

Project

Residential Development at Crodaun,  
Celbridge, Co. Kildare

Report Title

Stage 1 Road Safety Audit

Client

Ardstone Capital Ltd

# TRANSPORTATION



DBFL CONSULTING ENGINEERS

## Document Control

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## 1.0 INTRODUCTION

### 1.1 BACKGROUND

- 1.1.1 This report describes a Stage 1 Road Safety Audit (RSA) carried out for Ardstone Capital Ltd. The Audit, undertaken in December 2019 considers those elements of the design that have safety implications for all road users.
- 1.1.2 The proposed residential development site is located at Crodaun, Celbridge, Co. Kildare. The subject site is situated to the northeast of the R405 Maynooth Road corridor approximately 2km northwest of Celbridge town centre.
- 1.1.3 The subject greenfield development site is bounded to the southeast by an existing residential housing development (Crodaun Forrest Park), to the north-west by the R449 M4 Link Road (and M4 business park) and by agricultural lands to the northeast. The site fronts onto the R405 Maynooth Road corridor with agricultural lands currently facing the site on the opposite side of the road corridor. As illustrated in Figure 1.1 below the M4 motorway is approximately 500 meters north of the subject site. The indicative boundary of the proposed residential development site is presented in Figure 1.2.



Figure 1.1: Location of the Proposed Residential Development Site

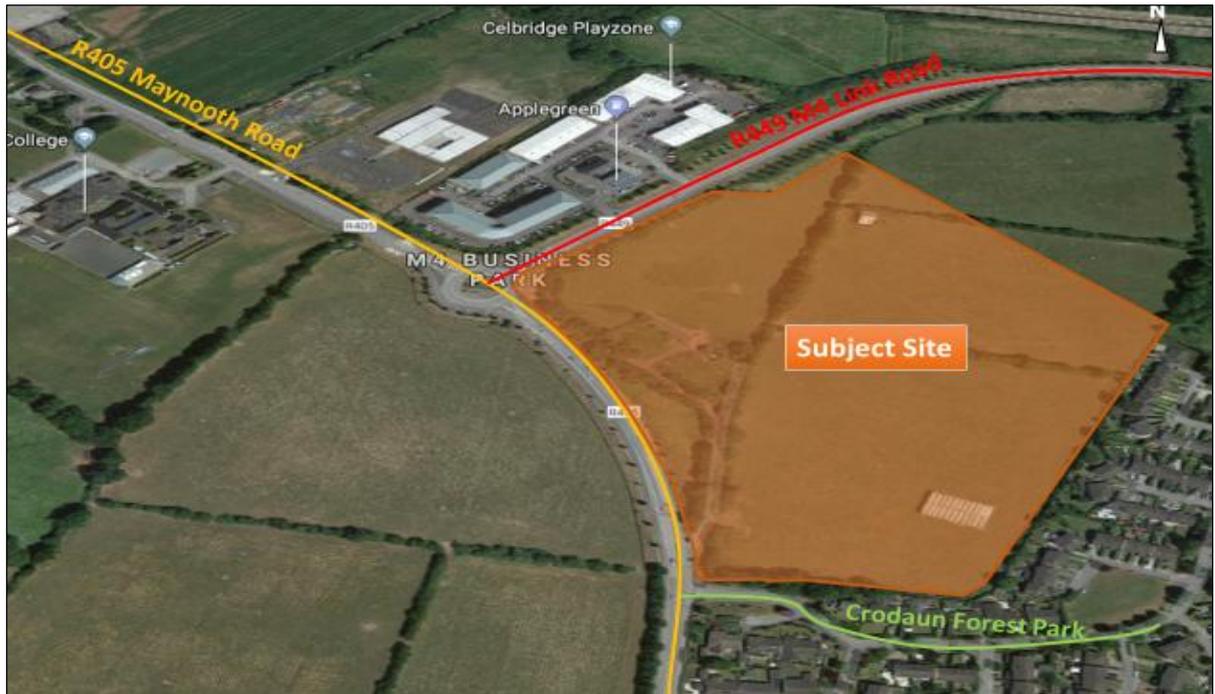


Figure 1.2: Extents of Benson Street Scheme (Source : Googlemap)

1.1.4 The geographical scope of this road safety audit considers the proposed residential developments new site access junction (Three arm priority-controlled ghost island arrangement) on the R405 Maynooth Road and its immediate approaches as illustrated in Figure 1.3 below.

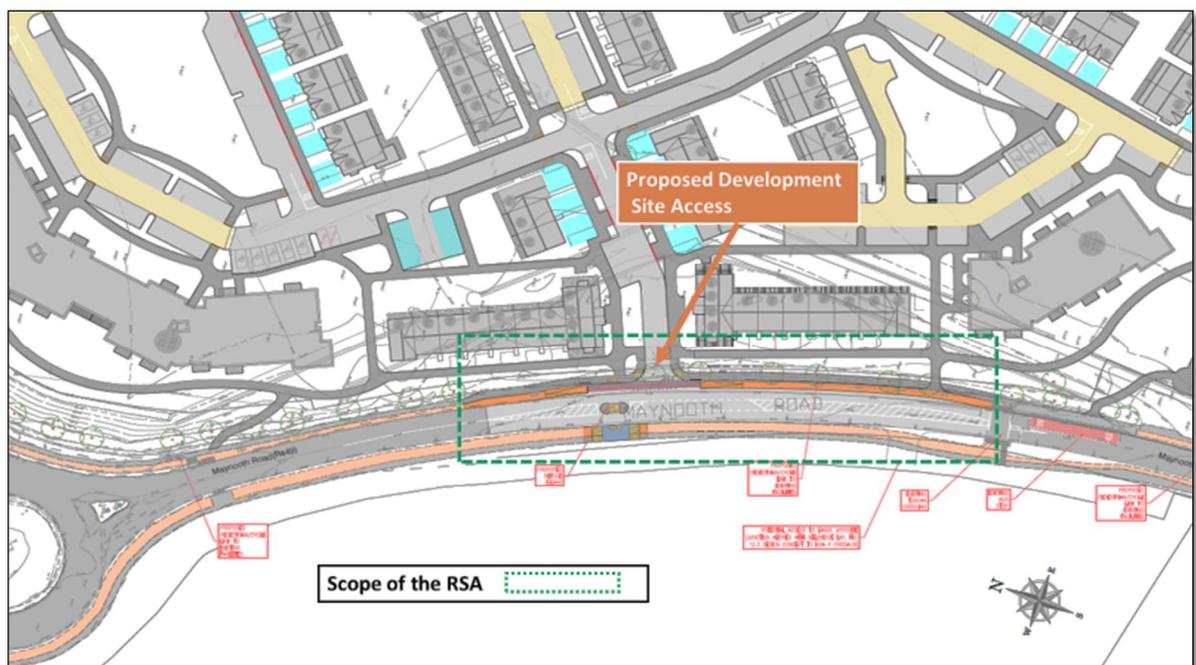


Figure 1.3: Geographical Scope of Road Safety Audit  
(Extract of Entrance Junction General Arrangement Drawing, DBFL)

1.1.5 The Audit Team membership was as follows:

Team Leader: Thomas Jennings *BEng MSc MIEI MIHT CMILT*  
*DBFL Consulting Engineers*

Team Member: Robert Kelly *BAI, MA, PG Dip. Const. Law, CEng MIEI*  
*DBFL Consulting Engineers*

1.1.6 The Audit comprised a desktop review of the documents listed in Section 5 of this report in addition to an examination of the existing site characteristics. The site was visited on Monday 2<sup>nd</sup> December 2019 between 9:00am and 11:00pm with the objective of quantifying;

- existing traffic (pedestrian, cyclist and vehicular) and travel demand characteristics,
- any issues that might impact the safety of non-motorised users (NMU's).

1.1.7 The audit confirmed that the general location of the new site access junction on Maynooth Road is currently subject to 60kph vehicle speed regulations and benefits the provision of footpaths and cycle tracks along both sides of the corridor. It was noted that street lighting is currently provided along the north-eastern side of the road corridor in the general area of the proposed site access junction.

1.1.8 This Audit has been carried out in accordance with the relevant sections of Transport Infrastructure Ireland (TII) guidance GE-STY-01024 (December 2017) for Road Safety Audits. The Audit Team has examined only those issues within the proposed design relating to the road safety implications of the scheme and has therefore not examined or verified the compliance of the design to any other criteria.

1.1.9 The problems identified and described in this report are considered by the Audit Team to require action in order to improve the safety of the scheme proposals and minimise both accident occurrence and level of severity.

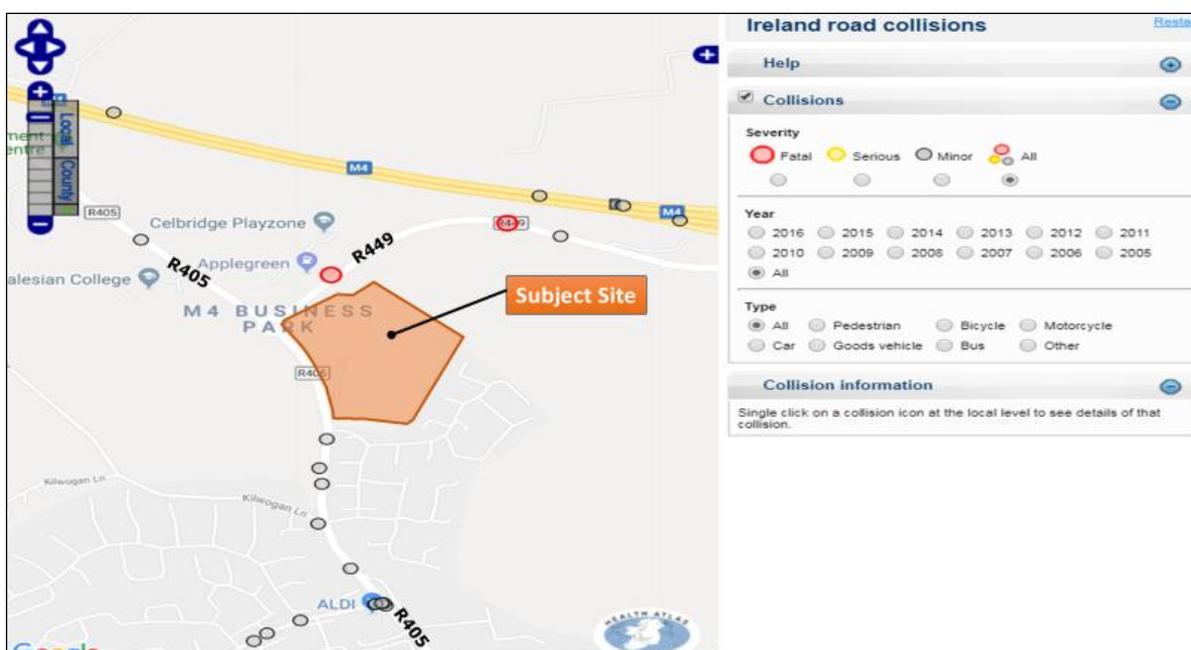
1.1.10 It should be noted that this audit does not comment on areas/issues where the subject proposals either removes or replaces the existing observed problems through the physical provision of the scheme proposals, associated new infrastructure and associated traffic management regime. As such it is

assumed that the aforementioned areas will be addressed by the scheme proposals.

1.1.11 The collision statistics on the Road Safety Authority (RSA) website were reviewed in order to ascertain the safety record of the subject site location in the vicinity of the subject scheme proposals over the most recent 12-year period. This includes information for the years 2005 to 2016 inclusive and indicates basic information on all reported incidents.

1.1.12 The RSA database records details where collision events have been officially recorded such as when the Garda are present to formally record details of the incident.

1.1.13 According to the RSA data there have been three minor collisions within 500m of the proposed development entrance along the Maynooth Rd (R405). There have been one minor and two fatal collisions along the M4 link road (R449). One of the fatal collisions included a pedestrian and the other fatal collision involved a head-on conflict. Figure 1.4 below illustrates the general locations of collisions in the vicinity of the subject site.



**FIGURE 1.4: RSA Collision Data (www.rsa.ie)**

1.1.14 In summary the review confirms that no significant incident trends or significant safety concerns are evident across the local road network in the immediate vicinity of the proposed development site access junction on the Maynooth Road corridor.

## 2.0 ITEMS RAISED DURING THIS STAGE 1 ROAD SAFETY AUDIT

### 2.1 PROBLEMS AT GENERAL LOCATIONS

#### 2.1.1 Location (G1) – Lighting

Problem:

The drawings provided for the purpose of this Road Safety Audit do not provide any details in regard to the provision of street lighting. As a result, the auditors cannot comment upon the adequacy of the proposed street lighting.



However, the auditors noted during the site visit that lighting columns are currently present along the north-eastern side of the Maynooth Road in immediate vicinity of the proposed development site access. As the audit was done during daytime, the lights were not operational during the site visit.

It is noted that the widening of the existing road carriageway on the Maynooth Road will require the relocation of a number of these street lighting columns.

It is unclear whether the proposed site access junction will be sufficiently lit in the hours of darkness. Any reduction in the level of street lighting could contribute to either (i) vehicle drivers not observing the cyclists resulting in a conflict and (ii) increase likelihood of a trip incident for pedestrians. Perceived security levels could also be compromised by poor streetlight conditions.

Recommendation:

The scheme designers should ensure that the appropriate level of illumination is provided for through the proposed site access junction and across the immediate approaches and internal streetscapes, footpaths and cycle tracks / lanes.

#### 2.1.2 Location (G2) – Width of Existing Footpath (North-eastern Side of Maynooth Road corridor)

The Audit team noted that the existing footpath along north-eastern side of the Maynooth Road corridor exhibits a varying substandard width in places below the recommended levels. The available width of the existing footpath becomes narrower due to the encroachment of the adjoining grass verge that has over recent years encroached into the footpath.



As a result of the inadequate width, pedestrians are required to walk on the adjacent cycle track. This could lead to conflicts between pedestrians and cyclists as there is increased pedestrian and cyclist movement particularly during school peak hours.

#### Recommendation

The designers should ensure that (i) an appropriate width is safeguarded along all new footpaths being proposed as part of the scheme proposals, and (ii) that the existing footpaths being retained on both sides of the Maynooth Road corridor (along the site frontage) are subject to a maintenance regime that removes the grass that has grown over the sides / edges of the existing footpaths with the objective of making the full as-built width of the footpath available for pedestrians.

### 2.1.3 Location (G3) – Road Drainage

The drawings provided for the purpose of this Road Safety Audit do not provide any details in regard to the provision of road drainage. As a result, the auditors cannot comment upon the adequacy of the proposed drainage provision.

#### Recommendation

The designers should ensure that the design of the scheme proposals including all road carriageway, footpath, and bicycle tracks / lanes hard surfaces benefit from the provision of adequate drainage system and associate gully specifications and locations) that will ensure that the pooling of surface water does not arise and that the location / specification of road gullies do not present a hazard for road users, particularly motorcyclists, pedal cyclists and pedestrians.

## 2.2 PROBLEMS AT SPECIFIC LOCATIONS

### 2.2.1 Location (S1) – ESB Pillars and Cabinets

Problem:

During the site visit the auditors noted that there are currently two cabinets located in the general area of the proposed site access junction. There are no details provided on the



drawings presented for the purpose of this RSA in regard to the continued need / retention or relocation of these existing cabinets. The scheme proposals should consider the need for retaining / relocating these cabinets and ensure that any new location as part of the subject junction works do not impede road uses or give rise to conflicts / accidents both during the development's initial construction and subsequent operational stages.

Recommendation:

It is recommended that the designers confirm the need to retain / upgrade the existing cabinets and if being relocated they should be positioned where they will not adversely impede road users or the safe operation of the local road network.

### 2.2.2 Location (S2) - Electricity Pole / Transformer / Pylon

The auditors have noted that there is an existing electricity pole and distribution transformer in proximity of the proposed site access junction. There are no details provided on the scheme drawings presented for the purpose



of this RSA in regard to the continued need / retention or relocation of this electricity pole. The scheme proposals should consider the need for relocating this electricity pole / transformer and ensure that any new location as part of the subject junction works do not impede road uses or give rise to conflicts / accidents both during the development's initial construction and subsequent operational stages.

Recommendation:

It is recommended that the Electricity Transformer / Pylon to be relocated to an appropriate position where it will not adversely impede road users or the safe operation of the local road network during the development's initial construction and subsequent operational stages.

### 2.2.3 Location (S3) – Visibility Splay from Minor Road

The drawings provided for this road safety audit do not provide any details in regard to the level of visibility splay that are available to vehicle drivers when seeking to exit the proposed new junction minor road. Failure to provide sufficient visibility for the drivers may result in overshoot incidents or side impact collisions with other road users.

Recommendation:

Ensure appropriate levels of visibility splays are provided for all road users at the proposed access junction in reference to the 85<sup>th</sup> percentile of vehicle

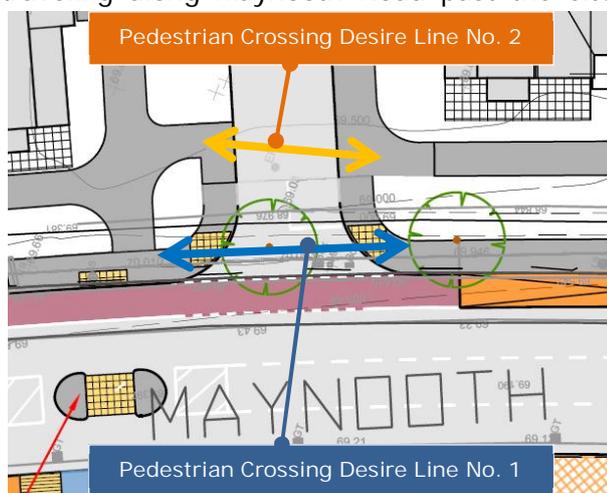
speeds currently travelling in both directions along the Maynooth Road corridor in the area of the proposed site access junction.

#### 2.2.4 Location (S4) – Minor Side Road with Pedestrian Priority

The auditors noted during the site visit a notable volume of pedestrians walking along the existing pedestrian footpaths as located on both sides of the Maynooth Rd corridor and traveling to/from destinations located to the northwest of the subject site (including schools and business park facilities).

The design of the proposed site access junction incorporates a traditional configuration that affords a higher priority to vehicles entering / exiting the proposed development and thereby requiring pedestrians (traveling along the main arms of the junction) to cross the minor arms road carriageway (by way of tactile paving and dropped kerbs). It is also noted that a 'second' potential pedestrian crossing desire line (across the minor arm of the junction) is evident approximately 6m back into the site and parallel to the main arm's pedestrian footpaths.

In the context of (i) a single vehicle access being proposed to serve the entire residential development (subsequently influencing the number of vehicle movements into / out from the junction's minor arm), (ii) the number of pedestrians (and potential vulnerability of these pedestrians e.g. school children) possibly crossing the minor arm of the junction, (iii) the presence of a 'second' pedestrian desire line immediately within the site, and (iv) the observed speed of vehicles traveling along Maynooth Road past the site (particularly southbound vehicle drivers which may influence the speed of vehicle turning into the subject site from the Maynooth Rd) the auditors are concerned that the potential for conflicts between inbound moving vehicles and pedestrians is increased.



#### Recommendation:

It is recommended that both pedestrian desire lines (across the minor arm of the site access junction) are amalgamated into a single crossing facility that is set back within the site 5m and benefits from the provision of a flat table top ramp and tactile paving thereby affording pedestrians enhanced priority in addition to slowing vehicle speeds at the potential conflict point. This approach also provides an entrance feature into the slower speed environment within the proposed residential development. Consideration should also be afforded to tapering the Maynooth Road kerbside footpath (as located either side of the proposed minor arm) from its kerbside location to the new crossing point location thereby encouraging pedestrians to cross the minor road at the appropriate location.

#### 2.2.5 Location (S5) – Minor Arms STOP Road Markings and Sign

The drawings provided for the purpose of this audit do not detail the provision of the regulatory STOP wording (Road markings) nor the associated STOP sign on the minor arms approach to the proposed site access junction. Failure to include these regulatory instruments could result in existing vehicle drivers treating the junction as a 'yield' configuration which could potentially lead to overshooting incidents and potential conflicts with moving vehicles traveling along Maynooth Road corridor.

#### Recommendation:

Regulatory STOP road markings and signage should be provided in accordance with the guidance outlined within the Traffic Signs Manual.

#### 2.2.6 Location (S6) – Length of Turning Lane

The auditors are concerned that the proposed length of the site access junctions right turn lane may prove to be insufficient to meet the demand generated by vehicles queuing to turn right into the proposed development. In instances where the queuing vehicles exceed the length of the proposed right turn lane the potential for rear end type of vehicle collisions increases.

#### Recommendation:

The designers should confirm if the predicted demand for vehicles waiting to turn right into the proposed residential development can be accommodated within the length of the proposed right turn lane. If the length of queuing vehicles is found to exceed the length of the right turn lane then extent of the right turn lane should be increased an appropriate distance.

#### 2.2.7 Location (S7) – Proposed Cycle Track (North-eastern side of Maynooth Rd)

The proposals include the relocation and subsequent replacement of a section of existing cycle track as located along the north-eastern side of the Maynooth Road corridor. The length of the bicycle track facility that is being repositioned / replaced constitutes an old design arrangement that is no longer advocated within the National Cycle Manual (NCM) due to the difficulty that sight impaired pedestrians have distinguishing between pedestrian route and adjoining cycling routes.

The auditors are concerned that, in the absence of the such details within the drawings provided for the purpose of this RSA, the scheme may seek replicate the existing on-site pedestrian / cycle track arrangements for which are no longer recommended by the NCM

Recommendation:

The design / construction of the proposed new cycle track infrastructure (parallel to the footpath) should be undertaken in accordance with the guidance detailed within the NCM.

#### 2.2.8 Location (S8) – Proposed Cycle Track (North-eastern side of Maynooth Rd)

The proposals include for the provision of a southbound cycle lane through the proposed new site access junction with ramp transitions accommodating cyclists between the proposed cycle track and on-road cycle lane. In the absence of tactile paving the introduction of the above measures could result in blind and/or sight impaired pedestrians being directed onto the on-road cycle lane and subsequently onto the road carriageway where they could come into conflict with moving vehicles.

Recommendation:

Further to S7 above, it is recommended that tactile paving is provided at the demarcation / tie-in between the existing on-site cycle track and the proposed new cycle track facility in response to best practice design guidance.

#### 2.2.9 Location (S9) – Proposed Cycle Track (North-eastern side of Maynooth Rd)

The proposals include for the provision of a southbound cycle lane through the proposed new site access junction with ramp transitions (to the north and south of the proposed site access junction) accommodating cyclists traveling between the proposed cycle track and on-road cycle lane. The auditors are concerned that the short length of the mandatory cycle lane located between the proposed site access junction and the transition ramp (cycle track to cycle lane) to the north of the site access junction is insufficient in length to enable southbound vehicle drivers to be aware of the presence of on-road cyclists. In such situations southbound vehicle drivers seeking to turn left into the proposed development may not appreciate the presence of a cyclists (within the parallel cycle lane) and may subsequently manoeuvre to turn left thereby cutting across the path of the cyclists resulting in a potential collision.

Recommendation:

The design / construction of the proposed new cycle lane infrastructure (and position of transition ramps) should be undertaken in accordance with the guidance detailed within the NCM with the provision of at least a 20m length of mandatory cycle lane immediately to the north of the site access junction.

#### 2.2.10 Location (S10) – Maynooth Road Uncontrolled Pedestrian Crossing Facility

The auditors welcome the provision of a formal defensible pedestrian area within the centre of the Maynooth Road carriageway (immediately north of right turning lane). The implementation of the proposed pedestrian refuge area with solid raised islands either side will enable vulnerable road users to cross the road carriageway adopting a two-stage crossing process. The provision of these raised islands could also perform an important traffic calming role.

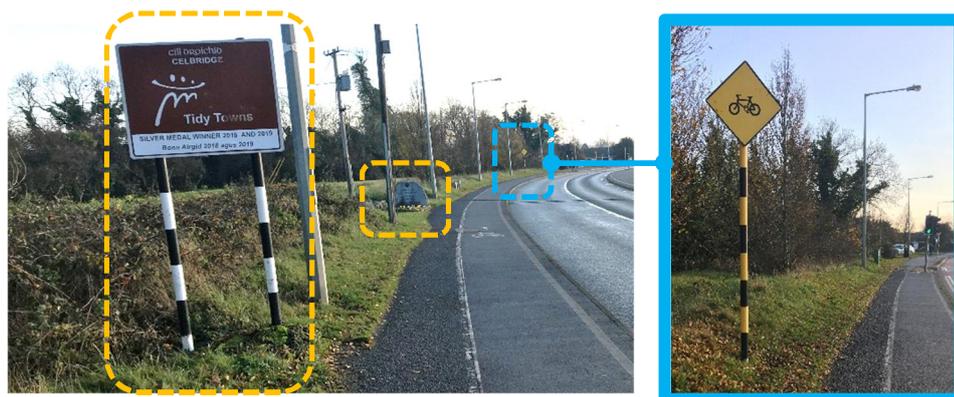
Nevertheless, the auditors are concerned that the modest size of the proposed raised islands (within the ghost islands hatched area) could make it difficult for vehicle drivers, particularly during dark and / or wet conditions, to clearly see and subsequently appreciate the presence of the raised islands from an appropriate distance away. If vehicle drivers can not clearly observe the raised islands when appropriating them, they may fail to proceed in an appropriate manner and speed which could result in them colliding with the island and / or other road users using the informal crossing facility.

Recommendation:

It is recommended that the size (length) of the physical islands is increased and constructed using a material of contrasting colour to the road carriageway with the objective of enhancing the conspicuousness of the islands (and the pedestrian refuge / crossing facility on Maynooth Road) for vehicle drivers. Keep Left signs should also be provided at the nose and heel of the proposed traffic islands.

### 2.2.11 Location (S11) – Existing Street Furniture and Advance Warning Signs

Existing street furniture in the form of signage (Tidy Towns and Cyclists Warning signs) and town entrance feature (Stone name plate) are required to be relocated to accommodate the proposed site access junction works.



The auditors are concerned that if the proposed junction design does not take due consideration of these existing features local stakeholders may seek to retrofit them to the completed scheme (upon completion of subject construction works). In such situations they may be located within

inappropriate locations where that may constitute a hazard to road users including cyclists and pedestrians.

Recommendation:

It is recommended that the scheme designers undertake an audit of all existing street furniture impacted by the proposed works (and on the immediate approach to and from along Maynooth Rd) and identify which features are to be removed completely or relocated (in appropriate locations) as part of the subject development works.

#### 2.2.12 Location (S12) – Junction Ahead Advanced Warning Sign

The auditors note that the scheme proposals do not detail the provision of a junction ahead warning sign to inform vehicle drivers of the presence of the new site access junction and the need to proceed with due caution.

Recommendation:

The auditors note the suburban edge location of the scheme proposals and the existing 50kph regulations but recommend that an advance warning sign indicating the presence of the new junction is provided to inform southbound vehicle drivers for a period of at least 24 months. The specification and placement of such a sign to confirm with the guidance detailed with the Traffic Signs Manual.

#### 2.2.13 Location (S13) – Proposed Tree Planting

The auditors note that the drawings presented for the purpose of the RSA detail the location of a number of trees along the north-eastern side of the Maynooth Road corridor. The auditors are unable to definitely confirm if the drawings tree symbols relate to existing or proposed tree planting, with a number of symbols located in areas where they will conflict with road / cycle track / footpath users.

Recommendation:

It is recommended that all proposed landscaping / tree planning is located / positioned appropriately, considers the width and height clearance

requirements of all road users (including pedestrians and cyclists) and is positioned to ensure that it does not compromise road safety or encroaches into the site access junction's visibility splays.

### 3.0 OBSERVATIONS AND COMMENTS

#### 3.1.1 Location (C1): Pedestrian and Cycle Facility on the of the Maynooth Road Corridor

As illustrated below there is a two-way cycle track and parallel footpath currently provided along the southwestern side of the Maynooth Road corridor opposite the proposed site access junction.

During the site visit the auditors observed that the cycle track and pedestrian footpath surface had a number of deformations which represent a hazard for both cyclists and pedestrians. It is recommended that the local authority is made aware of these existing deficiencies with the objective of programming appropriate maintenance works as soon as the opportunity arises.



During the site visit the auditors observed that many students were both walking and cycling to / from the local school / colleges using these existing facilities. The auditors noted that many of these cyclists travelled in groups of up to 4 or 5 and were observed using both sides of the two-way cycle track and the adjoining pedestrian footpath. This practice made it both difficult and uncomfortable for pedestrians who very much felt threatened (feel of being in a collision) by the groups of cyclists using the pedestrian footpath.



These existing practices should be monitored by the local roads authority with consideration being given to the need to retrofitting appropriate control measures with the objective of guiding cyclists to use the cycle tracks, segregating users and subsequently enhancing safety levels for pedestrians

### 3.1.2 Location (C2): Maynooth Rd Southbound Bus Stop

The proposals seek to retain the existing southbound bus interchange as located to the south of the proposed site access enhancement works. The scheme proposals could potentially result in an intensification of both pedestrians and cyclists (travelling southbound) either using or traveling through the existing bus stop area.

This demand could warrant the retrofitting of a bus stop in the future to accommodate the increased number of patronage pick-ups from this interchange. The accumulative impact of both an intensification in use and the retrofitting of a bus shelter in the future could result in a narrowing of the available 'shared area' which could contribute to collisions between pedestrians / bus patrons / cyclists in the general area of the existing bus stop.

It is recommended that the scheme proposals at minimum safeguard the ability for the existing bus interchange to be easily upgraded in the future with the objective of accommodate a bus stop layout as per the guidance outlined with the National Cycle Manual.

## 4.0 AUDIT TEAM STATEMENT

### 4.1 AUDIT TEAM STATEMENT

4.1.1 I certify that I have examined the drawings and other information listed in Chapter 5. This Audit has been carried out with the sole purpose of identifying any features of the Design that could be removed or modified to improve the safety of the Scheme. The problems that I have identified have been noted in the report, together with suggestions for improvement which we recommend should be studied for implementation.

Audit Team Leader: Mr. Thomas Jennings  
*BEng MSc MIEI MIHT CMILT*  
DBFL Consulting Engineers

Signed:

Date:

Audit Team Member: Mr. Robert Kelly  
*BAI MA PG Dip. Const. Law CEng MIEI*  
DBFL Consulting Engineers

Signed:

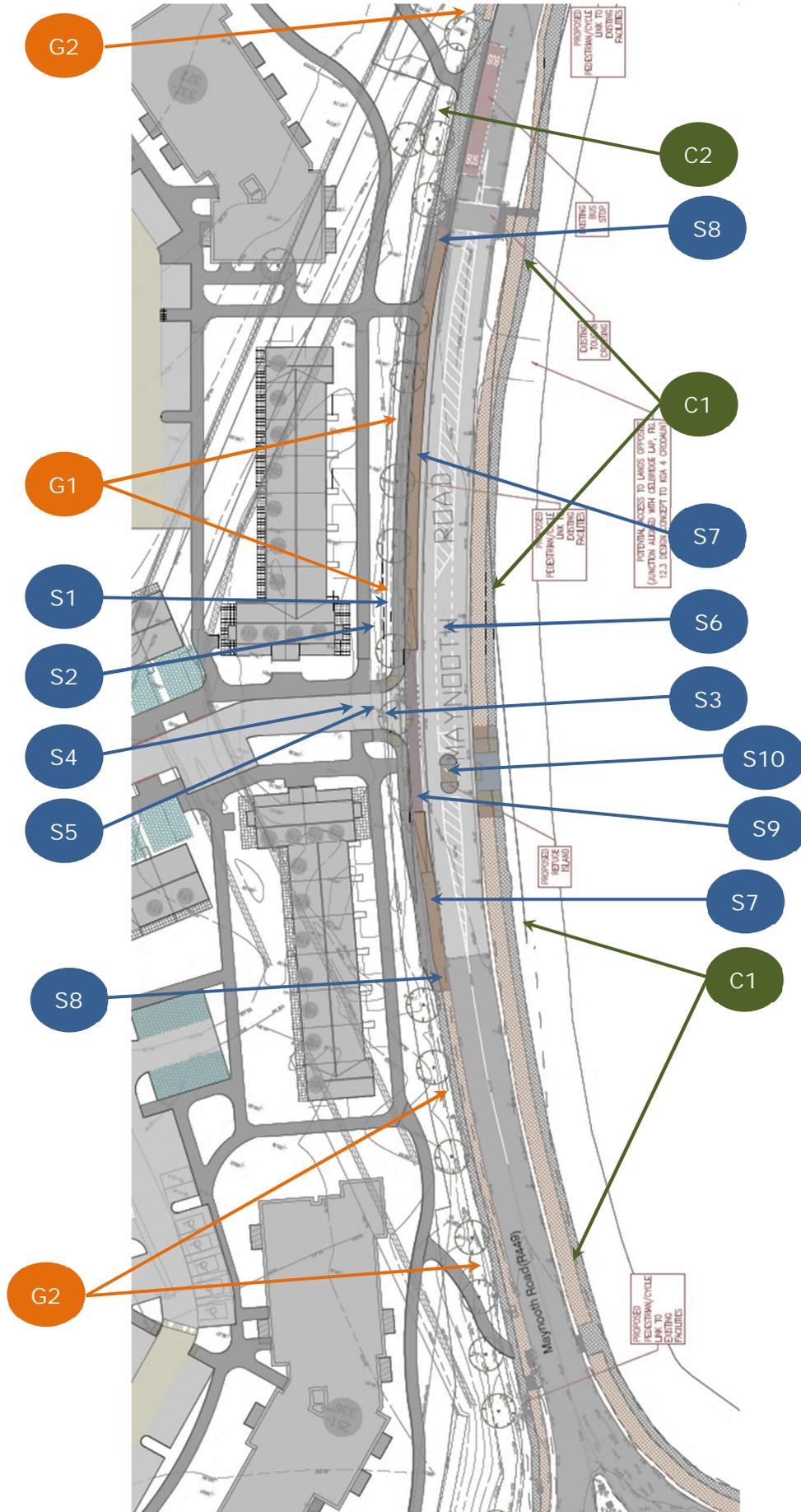
Date:

## 5.0 LIST OF INFORMATION RECEIVED

	Items Received	Yes/No	Details
1	Scheme Description	Yes	• Short description in email (29/11/2019)
2	Project Brief	No	
3	Scheme / Project Drawings	Yes	• DBFL Drawing No. 170099-2003
4	Departures from Standard	No	
5	Traffic Signal Information	N/A	
6	Road Signs & Road Marking Details	No	
7	Traffic Count Information	No	
8	Speed Survey Data	No	
9	Collision Data	No	Obtained by DBFL from <a href="http://www.RSA.ie">www.RSA.ie</a>
10	Previous Road Safety Audit Reports	No	
11	Relevant Design Standards	No	
12	Public Transport Information	No	
13	Other Information	No	

## APPENDIX A

### Problem Locations



## APPENDIX B

### Feedback Form

## ROAD SAFETY AUDIT FEEDBACK FORM

**Scheme:** Proposed Residential Development at Crodaun, Celbridge, Co. Kildare

**Audit Stage:** 1

**Date Audit Completed:** December 2019

To be Completed By Designer					To be Completed by Audit Team Leader	
Problem No. in Road Audit Report	Problem accepted (yes/no)	Recommended measure accepted (yes/no)	Describe alternative measure(s). Give reasons for not accepting recommended measure. Only complete if recommended measure is not accepted.	Alternative measures or reasons accepted by Auditors (yes/no)		
G1	Yes	Yes				
G2	Yes	Yes				
G3	Yes	Yes				
S1	Yes	Yes				
S2	Yes	Yes				
S3	Yes	Yes				
S4	Yes	Yes				
S5	Yes	Yes				
S6	Yes	Yes				
S7	Yes	Yes				
S8	Yes	Yes				
S9	Yes	Yes				
S10	Yes	Yes				
S11	Yes	Yes				
S12	Yes	Yes				
S13	Yes	Yes				



*Brendan Keogh*

Signed:

Designer: Brendan Keogh

Date: 10/12/2019

*Thomas Jennings*

Signed:

Audit Team Leader: THOMAS JENNINGS

Date: 10/12/2019

*Dan Reilly*

Signed:

Employer: Dan Reilly

Date: 10/12/2019

*Please complete and return to safety auditor.*

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