LANGAN

CONSULTING ENGINEERS

PREFERRED SCHEME OPTION REPORT

CUAN NA LOINGE CFM

GALWAY COUNTY COUNCIL

24155-RP-2602-PL01 | APRIL 2025

CIVIL
STRUCTURAL
MARINE

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QUALITY CHECK SHEET

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1 PROJECT DETAILS

1.1 INTRODUCTION

The proposed road improvement project is located on a 200m stretch of the L-52214, connecting the two townlands of Béal an Daingin & An Cheathrú Rua Thiar, including its junctions with two side roads in Cuan Na Loinge, Ceantar na nOileán, Co. Galway. This section of the road is frequently inundated by seawater during high tides and storm surges events. This limits public access and domestic access to 17 residences in the area.

The objective of the project is to raise the road level to minimize the impact of flooding, without significantly altering the tidal patterns or water flows.

Galway County Council proposes to finance the scheme via Department of Transport – Specific Improvement Grant.

The location of the proposed scheme is located approximately 4km north-east from Leitir Móir village, as shown in Figure 1.1, Figure 1.2 and Figure 1.3 below.

Figure 1.1 Scheme location (Aerial image 1)

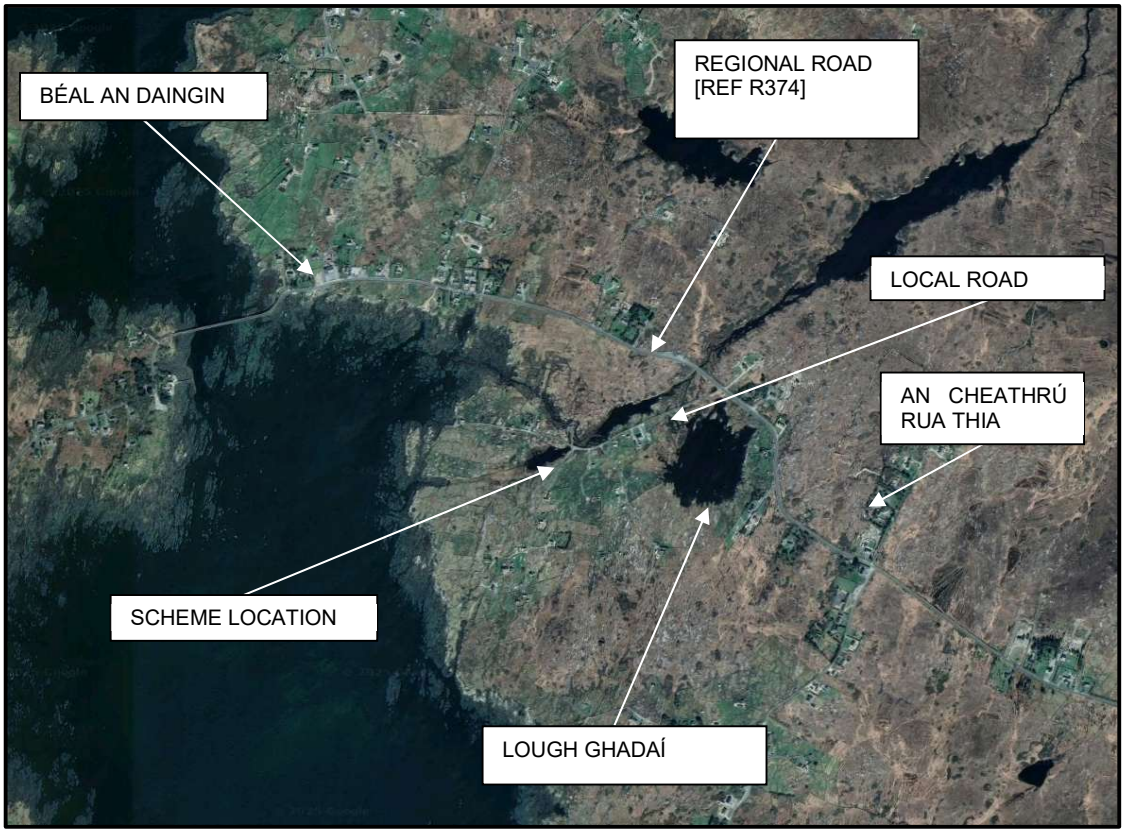

Figure 1.2 Scheme location (Aerial image 2)

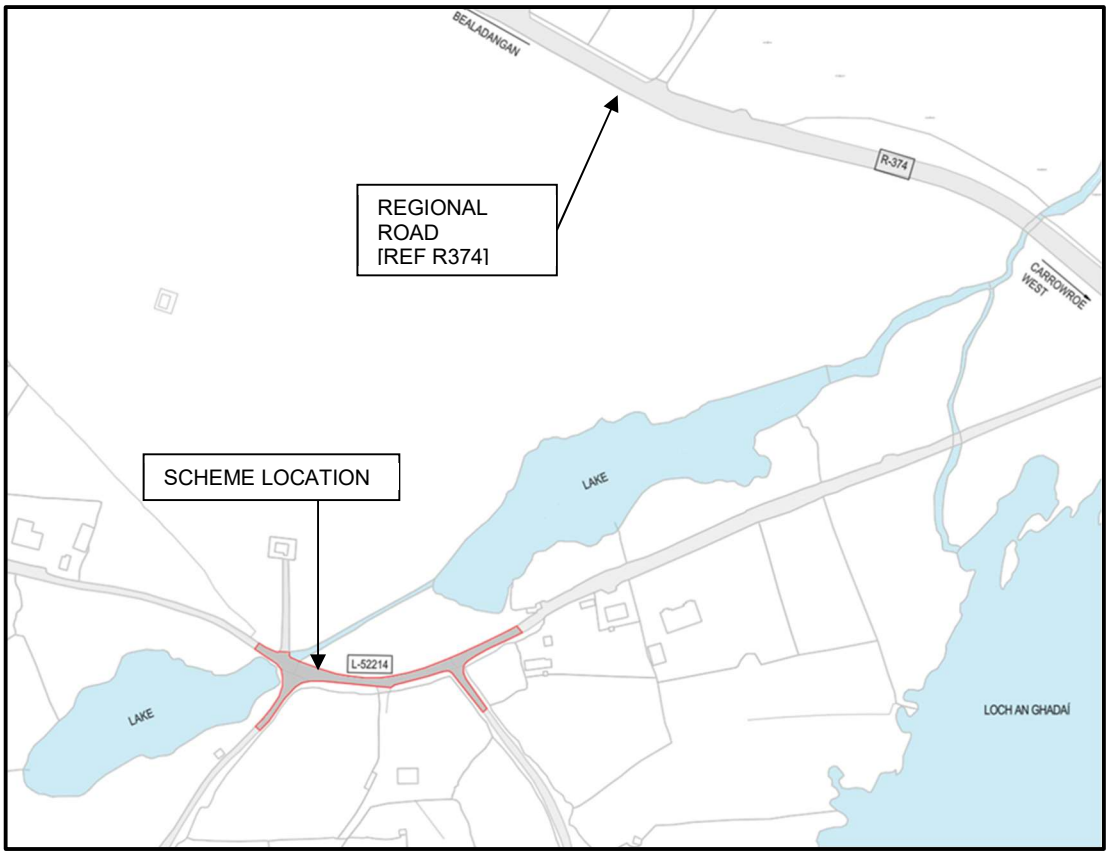

Figure 1.3 Scheme location

1.2 PURPOSE OF DOCUMENT

Langan Consulting Engineers (LCE) are appointed by Galway County Council as Civil/Structural Consultants to develop a Preferred Scheme Options Report for a proposed flood defence scheme. This document builds upon an earlier Options Assessment Report, prepared by LCE and issued on 7th April 2025, which evaluated two structural flood containment options:

- Option A: Rock armour embankment with roadside natural stone wall and culverts
- Option B: Reinforced concrete (RC) wall with natural stone-clad finish above ground level and culverts

Following a comparative appraisal that considered site geometry, civil and structural conditions, hydraulic, environmental and visual impact, Option A was recommended as the emerging preferred scheme.

The purpose of this report is to further assess and develop Option A, focusing on its preliminary design, technical viability, hydraulic function, economic implications, and overall suitability for implementation. The approach includes:

- An assessment of structural flood defence methods, beginning with a screening of multiple options to identify the most appropriate and feasible solution
- A preliminary design of the preferred flood containment method
- A further evaluation of the preferred method to refine the design and assess its performance, feasibility, and cost-effectiveness
- Consideration of cost risk and value management principles to ensure the proposed solution delivers optimal performance and resilience within budgetary constraints

It is noted that non-structural flood mitigation measures are outside the scope of this document.

1.3 ABBREVIATIONS AND DEFINITIONS

EPA	Environmental Protection Agency
FRA	Flood Risk Assessment
GCC	Galway County Council
HEFS	High End Future Scenario
ITM	Irish Transverse Mercator
LCE	Langan Consulting Engineers Ltd
mOD	Meters Ordnance Datum (Malin, unless otherwise noted)
MRFS	Mid-range Future Scenario
OPW	Office of Public Works
POR	Preliminary options report
SAC	Special area of conservation
SEA	Strategic environmental assessment
SSA	Spatial scale of assessment

1.4 HOLD POINTS

Hold items are items which are not yet defined and on which the design is dependent. All hold points must be addressed to enable design services to proceed.

2 EMERGING PREFERRED OPTION ASSESSMENT

2.1 SCREENING ASSESSMENT

The preferred option for a potential flood relief method considered during the initial stage is assessed and outlined in Table 2.1 below. The chosen method is compared against the options of “Do nothing” and “Do minimal”. These measures were assessed with regard to their viability in terms of the following criteria.

a) **Technical -** Methods were screened on feasibility only, requiring a high-level description of what the likely method would entail. Where methods were not considered to be technically feasible or not relevant to the site no further consideration has been given.
b) **Economic -** Technically feasible methods have been reviewed for economic viability.
c) **Health and safety -** The degree of health and safety risk during construction and operation was assessed at a level appropriate to the screening stage.
d) **Environmental -** Key environmental constraints noted. Methods may be rejected on the basis that they may have a detrimental impact on an environmentally site.
e) **Social and cultural** - The approach taken to the cultural criteria of the screening is similar to that undertaken for the environmental criteria.
f) **Adaptability to climate change -** The likely impacts of climate change have been assessed at an early stage to determine the suitability of identifying methods based on current flood risk, where there is a significant increase in flood risk in the future, methods will need to be reviewed in light of this risk.

A method can Pass (P) or Fail (F) the screening criteria. A method must pass all five criteria, [Technical, economic, health & safety, environmental, social and cultural] to be considered viable. Methods which fail to meet the relevant threshold of an objective have been 'screened out' and are not assessed against the remaining objectives.

Table 2.1 Initial screening of the preferred scheme option

Possible Flood Risk Management Measure	Technical	Economic	Health and Safety	Environmental	Social & Cultural	Initial Screening Result	Comment
Do Nothing	F	-	F	P	P	Not Viable	This option provides the baseline for the study and assumes no further work or expenditure on measures to reduce flood risk. The implication is that the existing risk of flooding persists in the study area. This is not considered to be a sustainable option as it fails to meet the needs of the residents of the village. Using this as the baseline scenario however allows the benefits of all existing measures to reduce the flood risk to be identified. It places the benefit of these measures into true perspective.
Do Minimum	P	F	P	P	P	Not viable	Flooding starts at high frequency events. This is not considered to be a sustainable option as it fails to meet the needs of the village.
Preferred Scheme option							
Raise the road level and construct a rock armour embankment with roadside natural stone wall with culverts	P	P	P	P	P	Viable	Raising the road level to 3.6mOD and constructing an 0.8m-high parapet wall on both sides of the road could provide effective protection while remaining mostly within the existing road footprint. The wall would be built on top of boulder rock armour and faced with natural stone to blend with the surroundings. Culverts installed beneath the road would allow water to pass through as necessary, maintaining hydraulic connectivity across the embankment.

This screening assessment identifies the preferred scheme option - Raise the road level and construct a rock armour embankment with roadside natural stone wall with culverts as the sole viable approach.

2.2 PREFERRED FLOOD CONTAINMENT METHOD - PRELIMINARY DESIGN

2.2.1 PROPOSED SCENARIO

The proposed scenario involves raising the road level and constructing parapet walls on both sides, with culverts facilitating the natural flow of water. This would help ensure the road remains accessible during stormy weather and high tides.

2.2.2 PREFERRED METHOD

The preferred structural flood containment method adopted comprises of the following elements.

- Raised road level and rock armour embankment with roadside natural stone wall with culverts.

a. Raised road level = 3.6mOD – maximum of 1m from existing road.
b. Length = approximately 200 metres, including side roads.
c. Embankment slope 1:1
d. Parapet wall height = 0.8m from road level
e. 5 no. Ø450mm culverts, with head walls
f. Realignment of existing services

Conceptual design drawings for the preferred method are shown on drawing reference: 24155-DG-1202 in Appendix A of this report.

2.3 FURTHER ASSESSMENT OF PREFERRED FLOOD RELIEF METHOD

This section develops the preferred option and assesses its viability further.

2.3.1 TECHNICAL VIABILITY

The proposed flood containment method relies on well-established construction techniques and widely accepted industry practices. Given its straightforward design and the use of conventional materials, the method is considered technically viable and feasible for implementation.

2.3.2 ECONOMIC ASSESSMENT

2.3.3 PRELIMINARY ECONOMIC ASSESSMENT OF PREFERRED METHOD

Table 2.2 below provides an indicative construction cost estimate for the preferred flood containment method. This preliminary assessment is based on current market rates and typical construction practices.

Table 2.2 Indicative Construction Cost Estimate [HOLD]

PROJECT CONSTRUCTION COST SUMMARY	Total Costs
Rock amour embankment with roadside natural stone wall and culverts	€ 425,936
Land dedication	€ 10,000
Contingency - 30%	€ 130,780
Indicative Total Cost of Flood Relief Scheme (€)	€ 566,717

2.3.4 ENVIRONMENTAL ASSESSMENT

The findings of the environmental assessments carried out on the preferred method are summarised in this section. All environmental assessments are included Appendix B of this report.

2.3.4.1 ENVIRONMENTAL IMPACT ASSESSMENT SCREENING REPORT

The EIA Screening determined that an Environmental Impact Assessment Report (EIAR) is not required for the proposed works. The development falls below the relevant thresholds and, given its nature, scale, and location, is unlikely to result in significant environmental effects, either directly, indirectly, or cumulatively. The assessment concluded that the project does not pose a significant risk to the environment under the current regulations.

2.3.4.2 APPROPRIATE ASSESSMENT SCREENING REPORT

A Stage 2 Appropriate Assessment was undertaken due to potential impacts on the Kilkieran Bay and Islands SAC. The Natura Impact Statement (NIS) concluded that, with the implementation of the specified mitigation measures, the proposed works will not adversely affect the integrity, conservation objectives, or qualifying interests of this or any other Natura 2000 site. No significant residual impacts are anticipated on habitats or species of conservation importance.

2.3.4.3 ECOLOGICAL IMPACT ASSESSMENT

The Ecological Impact Assessment found that the project can proceed without significant adverse ecological effects, provided that all recommended avoidance and mitigation measures are properly applied. The works

will not result in direct loss of priority habitats, and potential indirect impacts such as sedimentation or disturbance can be effectively controlled. The development is therefore considered compatible with the conservation of local ecological features and Natura 2000 sites.

2.3.4.4 CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN

A Preliminary Construction Environmental Management Plan (24155-RP-2401) was prepared by LCE on 17th March 2025, to control the construction phase of the proposed development.

2.3.5 SOCIAL AND CULTURAL CONSTRAINTS

The rural road in question serves as the sole means of access for the local community, making uninterrupted connectivity essential. The chosen flood containment method has been designed to minimise visual impact and blend with the established character of the region, helping to preserve the area's rural identity while addressing access needs.

Throughout this process stakeholders have been consulted, and their input has been fed into the preliminary option stage. There has been communication with local group representative throughout the process.

2.3.6 OPERATIONAL REQUIREMENTS

Operational requirements of flood defences should include an inspection regime to ensure that there is no deterioration in the structural integrity of the defences. It is expected the flood defence will have minimal maintenance requirements.

2.3.7 HEALTH AND SAFETY

A design health and safety risk assessment has been completed for the project which has been included in the project safety file.

2.3.7.1 CONSTRUCTION STAGE

It is imperative that robust site investigations are carried out in advance, to mitigate health and safety risks associated with the works and risk levels can be kept to a manageable level through the completion of a risk assessment and implementation of health and safety mitigation methods. Access to the site for machinery will need to be carefully managed. Health and Safety risks can be kept at a manageable level provided standard mitigation methods are put in place.

2.3.7.2 OPERATION STAGE

The provision of the proposed flood containment method will reduce flood risk in the area, however regular maintenance, even if minimal, is required to ensure this standard is maintained.

3 CONCLUSION

A previous flood scheme options review report was undertaken for the proposed flood defence. The preferred solution involves raising the road level and constructing a low-level rock armour embankment, approximately 200 metres in length, within the existing road footprint. A natural stone wall will be integrated into the design to ensure road safety along raised road section, for both vehicles and pedestrians, while maintaining the visual and environmental character of the area.

This flood containment structure is intended to protect the road and preserve access to residential properties. The proposed design includes raising the road level to 3.6mOD, representing a maximum increase of 1.0 metre from the existing level. The total length of the scheme is approximately 200 metres, including side roads. The embankment will have a slope of 1:1, and the parapet wall will be 800mm high, measured from the new road level. It is proposed to upgrade existing drainage culverts withing the extents of the scheme. The road cross-section design has been developed to planning stage.

Environmental assessments have been completed, concluding that the proposed works can proceed without significant adverse impacts on the environment, protected habitats, or species.

A preliminary cost estimate has also been prepared to inform early-stage decision-making.

This report identifies a viable scheme design upgrade.

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Analysis contains inherent uncertainty. LCE recommends the application of the upper bound flood level estimate from all analysis, and the inclusion of a min. of 500mm freeboard. Selection of mid-range estimates and lesser freeboard is at the risk of the client and the planning authority. All information relating to drainage and water networks assumes ongoing maintenance of the network and removal of obstructions to flow.

This report is based on available CFRAM and FSU data at the time of appointment. The client is responsible for the cost of any additional services resulting from any CFRAM and FSU updates after this date.

LCE accepts no liability for any matters arising if any recommendations contained in this document are not carried out, or are partially carried out, without further advice being obtained.

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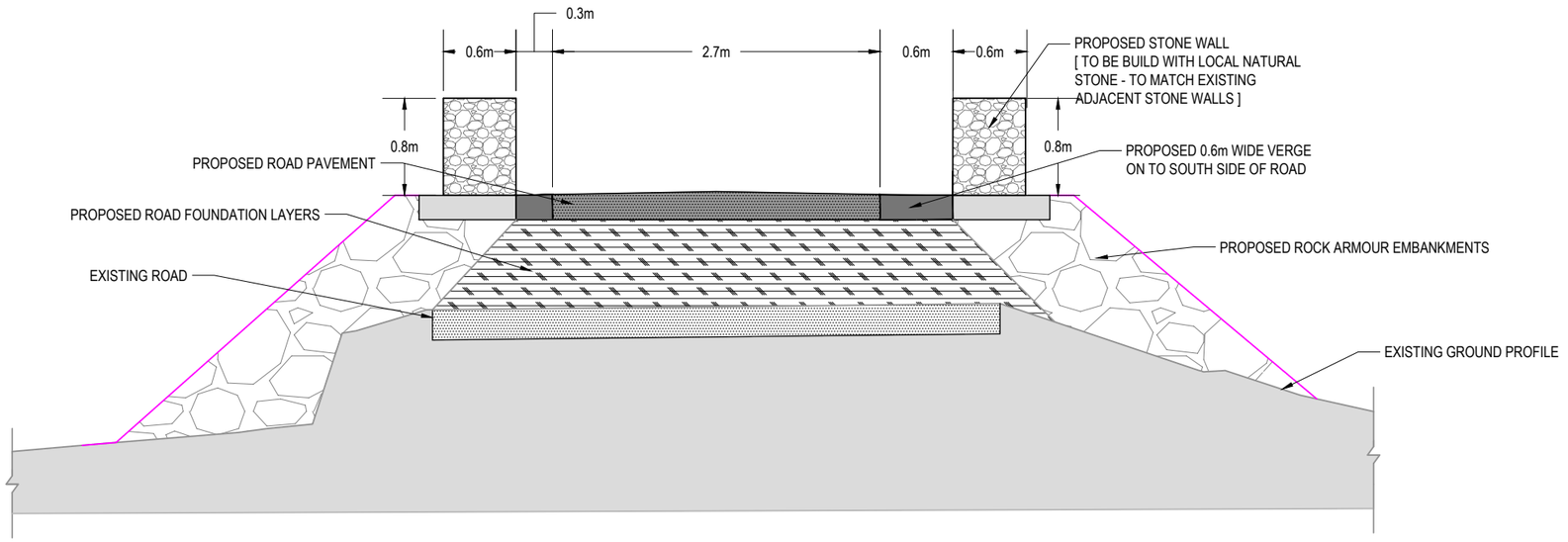
APPENDIX A - DESIGN DRAWINGS

A3



PROPOSED TYPICAL ROAD RAISING DETAIL

SCALE 1:50

NOTES:

1. ALL DIMENSIONS IN METERS UNLESS OTHERWISE NOTED.
2. ALL COORDINATES ARE IN METERS AND RELATE TO ITM (IRISH TRANSVERSE MERCATOR) UNLESS OTHERWISE NOTED.
3. ALL LEVELS IN METERS ARE RELATIVE TO ORDNANCE DATUM MALIN HEAD (OSGM15).
4. DO NOT SCALE FROM DRAWINGS, USE FIGURED DIMENSIONS ONLY.
   ALL DIMENSIONS SHALL BE CONFIRMED ON SITE.
5. DRAWINGS ARE FOR THE PURPOSES OUTLINED IN THE TITLE BOX ONLY.
6. DRAWINGS ARE BASED ON SITE SURVEY INFORMATION AND OSI VECTOR MAPPING (2025).
7. SITE LOCATION REFERENCE X=492948; Y=729969 (ITM)

LEGEND:

PROPOSED :

- PROPOSED ROAD PAVEMENT
- PROPOSED ROCK ARMOUR EMBANKMENTS
- PROPOSED STONE WALLS
- PROPOSED ROAD FOUNDATION

EXISTING :

- EXISTING ROAD
- EXISTING GROUND PROFILE

PLANNING

THIS DRAWING TO BE READ IN CONJUNCTION WITH THE PROJECT SPECIFICATIONS AND REPORTS.

DATE	REV	BY	CHK	DESCRIPTION
03/07/25	PL02	OK	JL	PLANNING ISSUE
12/06/25	PL01	OK	JL	PLANNING ISSUE
16/04/25	DR01	OK	JL	DRAFT ISSUE

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PROJECT TITLE:	CUAN NA LOINGE ROAD PROTECTION SCHEME	DATE:	APRIL 2025
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CLIENT:	GALWAY COUNTY COUNCIL	SCALE:	1:50@A3
JOB NUMBER:	24155	DRAWING BY:	OK
DRAWING TITLE:	PROPOSED ROAD CROSS SECTION A-A	CHECKED BY:	JL
		REVISION:	PL02

APPENDIX B - ENVIRONMENTAL ASSESSMENTS

1. Environmental Impact Assessment Screening Report.
2. Article 6 (3) Appropriate Assessment Screening Report.
3. Ecological Impact Assessment.
4. Construction and Environmental Management Plan.