analysis to populate the required data attributes;
- b) The Consultant shall undertake the Historic Coastal Change Assessment (Section 3.5) independently of the ISM;
- c) On completion of (a) and (b), the associated outputs will be used as inputs to the ISM, alongside the other necessary existing and available data to perform the assessments. An appropriate user interface will be designed and constructed to improve this functionality;
- d) The ISM will then perform the Future Coastal Change Assessment, the remaining elements of the Manmade Coastal Defence Assessment (not covered by (a)), and generate the Combined Future Coastal Change Timelines in a fully automated manner;

- e) The ISM will then generate Coastal Erosion Hazard Mapping outputs, in accordance with the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0, together with all the underlying data, any updated spatial data, and a short Non-Technical Summary (pdf/xlsx) downloadable for each individual frontage.

The ISM shall be comprised of modular components, rather than a single system. Each modular component shall be capable of being updated independently of the other modular components. For example, the validation of all data inputs may sit in one modular component, which would be independent of a modular component which performs the Manmade Coastal Defence assessment, and so on. Proposed modular components are to be set out within the methodology statement (see Section 3.1.1).

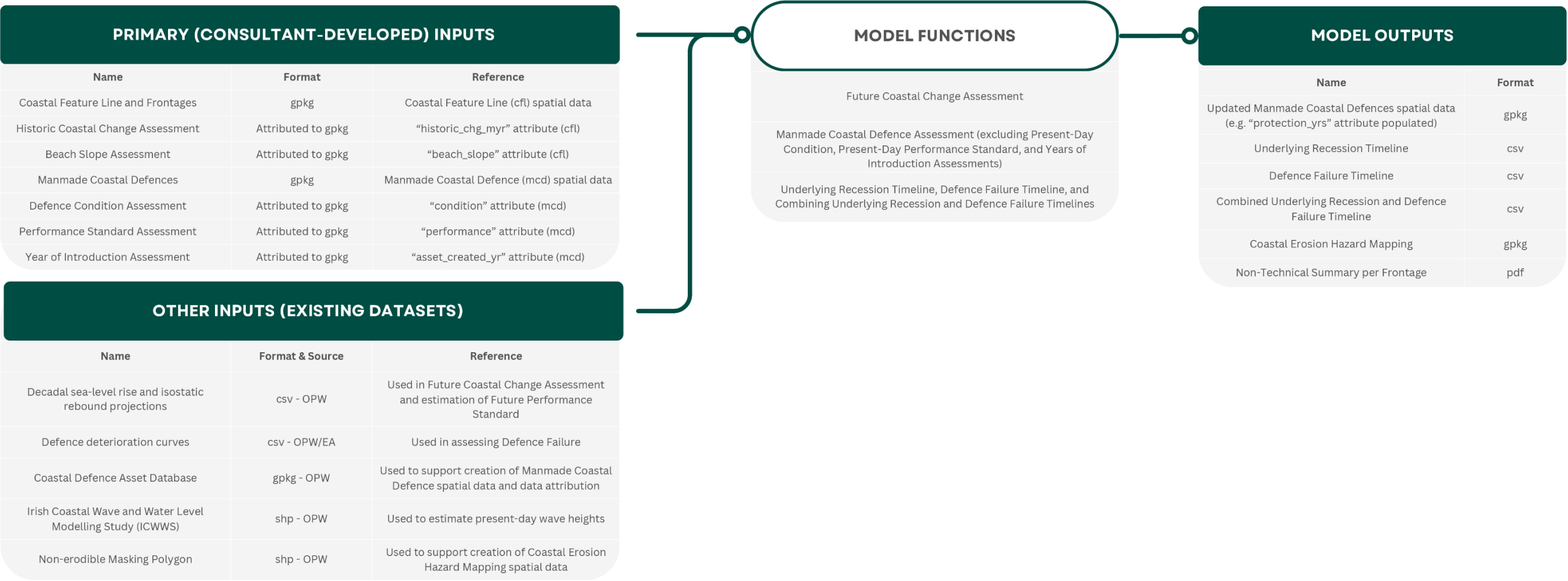


Figure 3-1 Wireflow diagram illustrating concept functionality of NCEHM ISM

3.1.1 METHODOLOGY STATEMENT

The Consultant shall, in advance of any work on the NCEHM Integrated Spatial Model, submit a draft Methodology Statement for review and approval. Work on the ISM cannot commence until the Methodology Statement has been approved by the Client. The Methodology Statement shall include:

- Details of the technology stack the Consultant proposes to use for the ISM, including justification for the proposal, confirmation that the development team has the appropriate competencies (e.g. if using FME, FME Certified Professional team members would be anticipated) and experience, and any software and software licence requirements necessary for future operation and maintenance;
- Details of the software architecture the Consultant proposes to use for the ISM including software frameworks, software components, module components, programming languages, processing modules, data flow, interfaces between software and module components, configuration files, and deployment architecture;
- Details of possible online platforms the Consultant proposes to use to host the ISM as an alternative/secondary option;
- Confirmation of all required inputs to the ISM, including the data source and format in each case;
- A schematic illustrating the proposal as to how the ISM would operate to meet the requirements of this Scope of Services;
- A concept proposal for the user interface of the ISM, covering both the functionality of the user interface (in relation to future maintenance and how it interacts with configuration files and processing modules) and the user interaction (in relation to setting up and running the ISM and the user experience);
- Confirmation of all outputs the Consultant proposes to be produced by the ISM, including the format in each case;
- Details of how the Consultant proposes to store, access, and manage input and output data within the ISM
- Confirmation of what testing, quality control, and review will take place during ISM development;
- Details of all quality control checks the Consultant proposes to embed within the ISM for the operational phase.
- Details of how the Consultant proposes the ISM to be maintained and/or updated in line with systems/software updates on which it relies e.g. QGIS updates/changes into the future (should it rely on QGIS);
- Details of the proposed operation and maintenance documentation (see also Section 3.1.4) to be issued to the Client with the completed ISM, including format and content.

3.1.2 ACCEPTABLE SOFTWARE ARCHITECTURE

The Consultant shall develop the ISM in compliance with the following requirements with regard to the technology stack and software architecture:

- (a) Where technically feasible and appropriate, the preference is to use mature and well-supported open-source technologies, libraries, and databases;
- (b) Where common open-source frameworks and libraries are suitable, preference shall be given to established and widely adopted technologies including, where appropriate:
 - Use of standard user interface frameworks (e.g. Bootstrap);
 - Relational databases (e.g. PostgreSQL / PostGIS);
 - Server-side application frameworks (e.g. Django).
- (c) Dependence on infrastructure, accounts, or services owned or managed by the Consultant shall be avoided;
- (d) Dependencies between software components shall be minimised where possible;
- (e) Dependence on a particular framework or software architecture shall be avoided where equivalent technologies could reasonably be substituted;
- (f) Proprietary databases shall be avoided;
- (g) Preference shall be given to the following technologies where technology is interchangeable:
 - PostgreSQL / PostGIS
 - Python
 - QGIS
 - FME
 - GDAL / OGR

3.1.3 USER TRAINING AND GUIDANCE

The Consultant shall provide a user guide and demonstration video alongside a sample input data package ('test dataset') to be used for training purposes. The user guide shall include:

- A description of the model development including a wireflow diagram or similar to illustrate the model functionality;
- Standard operating procedures (including installation in an OPW-controlled environment);
- Details of the technical, computational and software requirements for the model to operate effectively;
- An annotated user interface with clear description of what the user can and cannot do, and what input data is acceptable for each user defined field;
- A step-by-step guide to producing coastal erosion hazard mapping using the ISM;
- Details of common issues and troubleshooting scenarios including a description of each issue and in-text examples of solutions.
- A frequently asked questions section related to the operability and usability of the ISM;

The Consultant will lead a remote training session for OPW staff following approval of the ISM. In advance of this training session, the Consultant shall demonstrate and support the

successful installation of the ISM within an OPW-controlled environment (see also Section 3.1.6 (a)) including User Acceptance Testing.

As part of this process, and as evidenced within the training session, the Client shall be able to generate identical outputs to the Consultant using the test dataset in an OPW-controlled environment.

3.1.4 OPERATION AND MAINTENANCE DOCUMENTATION

The Consultant shall develop and deliver operation and maintenance documentation alongside the ISM. The operation and maintenance documentation shall include where relevant, and not necessarily limited to:

- Complete source code;
- Commented code;
- Project structure;
- Dependencies;
- Build instructions;
- Installation instructions (including software dependencies and supported software versions);
- Version history (software, methodology, configuration, datasets);
- Software design document;
- System architecture document;
- Methodological documentation;
- Data flow diagrams;
- Module descriptions;
- Configuration guide (including configuration files);
- Developer guide;
- Deployment guide;
- Validation reports;
- Data model specification;
- Operational data management guide;
- Update procedures (including specific update requirements following software upgrades);
- Migration procedures.

If a web-hosted solution is utilised for any part of the ISM, the Consultant shall arrange full transfer of the associated hosting environment, configuration, databases, deployment scripts, documentation and operational control to the Client.

The ISM, operation and maintenance documentation, and any associated technical documentation, shall be developed for a suitably qualified professional not directly involved in the development of the ISM to be capable of maintenance of, and comprehensive updates to, the ISM.

3.1.5 INPUTS TO THE ISM

The Consultant shall create, test and run an ISM that can generate coastal erosion hazard mapping and other related outputs (see Figure 3-1), based on defined input data and through a standardised user interface. It is envisaged that the ISM shall have a combination of existing available input data and consultant-developed input data as input components (Figure 3-1):

- A. Existing available input data is typically formatted as lookup tables (.csv) and spatial data (.gpkg or .shp), with standardised data used in the assessment;
- B. Consultant-developed input data is typically spatial data (.gpkg), including data attribution, created during the Coastal Feature Line and Frontages and Historic Coastal Change Assessment stages (e.g. coastal feature line and manmade coastal defences) which precede the ISM.

The ISM must incorporate a user interface designed to allow intuitive and efficient user interaction with the ISM alongside the functional requirements to perform the assessment (e.g. reading in and writing out datasets and outputs). In particular, this user interface must guide the user through the set up of model runs with step-by-step instructions and explanatory notes on the user entry fields. Where appropriate, user entry fields shall be locked down to valid entries only (e.g. coastal cell selection, management approach selection) and shall include embedded file format checks or similar to notify users if an invalid external configuration file has been selected as an input (e.g. coastal feature line, manmade coastal defences).

3.1.6 SPECIFIC OPERATIONAL REQUIREMENTS

The ISM shall be capable of, but not be limited to, performing the below specific operational requirements:

- (a) The ISM must be stable under all model runs, and operate effectively with reasonable processing times, when using devices with the following specifications:
 - i. Intel(R) Core(TM) i7-10610U CPU @ 1.80GHz (2.30 GHz) Processor
 - ii. 32.0 GB Installed RAM
 - iii. 64-bit operating system, x64-based processor
 - iv. Windows 11 Pro
- (b) The ISM must be compatible with recent and supported versions of the required software platforms, and must remain compatible with and operational following software updates;
- (c) The ISM must be able to undertake the assessment and mapping for an individual frontage cell, multiple frontage cells, an individual coastal sub-cell, multiple coastal sub-cells, an individual coastal cell, or for the entire coastline;
- (d) The ISM must be able to undertake the assessment and mapping for one or multiple management approaches and climate change timelines for the chosen coastline as a single run (e.g. batch mode);
- (e) The ISM must automatically generate coastal erosion hazard mapping outputs which are compliant with the CEHM Spatial Data Specification;
- (f) The ISM must handle any subdivision of data for processing automatically including boundary management, recombination of outputs following subdivision, and any resolution of unintended gaps, overlaps, or duplicate features;

- (g) The ISM must automatically generate updated manmade coastal defence outputs which are compliant with the CEHM Spatial Data Specification (including automated population of the “protection_yrs” attribute);
- (h) The ISM must retain and document any key intermediate outputs generated by the ISM for each model run (to assist with troubleshooting);
- (i) The ISM must have built in, automated quality control procedures to ensure the quality of the outputs and automatically generate a Quality Control report on the checks completed, issues found, summary table, and possible irregularities associated with the outputs (i.e. abnormally high erosion rates, distances);
- (j) The ISM must automatically generate key information for each model run (including Run ID, date and time, user, input data, and version history) and store these with the ISM Outputs and Quality Control report;
- (k) The ISM, if issues are found during model set up and model runs, should provide a clear description of the issue, an example of its occurrence, and a potential solution(s) within the interface. These shall be captured and recorded automatically within the ISM in an Error and Warning Log.

3.1.7 OUTPUTS OF THE ISM

The ISM developed shall be able to automatically generate the following outputs:

- Coastal Erosion Hazard Mapping spatial data, in accordance with the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0;
- Updated Manmade Coastal Defences spatial data, in accordance with the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0;
- Underlying Recession Timelines, Defence Failure Timelines, and Combined Future Coastal Change Timelines (both the underlying cumulative recession by year data and a standardised graphical representation);
- A short Non-Technical Summary (pdf) downloadable for each individual frontage (summarising key assessment details and outputs).

3.1.8 TESTING AND VALIDATION

The Consultant shall perform all necessary software testing and ISM validation / verification to ensure the ISM is working effectively, including all modular components in isolation as required.

Testing and validation shall include, but may not be limited to:

- Developing benchmark outputs independently of the ISM, using the test dataset, to verify ISM outputs generated from the test dataset;
- Undertaking additional ISM verification by amending the test dataset and data attributes to verify that the revised ISM outputs are consistent with the amendments made to the test dataset.
- Verifying that the ISM is able to identify and manage errors in the input data (e.g. incompatible input data and data attributes);
- Documenting all regression testing procedures undertaken;

- Provision of Quality Control and Validation Reports.

3.1.9 FUTURE UPDATES TO INPUT DATA AND ASSESSMENT METHODOLOGY

It is reasonable to foresee that, in the future, following completion of the NCEHM Project, amended or new input datasets may be available, or updates to the existing CEHM TMN may be proposed, or amendments to the required outputs made, that necessitate the need to update the NCEHM Integrated Spatial Model.

To ensure usefulness and reduce maintenance requirements:

- (a) The ISM shall be comprised of modular components, rather than a single system;
- (b) Input data to the ISM (see also Figure 3-1 and Section 3.1.3) shall be configurable as external configuration files or lookup tables;
- (c) The user guide (see Section 3.2) shall set out, conceptually, how future updates to input data, assessment methodology, and outputs shall be implemented and how workflows shall be maintained;
- (d) Outputs of the ISM shall be designed to ensure future updates to the CEHM Spatial Data Specification or reporting templates do not necessitate significant redevelopment of the ISM.
- (e) The regression testing procedures undertaken, including relevant documentation including Quality Control and Validation Reports, shall be sufficient to ensure these can be repeated to ensure the ISM continues to perform effectively following future software updates.

3.2 PATHFINDER COASTLINE

To help facilitate the creation of the NCEHM Integrated Spatial Model, and to demonstrate a robust understanding of the CEHM TMN and the scope of services, the Consultant shall also accelerate the delivery of a “pathfinder” length of coastline. The Consultant shall review available data and identify a length of coastline to act as the “pathfinder”. This proposal will subsequently be reviewed by the Client and work on the pathfinder may commence following Client approval of the proposed length.

The pathfinder coastline shall meet the following requirements:

- Pathfinder must be a minimum of 25 kilometres in length;
- Pathfinder must include hard and soft frontages;
- Pathfinder must include frontages protected by manmade coastal defences;
- Pathfinder will preferably be continuous and be one or more complete coastal sub-cell(s).

It should be noted that, as GSI Vegetation Lines are only available for County Wicklow, County Wexford, and County Waterford at Contract Award (Section 2.4.1.1), the pathfinder coastline must be located within those locations.

The Consultant shall deliver the draft and final Coastal Erosion Hazard Mapping, including all associated data (e.g. Coastal Feature Line, Historic Coastal Change Assessment, Manmade Coastal Defences) for the pathfinder coastline in line with the timescales set out in Section 1.5.2.

3.3 DATA COLLECTION AND REVIEW

It is the Consultant's responsibility to identify, collect and log all relevant reports, data or information. The Consultant shall keep the Data Register live and up-to-date for the duration of the NCEHM Project.

The Consultant shall satisfy themselves as to the quality, relevance and appropriate use (or otherwise) of data promptly upon receipt of any reports, data or information.

3.3.1 RELEVANT DATASETS

All datasets listed in **Appendix 1** will be made available to the consultant by the Client at or after Contract Award (see 'Status' column in **Appendix 1**). The Consultant shall be responsible for the data collection for those datasets listed in **Appendix 2**. The OPW shall support the Consultant, where necessary, in providing access to datasets in **Appendix 2**. The Consultant shall identify and review the suitability and accuracy of all potentially relevant datasets, including, but not limited to, those provided in **Appendix 1 and 2**.

It is the responsibility of the Consultant to identify, request, and review additional datasets to those listed in **Appendix 1 and 2** that may aid the NCEHM Project. Any third-party costs associated with the purchase of such data shall, subject to prior agreement, be paid for by the Client.

The level of detail of the data capture and derivation to be undertaken under this NCEHM Project should be sufficient to meet the project objectives and achieve the requirements of the NCEHM Project as set out herein.

3.3.1.1 LiDAR Data

In 2021, the OPW commissioned a Coastal Aerial LiDAR and Imagery Survey (CALS) project, to gather high resolution LiDAR and aerial imagery for the whole coast of Ireland.

Digital Terrain Models (DTM) and Digital Surface Models (DSM) are available nationally at 0.25m, 0.5m, 1m, 2m and 5m horizontal resolutions. For the purpose of this project, DTM data will be provided in the ITM coordinate reference system in 0.25m and 1m horizontal resolutions.

3.4 COASTAL FEATURE LINE AND FRONTAGES

The Consultant shall develop the Coastal Feature Line for the study area in accordance with Section 4 (and other sections as relevant) of the CEHM TMN. The Coastal Feature Line shall be split into Frontages in accordance with the CEHM TMN

As part of this work, the Consultant shall be required to perform the following tasks:

- Create the Coastal Feature Line spatial data (geopackage), in line with the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0, including classification of the coast to inform the required data attribution and subsequent splitting into frontages;
- Create the Manmade Coastal Defences spatial data (geopackage), in line with the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0, including a review of the provided data extracted from the OPW Coastal Defence Asset Database against the provided new oblique imagery survey, to (a) identify additional manmade coastal defences or (b) amend the spatial extent or details of manmade coastal defences that have been identified;

- Spatially identify the coastal sub-cells within each identified coastal cell, and assign a coastal sub-cell code to each coastal sub-cell in accordance with the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0;
- Review the frontages following the Historic Coastal Change Assessment and, if necessary, further sub-divide or merge frontages to reflect the findings of the Historic Coastal Change Assessment.

The Client shall review and approve the Coastal Feature Line and Frontages in advance of the Historic Coastal Change Assessment commencing.

3.4.1 UNDERSTANDING OF COASTAL PROCESSES

When identifying the coastal sub-cells, the Consultant shall identify and evaluate the key coastal features and landforms present and assess the coastal processes and forcing conditions affecting each identified coastal sub-cell. The Consultant shall prepare a one-page summary describing the features and processes associated with each sub-cell alongside an overview map spatially identifying key sediment sources, sinks, and pathways within each sub-cell. Any coastal processes and forcing conditions that cross multiple coastal sub-cells, or influence the wider coastal cell, shall also be detailed.

3.5 HISTORIC COASTAL CHANGE ASSESSMENT

The Consultant shall undertake the Historic Coastal Change Assessment for the study area in accordance with Section 5 (and other sections as relevant) of the CEHM TMN. The assessment shall be undertaken on a frontage by frontage basis, with the assessment being undertaken varying depending on the topography and hardness of the frontage as outlined in the CEHM TMN. The Consultant shall undertake the Historic Coastal Change Assessment for all frontages, including those where manmade coastal defences are present.

3.5.1 DIGITAL SHORELINE ANALYSIS SYSTEM (OR SIMILAR APPROVED)

The Consultant shall use the Digital Shoreline Analysis System (DSAS), or alternative software approved by the Client, when calculating rates of historic coastal change, in line with the CEHM TMN. If generating the reference baseline or the cross-shore transects in DSAS or using alternative approved software, the Consultant shall subsequently import the generated reference baseline or cross-shore transects into a geographic information system (GIS) for review.

This review shall consider whether the reference baseline is compatible with the coastline orientation to enable calculation of historic coastal change, and shall consider whether each cross-shore transect is at a representative location given historic coastal change and the coastline orientation for the respective frontage. The reference baseline and cross-shore transects shall be amended, as necessary, prior to the calculation of historic coastal change rates being run in DSAS or alternative approved software.

Section 5.3 of the CEHM TMN provides further detail.

3.5.2 AVAILABLE LIDAR DATA FOR CLIFFED COASTS

The recent Coastal Aerial LiDAR and Imagery Survey (CALIS) as detailed in Appendix 1 represents the only LiDAR dataset provided for use in this NCEHM Project. As such, the Consultant shall not be required to compare present and historic top of cliff positions using LiDAR as set out in Section 5.7 of the CEHM TMN, however other imagery datasets can be

used to assess historic coastal change of hard, cliffed frontages (see Section 5.4 of the CEHM TMN).

3.5.3 QUALITY ASSURANCE

As part of the Historic Coastal Change Assessment, the Consultant shall make every effort to verify and quality assure the 'representative rate' selected for each frontage. The Consultant shall review records of historic coastal erosion (including those in the Past Coastal Erosion Database), anecdotal evidence, observations from desk-based assessment, media and newspaper articles, and consultation with the relevant local authorities to ensure local knowledge of historic coastal change (e.g. known coastal erosion hotspots) is captured and utilised within the assessment. The Consultant shall undertake consultation with local authorities using the OPW NCEHM Consultation Portal and through the identified Technical Workshops.

3.5.4 REVIEW OF FRONTAGES AND UNDERSTANDING OF COASTAL PROCESSES

Throughout the historic coastal change assessment, the Consultant shall review the frontages and, if necessary, further sub-divide or merge frontages to reflect the findings of the Historic Coastal Change Assessment. Any change to frontages as part of the Historic Coastal Change Assessment will not require historic coastal change rates to be recalculated, with the amendment instead being dealt with through the selection of a "representative rate" process.

During the Historic Coastal Change Assessment, the Consultant shall incorporate any knowledge and understanding of coastal processes developed which is relevant to the coastal sub-cell within the summary and overview map set out in Section 3.4.1.

3.6 FUTURE COASTAL CHANGE ASSESSMENT

The Consultant shall undertake the Future Coastal Change Assessment for the study area in accordance with Section 6 (and other sections as relevant) of the CEHM TMN. The assessment shall be undertaken on a frontage by frontage basis.

The Consultant shall undertake the Future Coastal Change Assessment for all soft coasts, regardless of whether there has been historic coastal change or not, as future coastal change can still occur even in the absence of historic coastal change.

The Consultant shall undertake the Future Coastal Change Assessment for all hard coasts where historic coastal change has been identified. In these cases, the future coastal change rate shall be assumed to equal the historic coastal change rate (as per Section 6.2 of the CEHM TMN).

The Consultant shall undertake the Future Coastal Change Assessment for all soft frontages and all hard coasts where historic coastal change has been identified, including those where manmade coastal defences are present in both cases.

Where the Future Coastal Change Assessment is undertaken for a frontage, the Consultant shall, for each assessed frontage:

- Determine the representative rate of historic coastal change (R_1) based on the Historic Coastal Change Assessment (see Section 3.5);
- Determine the Coastal Slope (C_s) through manual evaluation of available INFOMAR bathymetric data. Where INFOMAR data is not available, the Consultant shall propose

an alternative data source, methodology, or C_s value for approval by the Client with appropriate justification.

The Consultant shall calculate the future coastal change rates for each frontage, management approach, climate change timeline, and year / time period (including automated selection of the appropriate historic and future sea level rise values) using the CEHM Integrated Spatial Model (see Section 3.1).

3.7 MANMADE COASTAL DEFENCES

The Consultant shall undertake the assessment of Manmade Coastal Defences for the study area in accordance with Section 7 (and other sections as relevant) of the CEHM TMN.

The OPW shall provide nationally available data on manmade coastal defences from the recently developed OPW National Coastal Defence Asset Database which comprises of Manmade Coastal Defences that were identified in the available 2003 oblique imagery. The spatial extent of manmade coastal defences and key attributes including the type, material, and purpose, as provided with this Requirements and Specification document (Appendix 1), has been populated based on the 2003 oblique imagery and available vertical aerial imagery.

3.7.1 REVIEW AND IDENTIFICATION OF MANMADE COASTAL DEFENCES

Following the issue of new oblique imagery to the Consultant (see Section 2.4.1.2), the Consultant shall:

- Review and update the longshore (defence extents) and cross-shore (Back of Defence alignment) location and attribution of identified manmade coastal defences;
- Remove any identified manmade coastal defences which are no longer evident in the new oblique imagery;
- Add any manmade coastal defences, including data attribution, which are evident in the new oblique imagery and were not previously included in the OPW Coastal Defence Asset Database.

3.7.2 ASSET CONDITION AND PERFORMANCE STANDARD

Following, or as part of, the review and identification of manmade coastal defences, the Consultant shall assign an asset condition grade and performance standard (and other required attributes as set out in the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0), in line with Section 7 of the CEHM TMN, using the new oblique imagery and any other available imagery including photographic records where available and appropriate.

3.7.3 ESTIMATING PRESENT-DAY WAVE HEIGHTS

The Consultant shall estimate present-day wave heights, in line with Section 7.2.2 of the CEHM TMN, for four different Annual Exceedance Probability (AEP) events (listed below) using:

- National Coastal Extreme Water Levels for the 5% (1:20), 2% (1:50), 1% (1:100), and 0.5% (1:200) Annual Exceedance Probability (AEP) events;
- Mean Sea Level extracted from the Mean Sea Level to OD Malin (OSGM15) Corrective Surface developed as part of ICWWS.

ICWWS spatial data is available for the above, the Consultant may undertake this element of the assessment using semi-automated methods (an automated assessment followed by a review by suitably qualified and experienced staff) if preferred.

3.7.4 MANMADE COASTAL DEFENCE SPATIAL DATA

Following completion of the requirements of Section 3.7.1 to 3.7.3, and in advance of the assessment of defence failure, the Consultant shall produce draft Manmade Coastal Defences spatial data in line with the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0, including the necessary attribution. Data attribution for Manmade Coastal Defences includes the following attributes to be derived or assigned by the Consultant:

- Defence exposure, categorised as “Open Coast” or “Estuary / Sheltered”;
- Owner and Maintainer, to be developed in consultation with the OPW and the relevant local authority;
- Defence classification, in line with the allowable classifications set out in the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0;
- Condition Grade and Performance Standard (including Confidence score and rating as per Section 7 of the CEHM TMN);
- Year of Introduction, using available imagery.

3.7.5 QUALITY ASSURANCE

As part of the assessment of Manmade Coastal Defences, the Consultant shall make every effort to verify and quality assure the manmade coastal defence data compiled. The Consultant shall submit draft Manmade Coastal Defence spatial data (shapefile) for review by the relevant local authorities to ensure local knowledge of constructed manmade coastal defences is captured and utilised within the assessment. The Consultant shall consult on the defences for the purpose of the quality assurance with local authorities using the OPW NCEHM Consultation Portal and through the identified Technical Workshops.

3.7.6 ASSESSMENT OF DEFENCE FAILURE

Once approved, the Manmade Coastal Defences spatial data (shapefile) shall form an input to the NCEHM Integrated Spatial Model. The Consultant shall use the NCEHM Integrated Spatial Model with these data, and other data as relevant, to:

- Categorise the relevant level of maintenance;
- Assign the relevant defence deterioration curve;
- Estimate future wave heights and future performance standard;
- Assess probability of exceedance;
- Determine the primary defence failure mechanism (defence deterioration or performance standard exceedance);
- Calculate the Years Protected (at time of failure) and Coastal Catch Up Period;
- Develop the Defence Failure Timeline.

3.8 COMBINING RECESSION AND DEFENCE TIMELINES

The Consultant shall develop the underlying recession timeline, the defence failure timeline and the combined future coastal change timeline for each frontage in accordance with Section 8 (and other sections as relevant) of the CEHM TMN.

The Consultant shall generate an underlying recession timeline for all frontages for all climate change timelines. Where no manmade coastal defences exist, the future coastal change timeline is identical to the underlying recession timeline.

The Consultant shall generate a defence failure timeline for all frontages where a manmade coastal defence is present. These should be combined with the underlying recession timeline to give a combined future coastal change timeline. The Consultant is required to complete this for all management approaches and climate change timelines.

The Consultant shall produce underlying recession timelines, defence failure timelines, and combined future coastal change timelines and outputs using the NCEHM Integrated Spatial Model (see Section 3.1).

3.9 MAPPING OUTPUTS

The Consultant shall produce coastal erosion hazard mapping in accordance with Section 9 of the CEHM TMN and the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0. The Consultant shall produce the coastal erosion hazard mapping for each combination of management approaches (3 Nr), climate change timelines (4 Nr), and time periods (3 Nr) as set out in the CEHM TMN. This will equate to a combined set of thirty-six (36 Nr) unique coastal erosion hazard areas for each frontage, although in some cases the hazard areas will be identical for a given frontage (see Section 9 of the CEHM TMN for further detail).

The Consultant shall produce all coastal erosion hazard mapping using the NCEHM Integrated Spatial Model (see Section 3.1). All coastal erosion hazard mapping outputs shall comply with the Coastal Erosion Hazard Mapping Spatial Data Specification V1.0.

The draft and final deliverables shall include:

- An 'unmerged' version of the coastal erosion hazard mapping, where the hazard mapping for each frontage can be interrogated individually in GIS. Note: it is envisaged that all frontages will be in a single shapefile for each management approach, climate change timeline, and time period combination (i.e. single shapefile, one feature for each frontage).
- A 'merged' version of the coastal erosion hazard mapping, where the coastal erosion hazard mapping features or polygons are merged for neighbouring frontages for the entire coastline.

Draft coastal erosion hazard mapping shall be reviewed by the relevant local authorities using the OPW NCEHM Consultation Portal and through the identified Technical Workshops. The Consultant shall issue draft and final spatial data to the OPW, and the OPW shall upload it to the OPW NCEHM Consultation Portal.

3.10 FINAL REPORTING

The Consultant shall deliver three separate report types as part of the NCEHM Project:

1. Multiple National Coastal Erosion Hazard Mapping Reports, one for each Coastal Cell (See Section 3.10.1);
2. A single NCEHM Integrated Spatial Model Report (see Section 3.10.2);
3. A single Future Recommendations Report (see Section 3.10.3).

3.10.1 NATIONAL COASTAL EROSION HAZARD MAPPING REPORT

The Consultant shall produce an NCEHM Report for each coastal cell, documenting the assessment undertaken for the coastline, and the subsequent coastal erosion hazard mapping produced. Each Coastal Cell NCEHM Report shall include, but not be limited to, the following:

- Clear distinction between coastal sub-cells and frontages to ensure changes in characteristics and behaviours from one distinct section of coast to the next are effectively communicated;
- A detailed description of the coastal cell including coast types, features, landforms, and baseline processes relevant to coastal change;
- An annotated map labelling key features, the extent of the coastal cell assessed and the extent of any coastal sub-cells assessed to aid the NCEHM Project, shall be appended to the report. This shall also detail sediment sources, sediment sinks, and sediment transport pathways relevant to the coastal cell.
- A detailed summary covering existing manmade coastal defences, historic coastal change, anecdotal evidence, and any relevant observations from desk-based assessment or site visits (if undertaken, see Section 2.1.6), and documenting the historic coastal change within the coastal cell;
- A qualitative description of the coastal erosion hazard mapping produced at a coastal sub-cell level and evaluation of key trends or findings, considering the Management Approach, Time Period, Climate Change Timeline, and Confidence Level as relevant;
- It is the responsibility of the Consultant to present, discuss, and outline the limitations of all quantitative and qualitative analysis techniques outlined in the CEHM TMN within the final NCEHM Reports.

3.10.2 NCEHM INTEGRATED SPATIAL MODEL DOCUMENTATION

The Consultant shall produce the following documentation associated with the NCEHM Integrated Spatial Model:

- User Guidance and Demonstration Video (see Section 3.1.3);
- Operation and Maintenance Documentation (see Section 3.1.4);
- Quality Control report (see Section 3.1.6) associated with all draft and final coastal erosion hazard mapping issued to the Client.

3.10.3 FUTURE RECOMMENDATIONS REPORT

The Consultant shall develop a single Future Recommendations Report for the NCEHM Project, outlining issues encountered throughout the NCEHM Project and their resolution or otherwise.

The report shall reflect on issues pertinent to all aspects of the NCEHM Project, how they were overcome and how they impacted the final outputs of this NCEHM Project. The document shall also identify issues, if any, that were not overcome in the NCEHM Project but require consideration as part of the NCEHM Project, and also identify opportunities for refinement, improvement or further development of the methodology, for example, if additional data were available or if certain innovations were incorporated. This may inform the next cycle of coastal erosion hazard mapping, or may inform data collection or other projects.

3.10.4 REPORTING TIMELINES

The Consultant shall deliver all three reports as follows:

- First draft of each NCEHM Report shall be delivered with the draft Coastal Erosion Hazard Mapping for that coastal cell.
- Second and subsequent drafts of the NCEHM Report and Coastal Erosion Hazard Mapping shall be updated with the feedback provided addressed, including details of how it has been addressed.
- A Final draft, addressing all outstanding feedback, shall subsequently be delivered for approval.

The draft NCEHM Integrated Spatial Model documentation shall be delivered with the draft NCEHM Integrated Spatial Model, with second draft and final draft issued in line with the above.

The draft Future Recommendations Report shall be submitted once all draft Coastal Erosion Hazard Mapping has been issued.

Appendix 1 – Data provided by the Client

Dataset	Delivered on Contract Award (✓) or Comment	File Type	Spatial Type	Key Attributes
Coastal Aerial LiDAR Survey (CALs)				
North (Lough Foyle) to West (Galway Bay) Coast - DTM	0.25m resolution provided on contract award only	GeoTiff	Raster	Spatial Resolution 0.25m x 0.25m and 1.0m x 1.0m as per Section 3.3.1.1. Irish Transverse Mercator (EPSG: 2157) • Irish Grid (EPSG: 29903) an UTM29 (WGS84) (EPSG: 32629) available on request.
North (Lough Foyle) to West (Galway Bay) Coast – Ortho-rectified images (Tiled)	✓	GeoTiff	Raster	Spatial Resolution 0.1m x 0.1m. Irish Transverse Mercator (EPSG: 2157) Irish Grid (EPSG: 29903) available on request
South (Cork Harbour) to East (Carlingford Lough) Coast - DTM	0.25m resolution provided on contract award only	GeoTiff	Raster	Spatial Resolution 0.25m x 0.25m and 1.0m x 1.0m as per Section 3.3.1.1. Irish Transverse Mercator (EPSG: 2157) • Irish Grid (EPSG: 29903) an UTM29 (WGS84) (EPSG: 32629) available on request.

Dataset	Delivered on Contract Award (✓) or Comment	File Type	Spatial Type	Key Attributes
South (Cork Harbour) to East (Carlingford Lough) Coast – Ortho-rectified images (Tiled)	✓	GeoTiff	Raster	Spatial Resolution 0.1m x 0.1m. Irish Transverse Mercator (EPSG: 2157) Irish Grid (EPSG: 29903) available on request
South (Cork Harbour) to West (Galway Bay) Coast - DTM	0.25m and 1m resolution provided on contract award only	GeoTiff	Raster	Spatial Resolution 0.25m x 0.25m and 1.0m x 1.0m as per Section 3.3.1.1 Irish Transverse Mercator (EPSG: 2157) • Irish Grid (EPSG: 29903) an UTM29 (WGS84) (EPSG: 32629) available on request.
South (Cork Harbour) to West (Galway Bay) Coast – Ortho-rectified images	✓	GeoTiff	Raster	Spatial Resolution 0.1m x 0.1m. Irish Transverse Mercator (EPSG: 2157) Irish Grid (EPSG: 29903) available on request
TE Aerial Imagery				
National Aerial Imagery Data Series (1995-2021), mosaics	Requires submission of NMA data request form on contract award	WMS	Raster	Irish Transverse Mercator (ITM) - EPSG:2157, WGS 84 / UTM zone 29N - EPSG:32629.

Dataset	Delivered on Contract Award (✓) or Comment	File Type	Spatial Type	Key Attributes
National Aerial Imagery Data Series (1995-2021), tiles	Available on request following contract award	Shapefile	Raster	Irish Transverse Mercator (ITM) - EPSG:2157, WGS 84 / UTM zone 29N - EPSG:32629.
Oblique Imagery				
Coastal Oblique Imagery (2003)	✓	jpg	Raster	Irish Transverse Mercator (ITM) - EPSG:2157
OPW Coastal Oblique Imagery Coverage Area	✓	Shapefile	Vector	File '2509_SHP_ObliqueImagerySurveyExtent_1.0'. Irish Transverse Mercator (ITM) - EPSG:2157
Coastal Oblique Imagery (2026)	End of March 2027	jpg	Raster	Irish Transverse Mercator (ITM) - EPSG:2157
Bluesky Pilot (Wicklow Head to Arklow) Oblique Imagery	✓	jpg	Raster	Irish Transverse Mercator (ITM) - EPSG:2157
Coastal Defence Asset Database				
OPW Coastal Defence Asset Database	✓	Geopackage	Vector	Spatial dataset showing the location and extent of coastal defence including data on the type, material, and purpose amongst other attributes. Irish Transverse Mercator (ITM) - EPSG:2157
Vegetation Lines				
GSI digitised vegetation lines (Wicklow, Wexford, and Waterford)	✓	Shapefile	Vector	Digitised vegetation lines for available TE aerial imagery. Available for the purpose of this NCEHM Project only.

Dataset	Delivered on Contract Award (✓) or Comment	File Type	Spatial Type	Key Attributes
GSI digitised vegetation lines (Kerry, Clare, and Sligo)	End of March 2027	Shapefile	Vector	Digitised vegetation lines for available TE aerial imagery. Available for the purpose of this NCEHM Project only.
GSI digitised vegetation lines (Cork, Galway, Mayo, Leitrim, and Donegal)	End of June 2027	Shapefile	Vector	Digitised vegetation lines (manual) available for TE aerial imagery. Available for the purpose of this NCEHM Project only. Irish Transverse Mercator (ITM) - EPSG:2157
OPW CALS Vegetation Line	✓	Shapefile	Vector	Digitised vegetation lines (automated) available for the OPW CALS imagery. Available for the purpose of this NCEHM Project only. Irish Transverse Mercator (ITM) - EPSG:2157.
Irish Coastal Protection Strategy Study (ICPSS 2010 -2014) – 1973, 2000 and 2006 Vegetation Lines	✓	Shapefile	Vector	Digitised vegetation lines (manual) available for the years stated. Availability varies by location. Irish Transverse Mercator (ITM) - EPSG:2157
Irish Coastal Wave and Water Modelling Study				
ICWWS 2018 National Coastal Extreme Water Level Estimation Points	✓	Shapefile	Vector	-
ICWWS 2018 Phase 1 report	✓	PDF	-	Technical report setting out methodology and assessment undertaken in estimating national coastal extreme water levels at identified estimation points.
ICWWS 2018 MSL to OD Malin conversion raster	✓	ADF	Raster	Irish Transverse Mercator (ITM) - EPSG:2157.

Appendix 2 – Other Data Available to the Consultant

A non-exhaustive list of other data available to the Consultant, for the purpose of this Study, is highlighted below:

Data Type	Dataset	Description	Source
Tailte Éireann (TE Mapping and Imagery)			
Background Layer Mapping	TE Background Mapping	Datasets will be made available to the Consultant, at the scales and formats for which the OPW holds a licence for upon Commencement of the NCEHM Project including Premium Basemaps for Ireland	https://tailte.ie/en/https://webapps.geohive.ie/mapviewer/index.html
Historic Mapping	TE Historic Mapping	Datasets will be made available to the Consultant, at the scales and formats for which the OPW holds a licence for upon Commencement of the NCEHM Project.	https://tailte.ie/en/https://webapps.geohive.ie/mapviewer/index.html
Shoreline Mapping	Mean High Water Mark	Digital datasets of the High Water Mark (HWM) in Ireland, representing the boundary between land and sea, derived from historical 6-inch and 25-inch Ordnance Survey maps	https://tailte.ie/en/https://webapps.geohive.ie/mapviewer/index.html
GSI Mapping			
Geological Data	Bedrock Geology	This data represents the latest version of the bedrock geological dataset for the Rep of Ireland at the 1:100,000 scale digital geological map series.	GSI
Geological Data	Quaternary Sediments	The Quaternary geology of Ireland – Sediments Map is a representation of the surficial geology of Ireland at a scale of 1 to 50,000.	GSI

Data Type	Dataset	Description	Source
Copernicus Coastal Zone Mapping			
Coastal Types	Coastal Zone Mapping	Polygon Shapefiles which classify coastal types (e.g. 63120 Coastal Cliffs) using satellite imagery.	Copernicus
INFOMAR			
Bathymetry Data	INFOMAR	Bathymetry data captured as part of the INFOMAR programme	GSI and the Marine Institute
Other Data Sources			
Aerial Imagery	Coastal Aerial Imagery	Aerial imagery of the coast of Ireland.	Department of Defence
Aerial Imagery	Coastal Photogrammetry (Drones)	Photogrammetry of selected sites.	GSI and The Discovery Programme
Coastal Features / Infrastructure	EuroSION "Erosion Trends and Coastal Defence Works" Layer	This layer features both erosion trends and the existence of coastal defence works along the coast. 3 codes have been defined to depict erosion trends (stable, erosion, accretion) and 2 codes to depict coastal defence works (presence, absence).	European Environment Agency
Coastal Features / Infrastructure	EMODnet Geology map on coastal type	This dataset allows users to visualise pan-European coastal type at different spatial scales. Users can distinguish areas marked by rocky coasts, (pocket) beaches of sand and gravel, muddy tidal basins and	EMODnet

Data Type	Dataset	Description	Source
		estuaries, and manmade coastlines such as harbours and dams.	
Coastal Features	Habitats	Marine and Coastal Habitats	Marine Institute - https://atlas.marine.ie/#?c=51.3924:-8.5364:7
Erosion Data	EMODnet Coastal Behaviour	This dataset allows users to visualise pan-European coastal behaviour for 2007-2017 at different spatial scales. Users can distinguish areas of landward migration (erosion or submergence), stability, and seaward migration (accretion or emergence). The underlying, downloadable satellite-based dataset offers additional information on annual values and uncertainty.	EMODnet
Erosion Data	Shoreline-migration map based on field measurements and aerial photography	This dataset allows policy makers, together with national and regional coastal managers, to determine large-scale coastal behaviour and identify areas of rapid change. It is based on field measurements and aerial photography, and covers time periods up to decades. The map is particularly valuable for cliffs, which are prevalent along European coastlines, particularly since state-of-the-art satellite-monitoring methods aren't yet suitable for imaging erosion of non-sandy types of coastline.	EMODnet
Erosion Data	Erosion Prediction Lines from Site Specific Studies	Erosion prediction lines from site specific studies, e.g. coastal erosion risk management studies.	Local Authority / OPW
Geological Data	National Subsoils Map	The Teagasc Subsoils map classifies the subsoils of Ireland into 16 themes, using digital stereo photogrammetry supported by field work.	EPA

Data Type	Dataset	Description	Source
Oceanographic Data	Sea level daily gridded data from satellite altimetry for the global ocean from 1993 to present	This data set provides gridded daily global estimates of sea level anomaly based on satellite altimetry measurements.	Copernicus
Oceanographic Data	Irish Marine Data Buoy Observation Network	Wave parameter datasets from IMDBON used for operational oceanographic forecast models	Marine Institute
Oceanographic Data	Irish Lights Wave Data	Data from Irish Lights wave buoys	Irish Lights https://dbpedia.org/page/Commissioners_of_Irish_Lights
Oceanographic Data	Irish National Tide Gauge Network	Marine Institute network of tide gauges	Marine Institute - https://atlas.marine.ie/#?c=54.1174:-9.1406:7
Oceanographic Data	OPW Tide Gauge Data	OPW tide gauge data available at www.waterlevel.ie	OPW
Oceanographic Data	UK National Tide and Sea Level Facility Tide Gauge Data	UK gauges accessible through UK National Tidal and Sea Level Facility	UK National Tide and Sea Level Facility
Oceanographic Data	Private Sector Tide Gauges	Gauges owned and operated by the private sector which are not publicly accessible, e.g. Port Authorities, etc.	Real time data. Length of record varies by gauge
Oceanographic Data	Various	Global Wave Forecasting Facility	DHI - http://www.waterforecast.com/
Oceanographic Data	Various	Oceans & Coast data	National Oceanic and Atmospheric Administration (NOAA)

Appendix 3 – Coastal Erosion Risk Management Studies

Study Name	Client	Dates
Liscannor Bay (Clahane, Liscannor & Miltown Malbay)	Clare County Council	2017
Quilty to Miltown Malbay (Quilty, Spanish Point & Whitestrand)	Clare County Council	2019
Doolin	Clare County Council	2019
Cloughauninchy	Clare County Council	2017
Kilbaha, Aughinish & New Quay	Clare County Council	2019
Slodden Port to Binbane Head (Pollan Strand, Ballyliffin & Five Fingers Strand)	Donegal County Council	2019
Rogerstown Estuary (Portrane, Rush)	Fingal County Council	2013
Cloonamore, Inishboffin	Galway County Council	2024
Tralee Bay (Banna, Carrahane & Maharees)	Kerry County Council	Ongoing, draft report available

Study Name	Client	Dates
Dingle Bay East (Castlemaine Harbour)	Kerry County Council	Ongoing, draft report available
Dundalk Bay (Greenore, Dillonstown & Blackrock)	Louth County Council	2016
Deadman's Point to Rosses Point	Sligo County Council	2015
Strandhill Bay	Sligo County Council	2024
Ardmore Bay	Waterford City and County Council	2022
Rosslare Warren Middle	Wexford County Council	2016