

# CARRICKMINES & SHANGANAGH RIVERS FLOOD RELIEF SCHEME

TII PRESENTATION – AUGUST 2025



## AGENDA

1. Introduction
2. N11 Dual Carriageway
3. Glenamuck Road North
4. Traffic Assessment
5. Long Term Operational Benefits
6. TII Publication Compliance

Introduction (1/1) N11 Dual Carriageway Glenamuck Road North Traffic Assessment Long Term Operational Benefits TII Publication Compliance

## INTRODUCTION

### Overview Of The Scheme

Carrickmines and Shanganagh River Flood Relief Scheme interacts with TII assets at two locations:

1. N11 Dual carriageway
  - The N11 dual carriageway is subject to flooding in the existing scenario for the 1% AEP (Annual Exceedance Probability) event from both the Shanganagh and Carrickmines Rivers
  - Solution: A second overflow culvert to convey high flows
2. Glenamuck Road roundabout
  - Glenamuck Road roundabout floods under existing conditions.
  - Maintained (MMaRC) as part of the M50 (Junction 15).
  - Solution: New flood defence walls to contain flows upstream of bridge

The intention of this engagement is to ensure the delivery of this critical infrastructure to realise the objectives of DL RCC, OPW and TII.

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**Carrickmines Shanganagh River Flood Relief Scheme**

Legend:

- Preferred option defences
- Preferred option 1% AEP extent
- Existing scenario 1% AEP extent

Logos: dlr, OPW, egis, JBA

3

Introduction (1/11) N11 Dual Carriageway Glenamuck Road North Traffic Assessment Long Term Operational Benefits TII Publication Compliance

## N11 DUAL CARRIAGEWAY

### Existing Scenario

- Shanganagh River flows beneath the N11 national road
- 53m long culvert which transitions from a masonry arch (c.10m) to a narrower box culvert beneath the road.
- Acts as a **flow constriction on the existing system**
- Creates a backwater effect at the upstream end of the culvert.
- Results in flood water spilling out over the N11 dual carriageway and nearby residential properties.

**Carrickmines Shanganagh River Flood Relief Scheme**

Legend:

- FRS 1% AEP extent
- ECRRAM 1% AEP extent

Logos: dlr, OPW, egis, JBA

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4

Introduction N11 Dual Carriageway (2/11) Glenamuck Road North Traffic Assessment Long Term Operational Benefits TII Publication Compliance

## N11 DUAL CARRIAGEWAY

### Options Assessment

The alternatives and options for the FRS have been considered in accordance with OPW's guidance.

**3 Fundamental Approaches** to measures have been hydraulically tested to reduce the risk of flooding to the N11 dual carriageway. These are:

1. Store water upstream
2. Containment
3. Conveyance measures

In Combination Measures (to form an option)

- A measure to increase conveyance is essential.
- A containment measure in combination will protect Waterfall Cottage.

### HOW DID WE ARRIVE AT THIS SOLUTION?

**High level review**  
Identifying approaches suitable for the catchment:

- Storage (hold water back),
- Containment (stopping water flowing out)
- Conveyance (letting water move more easily)

**Detailed measures**  
Testing in hydraulic model.  
How will these approaches work in reality?

**Formation of options**  
Measures combined to make a scheme option

**Climate change adaptation**  
How does a scheme option perform in the future?  
What can be adapted and does it impact the present-day alignment

**Preferred Scheme Option**

dlr OPW egis JBA

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5

Introduction N11 Dual Carriageway (3/11) Glenamuck Road North Traffic Assessment Long Term Operational Benefits TII Publication Compliance

## N11 DUAL CARRIAGEWAY

### Options Assessment

#### Storage Measures

- 100,000m<sup>3</sup> storage volume required to provide the necessary hydraulic benefits.
- 12,350m<sup>3</sup> maximum viable volume available within the catchment.
- Constraints: steep topography and urban environs of the catchment.
- **Conclusion:** Too much storage is required. This option does not work.

**Carrickmines Shanganagh River Flood Relief Scheme**

dlr OPW egis JBA

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6

Introduction
**N11 Dual Carriageway (4/11)**
Glenamuck Road North
Traffic Assessment
Long Term Operational Benefits
TII Publication Compliance

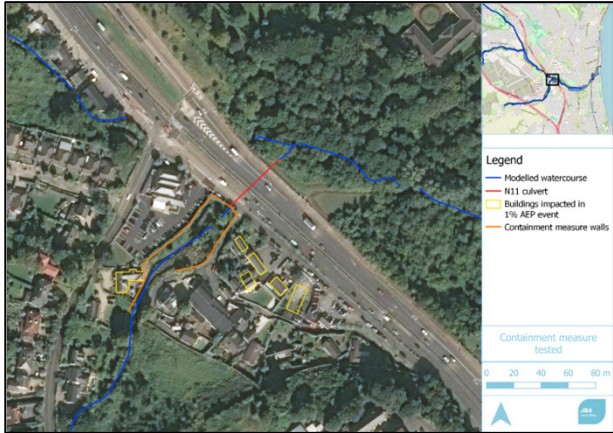
## N11 DUAL CARRIAGEWAY

### Options Assessment

#### Containment Measures

- Tested scenario: walls to envelop the backwater effect thus eliminating spillage.
- Wall height of 5.5m-6.0m required upstream of the culvert.
- Conclusion: Too much water for containment measures alone

**Carrickmines Shanganagh River**  
Flood Relief Scheme





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7

Introduction
**N11 Dual Carriageway (5/11)**
Glenamuck Road North
Traffic Assessment
Long Term Operational Benefits
TII Publication Compliance

## N11 DUAL CARRIAGEWAY

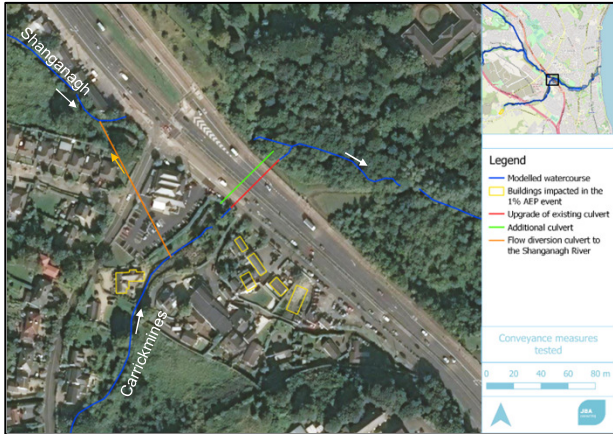
### Options Assessment

#### Conveyance Options considered

- Replace the existing N11 culvert.
  - Not feasible to construct online with high live flows.
- Flow diversion into the Shanganagh River
  - Not feasible
- Pumping Station Installation
  - Not feasible due to High Flows, No Available Lands & Long-Term Reliance on Mechanical Equipment.
- Additional culvert / pipe under the N11 dual carriageway

**Conclusion:** Option 4 is the only viable option

**Carrickmines Shanganagh River**  
Flood Relief Scheme





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8

Introduction
**N11 Dual Carriageway (6/11)**
Glenamuck Road North
Traffic Assessment
Long Term Operational Benefits
TII Publication Compliance

## N11 DUAL CARRIAGEWAY

### Options Assessment

#### Hydraulic Modelling

- New culvert to act as an overflow route to convey higher flows at the N11 dual carriageway culvert.
- Additional capacity required for 1% AEP is equivalent to 1800mm dia. culvert.

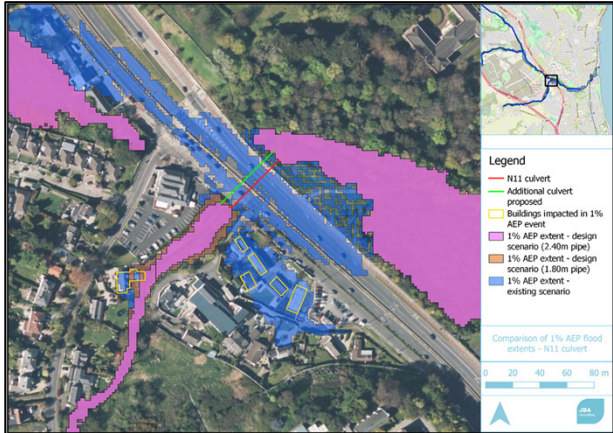
#### Construction Methodology

- A pipe culvert is a simpler structure & presents an opportunity to construct using trenchless techniques.

#### Climate Change

- Flows, tides and rainfall are to increase, putting pressure on the system.
- The proposed culvert (2400mm dia.) is designed for a higher design criteria (HEFS) than the normal standard of protection (Present Day) of the scheme.
- This avoids works having to come back and upgrade the culverts in the next 20 to 50 years.

### Carrickmines Shanganagh River Flood Relief Scheme



| Scenario     | Flow/rainfall increase | Tide increase |
|--------------|------------------------|---------------|
| Medium Range | +20%                   | +0.50m        |
| High End     | +30%                   | +1.00m        |

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9

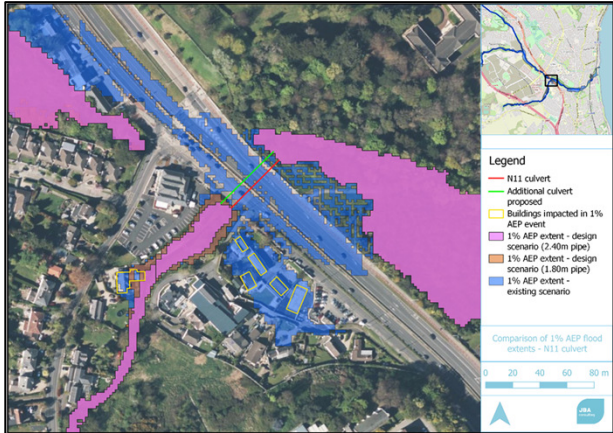
Introduction
**N11 Dual Carriageway (7/11)**
Glenamuck Road North
Traffic Assessment
Long Term Operational Benefits
TII Publication Compliance

## N11 DUAL CARRIAGEWAY

### Construction Options

1. Trenchless techniques (e.g. pipe jacking, TBM).
  - Risk of structural damage (e.g. settlement) to the existing road structure remains – Insufficient cover.
  - Damage to existing utilities (Clashes with Gas, Water, ESB, Sewers) (Multiple Open Cut Sections required to temporarily divert)
  - Large space requirements for launch and reception shafts – Not Available
  - Topographical Constraints with riverbed levels upstream and downstream.
  - **Considered within the EIAR**
2. Directional Drilling
  - Technology not available for the pipe diameter required.
  - Control of invert level for gravity solutions utilising HDD methodologies is problematic. More commonly adopted for flexible pipes.
  - **Not a viable option and not considered within the EIAR.**
3. Inverted Siphon
  - Deepening and reducing the gradient of the proposed pipe – siphon effect.
  - Does not provide the necessary hydraulic benefit.
  - **Not a viable option and not considered within the EIAR.**
4. Open cut construction
  - Enables the overflow culverts operational capacity to be optimised, providing a longer-term benefit relative to the short-term impact from the installation, and allows a larger pipe size to be used. *EIAR Volume 2, Page 24, Section 2.2.3*

### Carrickmines Shanganagh River Flood Relief Scheme



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10

Introduction **N11 Dual Carriageway (8/11)** Glenamuck Road North Traffic Assessment Long Term Operational Benefits TII Publication Compliance

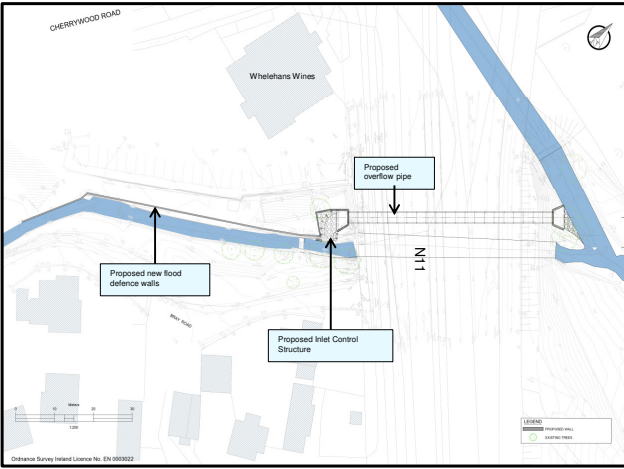
## N11 DUAL CARRIAGEWAY Preferred Option

### Proposals

- Install a new overflow culvert beneath the N11 dual carriageway to increase conveyance during the design event.
- Install new flood defence walls (up to 1.1m high) upstream of the N11 overflow culvert to protect low lying properties

### Constraints

- Traffic Management
- Existing Services (including ESB, Uisce Éireann)
- Brides Glen River, sensitive to instream works
- Works within existing residential areas, parkland and on the N11 National Road
- Existing box culvert 4m to the south



**Carrickmines Shanganagh River Flood Relief Scheme**

Cherrywood Road

Whelehans Wines

Proposed new flood defence walls

Proposed overflow pipe

N11

Proposed Inlet Control Structure

Scale: 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 790 800 810 820 830 840 850 860 870 880 890 900 910 920 930 940 950 960 970 980 990 1000

Legend

Proposed Works

Existing Features

DLR | OPW | egis | JBA

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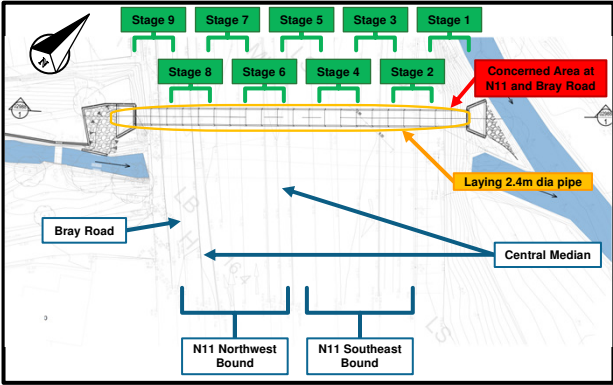
11

Introduction **N11 Dual Carriageway (9/11)** Glenamuck Road North Traffic Assessment Long Term Operational Benefits TII Publication Compliance

## N11 DUAL CARRIAGEWAY Outline Construction Methodology

### Proposals

- 9 night-works phases, 6m to 9m progress per phase.
- Expected programme: 2 months (Service diversions expected to take most of this time).
- Specific traffic management arrangements for each phase
- Accommodation and enabling works (service diversions, barrier removal & road realignments) in advance of each phase.
- Watermain, gas, public lighting and ESB will need to be diverted.
- Temporary works including vibration and structural monitoring
- Excavation, installation, pipe bedding and backfill (Cl.808) as per TII's specifications for roadworks.
- N11 dual carriageway is expected to be permanently reinstated during the works.



**Carrickmines Shanganagh River Flood Relief Scheme**

Stage 9

Stage 7

Stage 5

Stage 3

Stage 1

Stage 8

Stage 6

Stage 4

Stage 2

Concerned Area at N11 and Bray Road

Laying 2.4m dia pipe

Bray Road

Central Median

N11 Northwest Bound

N11 Southeast Bound

DLR | OPW | egis | JBA

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12



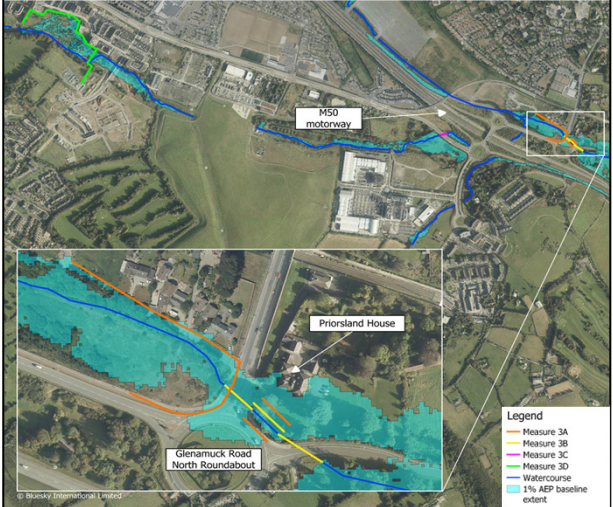
Introduction
N11 Dual Carriageway
**Glenamuck Road North (1/4)**
Traffic Assessment
Long Term Operational Benefits
TII Publication Compliance

## GLENAMUCK ROAD NORTH

### Options Assessment

- A. New flood defences upstream of Glenamuck Rd North & adjoining the watercourse at Priorsland House (3A)
- B. Upgrade of culverts at Glenamuck Rd North & Luas P & R (3B)
- C. Storage upstream of Ballyogan Stream using culvert constriction (3C)
- D. Storage at Clay Farm greenspace (3D)
  - Options C & D provide limited hydraulic benefit and would not improve flood risk relative to the other options.
  - Option B does not fully resolve flood risk and is complex construction relative to the other alternatives.

**Carrickmines Shanganagh River Flood Relief Scheme**



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15

Introduction
N11 Dual Carriageway
**Glenamuck Road North (2/4)**
Traffic Assessment
Long Term Operational Benefits
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## GLENAMUCK ROAD NORTH

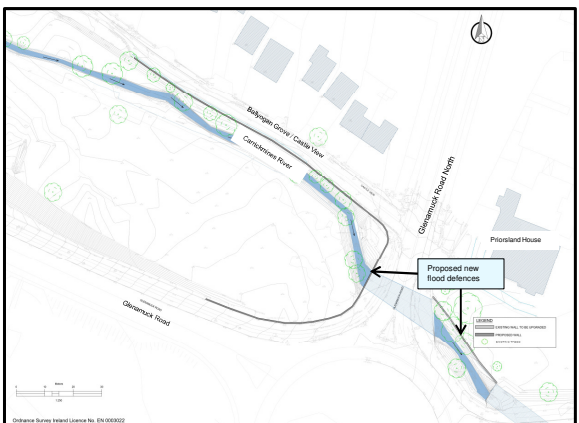
### Preferred Measure

- Install new flood defence walls (1.1m to 1.6m) on the existing riverbanks adjacent to Castle View, Priorsland House and Glenamuck Road North.
- The new walls are set back from the road behind the footpath/ cycletrack along Glenamuck Road north and Glenamuck Road. They are adjacent to the road in Castle View/Ballyogan Grove cul de sac only.

### Constraints

- Traffic Management
- Existing Services (Gas)
- Archaeological

**Carrickmines Shanganagh River Flood Relief Scheme**



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16

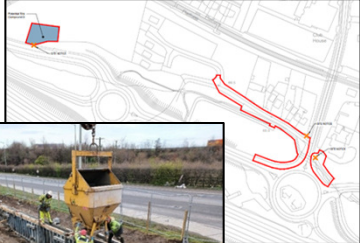
Introduction
N11 Dual Carriageway
**Glenamuck Road North (3/4)**
Traffic Assessment
Long Term Operational Benefits
TII Publication Compliance

## GLENAMUCK ROAD NORTH

### Outline Construction Methodology

- Establish a site works and welfare compound to the west of the works area (Shown Blue)
- The proposed flood defence walls may be constructed by a traditional method of casting concrete in situ. Note existing stone will be retained for reuse where possible.
- The proposed flood defence walls may be constructed by following sequence:
  - Excavate proposed flood defence wall up to the required foundation depth.
  - Install trench supports and other temporary works (e.g. security measures)
  - Ground preparation works (i.e. concrete blinding/ hardcore material)
  - Steel fixing and in-situ concrete casting.
  - Backfilled in accordance with the design specification.
  - Natural stone or other decorative finishes will be installed
- The proposed new concrete bridge parapet (upstream face) is intended to replace the safety railing (anchor to culvert or beam across the culvert).
- The flood defence walls downstream on the bridge at Glenamuck Road north will be constructed from the adjoining footpath/ road on the southern side and within the confines of Priorsland House to the north.
- Reinstate all areas affected by the accommodation and construction works in accordance with the local authority and/ or landowner requirements.
- The expected programme duration of this is 2-3 months

**Carrickmines Shanganagh River Flood Relief Scheme**










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17

Introduction
N11 Dual Carriageway
**Glenamuck Road North (4/4)**
Traffic Assessment
Long Term Operational Benefits
TII Publication Compliance

## GLENAMUCK ROAD NORTH

### Outline Construction Methodology

#### Traffic Management Requirements as set out in the EIAR

- Sections of the cycleway and footpath adjoining the proposed flood defence wall at Glenamuck Road North and the roundabout will need to be closed to facilitate the proposed construction works.
- To enable the removal of the existing wall and installation of the new flood defence at Castle View/ Ballyogan Road, a road closure will be required. Only local access will be available.
- As works on Castle View approach Glenamuck Road North, a temporary traffic management system will be required at Castle View and Glenamuck Road North to maintain two-way traffic flow on Castle View.
- To minimise the traffic impact to public, the works will be carried out during the off-peak subject to agreement with the DLRC Traffic Section, AGS, TII and NTA.
- Castle View and Glenamuck Road North will re-open for public use outside of working hours.

**Carrickmines Shanganagh River Flood Relief Scheme**

Adjoining the works area is a footpath, 2 way cycleway & grass verge

| Area       | Footpath | Cycleway | Grass verge | Total |
|------------|----------|----------|-------------|-------|
| Eastbound  | 2.1m     | 2.4m     | 1.6m        | 6.1m  |
| Northbound | 4.2m     | 2.4m     | 1.2m        | 7.8m  |



Picture at the R842 - Eastbound



Picture at the R842 - Northbound

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18

Introduction
N11 Dual Carriageway
Glenamuck Road North
**Traffic Assessment (1/3)**
Long Term Operational Benefits
TII Publication Compliance

## TRAFFIC ASSESSMENT

### Areas Studied

To demonstrate a safe and efficient operation of the national road network during construction stage, a traffic count survey and traffic assessment at the Glenamuck Road North and N11 were conducted.

As the proposed scheme works at two sites will interact with the national road network carriageways, traffic count surveys were undertaken on the 27<sup>th</sup> May 2025 at Glenamuck Road North and at the N11, as shown, to determine current traffic behaviour in the vicinity of the subject sites and to facilitate the assessment of traffic impact due to the proposed scheme works at the sites, as follows:

- Junction 1: Glenamuck Road North Roundabout,
- Junction 2: Glenamuck Road North / Castle View Junction,
- Junction 3: N11 / Cherrywood Road / Bray Road Junction (for N11 Crossing Site).

To estimate the lane capacity for one traffic lane with minimum lane width of 3.0m, two guidance documents were referred to:

- Section 5.11 of "Transport Research & Information Note – A Study of Lane Capacity in the Greater Dublin Area".
- Table 5/3/1 of "Volume 15 – Economic Assessment of Road Schemes in Scotland (Section 1 – The NSA Manual) of Design Manual for Roads and Bridges".
- To provide a robust and conservative analysis ("worst-case") scenario, a lower figure of 1,200 vehicles per hour was adopted for assessment.

**Carrickmines Shanganagh River Flood Relief Scheme**

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19

Introduction
N11 Dual Carriageway
Glenamuck Road North
**Traffic Assessment (2/3)**
Long Term Operational Benefits
TII Publication Compliance

## TRAFFIC ASSESSMENT

### N11 Overflow Culvert Site

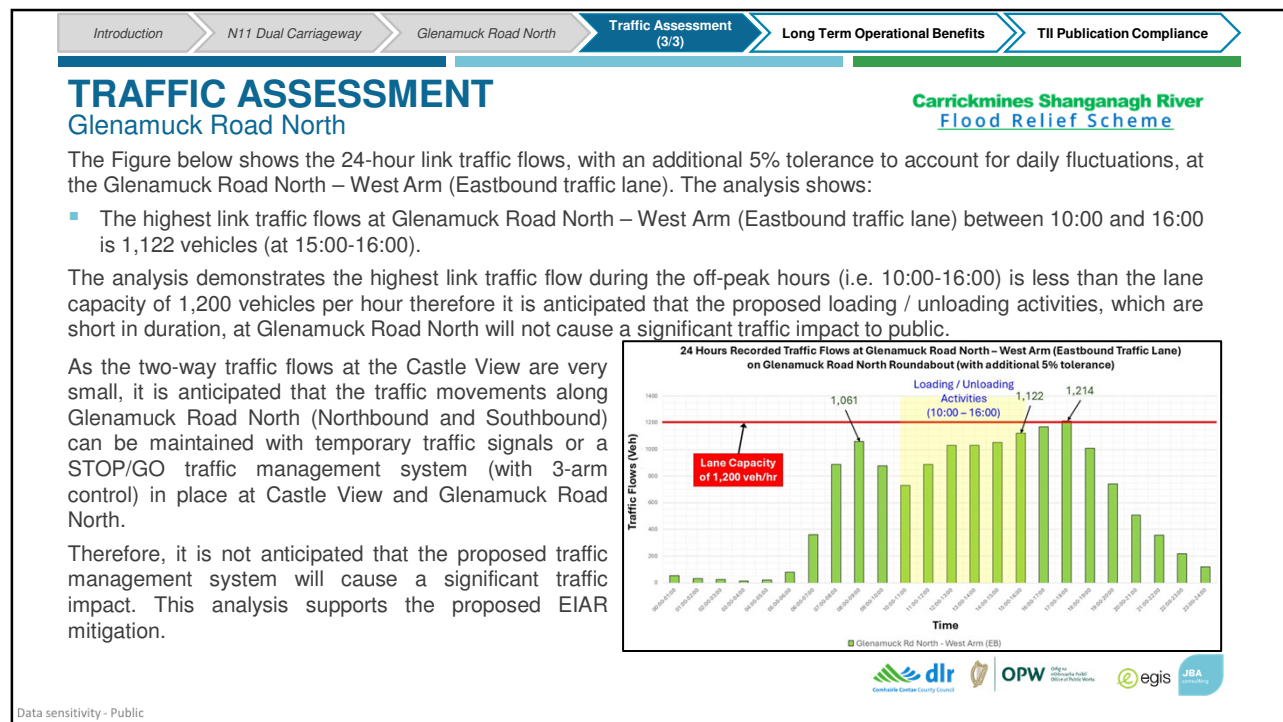
The Figure attached presents the 24-hour link traffic flows, with additional 5% tolerance to account for daily fluctuations, at the N11 (Northwest & Southeast bound) mainline. The analysis shows:

- The link traffic flows at the N11 mainline (Northwest bound) and N11 mainline (Southeast bound) in the morning peak hour are 1,962 vehicles at 08:00-09:00 and 1,336 vehicles at 11:00-12:00 respectively
- The link traffic flows at the N11 mainline (Northwest bound) and N11 mainline (Southeast bound) in the evening peak hour are 1,281 vehicles at 13:00-14:00 and 2,511 vehicles at 17:00-18:00 respectively.
- For the period between 10:00 and 16:00, the highest link traffic flows at the N11 mainline (Northwest bound) and N11 mainline (Southeast bound) are 1,510 vehicles at 10:00-11:00 and 2,029 vehicles at 15:00-16:00 respectively.
- The analysis shows the link traffic flows at the N11 mainline will exceed the lane capacity of 1,200 vehicles per hour hence, the reduction of any traffic lane at N11 in daytime will cause significant traffic impact to public.
- The analysis demonstrates the proposed works at the works site of the N11 overflow culvert will need to be undertaken between 20:00 and 06:00. This analysis supports the proposed EIAR mitigation.
- It is anticipated that full road closure at Bray Road with a traffic diversion between 20:00 and 06:00 will not cause a significant traffic impact to public.

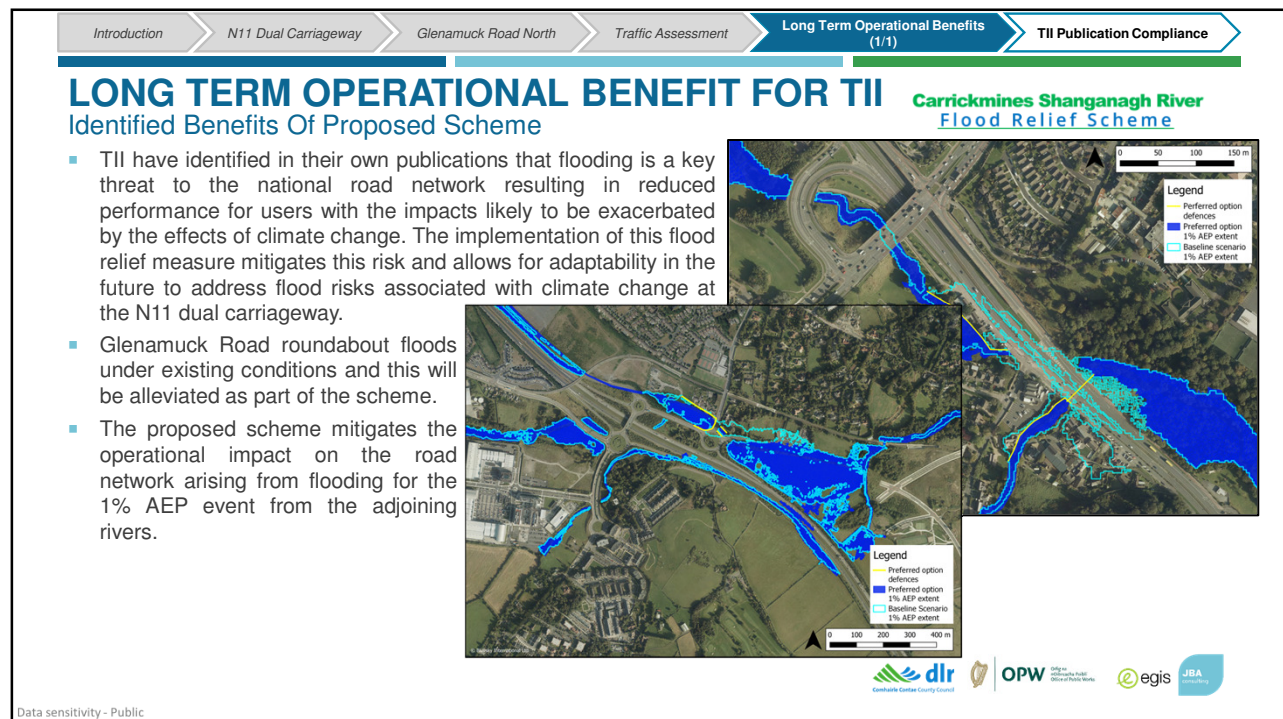
**Carrickmines Shanganagh River Flood Relief Scheme**

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20



21



22

Introduction > N11 Dual Carriageway > Glenamuck Road North > Traffic Assessment > Long Term Operational Benefits > **TII Publication Compliance (1/2)**

## TII PUBLICATION COMPLIANCE

**Carrickmines Shanganagh River Flood Relief Scheme**

TII has advised ABP that the FRS proposes to introduce significant new infrastructure in the N11 dual carriageway that must be subject to TII Publication compliance.

- TII Publication DN-STR-03001
- Is the N11 overflow culvert a Category 0 or 1 structure based on Section 3.4 of the guidance? (Extracts below)

**Category 0** - Simple structures, where all aspects of design, assessment and execution are in accordance with the current TII Publications (Standards) and Specification for Works (SPW) and contain no Departures, provided they also conform to one of the following:

- Single span simply supported structures with span of less than 5m;
- Buried concrete boxes or buried rigid pipes greater than 2m clear but less than 3m span/diameter and having more than 1m cover;
- Environmental barriers less than 2.0m in height.

**Category 1** - Simple structures, other than those in Category 0, which can be analysed by the equations of statics and where all aspects of design, assessment and execution are in accordance with the current TII Publications (Standards) and Specification for Works (SPW) and contain no Departures, provided they also conform to one of the following:

- Single span simply supported structures with spans greater than 5m but less than 10m and having less than a 25° skew;
- Buried concrete box type structures with spans greater than 3m but less than 7m span and having more than 1m cover;
- Corrugated steel buried structures less than 5m in span;
- Retaining walls with a retained height of less than 5m;
- Portal sign gantries with a span less than 20m;
- Cantilever sign gantries with an arm span of less than 9m;
- Environmental barriers 2.0m and greater in height;
- High masts;
- Telecom masts.

### MMaRC AREAS

TII advises that consultation and appropriate protocol agreement with the MMarC Network Contractor is required in relation to any proposed works.

We will engage with MMarC on the proposed flood alleviation measures at Glenamuck Road North.

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dlr | OPW | egis | JBA

23

Introduction > N11 Dual Carriageway > Glenamuck Road North > Traffic Assessment > Long Term Operational Benefits > **TII Publication Compliance (2/2)**

## TII PUBLICATION COMPLIANCE

**Carrickmines Shanganagh River Flood Relief Scheme**

### Construction Traffic Management Plan

We consider the provision of a Traffic Management Plan to be premature at this stage. We request that a condition to be included as part of the granted permission for the appointed Contractor to consult and agree the Construction Traffic Management Plan with TII and other relevant stakeholders including DLRCC and NTA, prior to construction of the flood relief works.

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24

Introduction > N11 Dual Carriageway > Glenamuck Road North > Traffic Assessment > Long Term Operational Benefits > TII Publication Compliance

**Carrickmines Shanganagh River**  
Flood Relief Scheme

# FEEDBACK AND DISCUSSION

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