

Road Safety Audit

Stage 1/2

for

MONEYDUFF HOUSING DEVELOPMENT

AT

ORANMORE, Co GALWAY

Date: April 2019

Report produced for: TOBIN Consulting Engineers

Report produced by: Road Safety Matters

Reference: RSM/MOB/090318/MONEYDUFFRSA1-2

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DOCUMENT CONTROL SHEET

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Record of Issue

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DRAFT 1	M O' B	AJS	22/5/18	Brendan Rudden, TOBIN Consulting Engineers
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BACKGROUND INFORMATION

The report which follows is the Road Safety Audit - Stage 1/2 for access to a proposed residential development to the west of the N67 (old N18) in Oranmore, Co Galway, based on the information supplied to the RSA Team as detailed below. The scheme will involve construction of a creche and residential dwellings accessed via a network of internal roads and junctions, along with parking and all associated ancillary services.

Table 1: Information Supplied

Item		Supplied	Comment
A	Plans / Drawings	Y	10402-2005_C-Proposed Roads Layouts
			10402-2006_C-Proposed Roads Layouts
			10402-2017_B-Lighting Layout
			10402-2018_B-Autotrack Layout Refuse Vehicle
			10402-2019_B-Autotrack Layout Large Car
			10402-2020_B-Autotrack Layout Fire Truck
			10402-2014_A-Site Location Map
			House Type C-2325-P 027
			House Type F Curtilage-2325-P-018
			House Types A and B-Layout2
			House Types D and J-Layout2
			2325-P-025 Uncontrolled Pedestrian Crossing Detail-2325-P-025
			2325-P-026 Boundary Treatment Plan-2325-P-026
			2325-P-031-032 Home Zone +Duplex garden-2325-P-031
			10402 Moneyduff Access Mark Up
			2325-P003-P005_Rev D-2325-P-003_A
			2325-P003-P005_Rev D-2325-P-004
2325-P003-P005_Rev D-2325-P-005			
B	Traffic Volume Information	Y	10402-Traffic and Transportation Statement_Rev D

Table 1 Contd...			
C	Speed Count Data	N	
D	Collision Data	N	
E	Departures from Standards	N	
F	Audit Brief	Y	RSA 1/2 Scope of Audit to include internal site layout only
G	Other Data / Documents	Y	10402-DMURS - Statement of Consistency _ Rev D 2325_Planning Statement_Connections 2325_Planning Statement_Permeability

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1. INTRODUCTION

- 1.1 This report results from a Stage 1/2 Road Safety Audit (RSA) of the internal site layout at a new residential development, in Moneyduff, Oranmore, Co Galway, carried out at the request of TOBIN Consulting Engineers. The site is located to the west of the N67 (old N18) national road approximately 10km to the southeast of Galway City Centre, at the location shown in Figure 1. This Audit examines the road safety implications associated with development of the site including all internal access roads and junctions within the red line boundary of the site shown in figure 2. The Audit did not include the link road and roundabout running along the eastern boundary of the site or the connection to the existing roundabout on the N67, as this infrastructure has been granted permission through development of adjacent lands surrounding the subject site, and as such is subject to separate Auditing procedures.



Figure 1: Site Location Plan (Red Line Boundary Indicative Only)



Figure 2: Internal Site Layout

1.2 The RSA was carried out during March and April 2018 and included a site visit by the Audit Team on Friday 9th March 2018 during daylight hours. The weather at the time of the site visit was fine and dry, and the surface of the road was predominantly dry. Traffic conditions on the N67 adjacent to the site were light and the posted speed limit on the N67 adjacent to the site was 100 km/hr.

1.3 The Audit Team Membership was as follows;

Team Leader: Miriam O'Brien – BE (Civil) FIHE MIEI MCIHT SoRSA CoC

Team Member: Anthony Sumner – HNC Civil Eng, AEng, MIEI, MIHT

1.4 The Audit took place at the offices of Road Safety Matters following the site visit by the Audit Team. The Audit was undertaken in accordance with the Design Team's Audit Brief, and comprised an examination of the plans provided by the Design Team, as listed in Background Information, Table 1.

1.5 The terms of reference of the Audit are as described in TII GE-STY-01024 Dec 2017. The team has examined and reported only on the road safety implications of the scheme as presented and has not examined or verified the compliance of the design to any other criteria. Comments on potential issues arising from a safety review of the site with reference to the Design Manual for Urban Roads and Streets (DMURS) have also been included where relevant, in respect of urban nature of the development. DMURS changes the approach to traffic safety in urban areas with the emphasis now on creating low-speed environments where it is clear to car drivers that they must give way to vulnerable road users (VRUs), thus reversing the traditional vehicle-dominated road hierarchy to favour non-motorised traffic.

1.6 Section 2 of this report contains issues raised by the Stage 1/2 RSA together with recommendations to be considered. Section 3 contains the Auditor Team Statement. Most issues raised in Section 2 can be cross-referenced with the scheme drawing (**Appendix C**) and photographs taken on the site visit (**Appendix B & Within Body of Report** where necessary).

2. ISSUES RAISED BY THE STAGE 1/2 ROAD SAFETY AUDIT

2.1 GENERAL

2.1.1 The designers have not advised of any departures from standard.

2.1.2 There was no information provided relating to cross sections or long sections.

2.1.3 A review of the Road Safety Authority (RSA) online collision database indicates that there were a number of collisions recorded on the N67 to the west of the site between 2005 and 2014 inclusive, as shown in Figure 3, all resulting in minor casualties. The cluster of 3 collisions recorded at the roundabout were single vehicle collisions. It should be noted that the RSA database is not a comprehensive record of collisions, and should be reviewed in conjunction with the Local Authority / Gardaí records for the site.

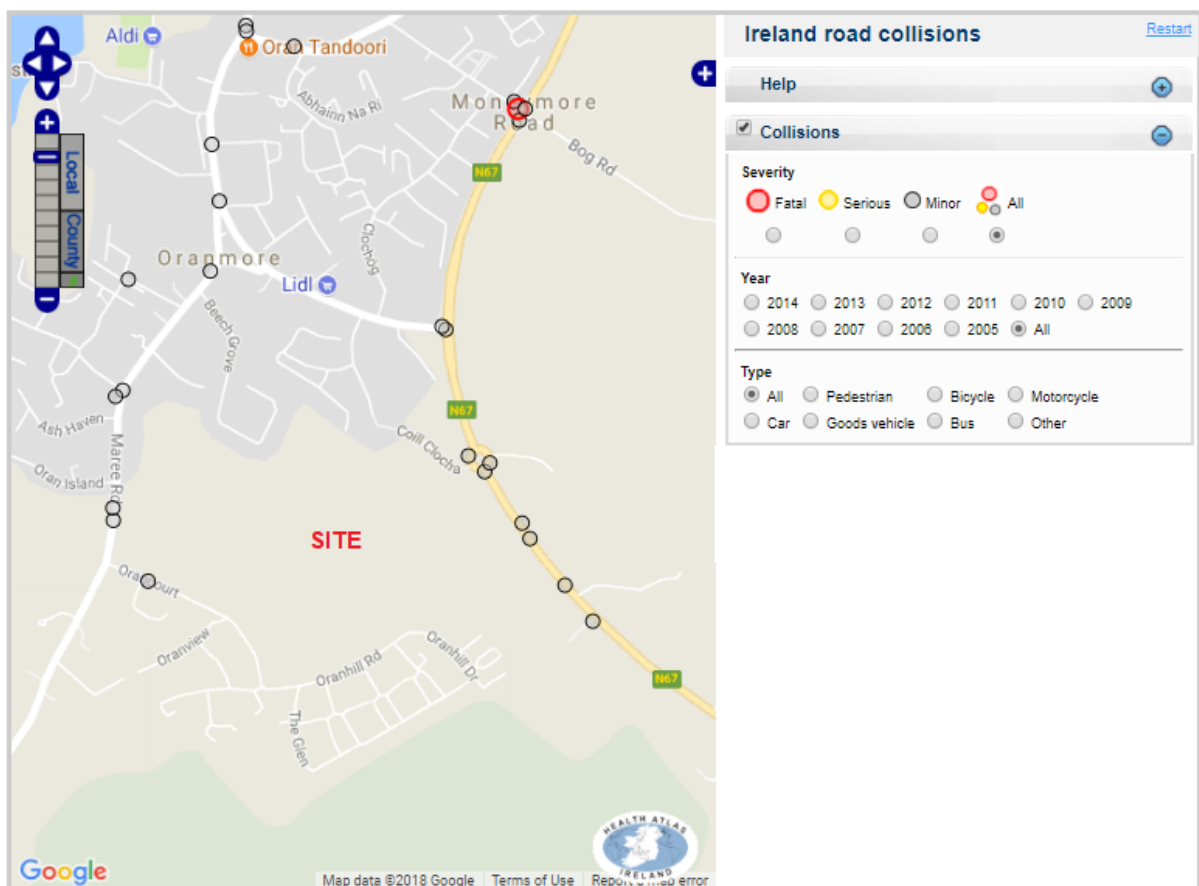


Figure 3: Collision Plot for Surrounding Road Network

2.1.4 Problem – Speed Limit at Site

The site will be accessed from a link connecting two roundabouts, one existing roundabout on the N67, which is shown in the photos in figures 4 and 5, and the other forming a new junction with a newly constructed network of roads serving proposed residential developments in the locality. The N67 is posted with a speed limit of 100 km/hr, and there is no other speed limit signage proposed on the internal estate roads. Observed site speeds on the N67 on approaches to the roundabout at the time of the site visit were considered high, which will increase the risks to all road users accessing the development from this direction. A pattern of single vehicle collisions was also noted in respect of the current collision history adjacent to the site, as outlined in paragraph 2.1.3, which are typically characterised by loss of control and speeds inappropriate to local conditions. 100 km/hr is characteristic of a high speed inter urban arterial route, and is considered too high for an area where a significant number of Vulnerable Road Users (VRUs, e.g. pedestrians and cyclists) should be anticipated, including children at play, and a speed limit of 30 km/hr or less would be considered more appropriate for an urban residential environment. The Designer has confirmed that it is expected that Vulnerable Road Users (VRUs) *i.e.* pedestrians and cyclist will access the nearby village via the permitted link road adjacent to the site and then through the adjacent Coill Clocha development to the North as this provides the shortest available and therefore most direct and desirable route. There is also a route via the adjacent Oranhill development to the South. It is anticipated that both of these routes are more desirable and safer than the N67 and VRU's will be encouraged to take these routes accordingly.



Figure 4: Northbound Approach to roundabout on N67



Figure 5: Southbound Approach to roundabout on N67

It was noted that there is provision for uncontrolled pedestrian courtesy crossings throughout the site, which should assist in encouraging low speeds, the cross sections have been updated following preliminary comments to increase the height to 100mm *i.e.* the same as the kerb height. There is also provision for an open space/home-zone area within the site, as highlighted in figure 6, while no details have been provided for signage at this preliminary stage, the road width has been reduced in line with DMURS in order to encourage slower speeds by way of driver recognition and a corresponding need for change in behaviour of drivers as per the principles of DMURS.



Figure 6: Proposed Home Zone Area

Recommendation

Ideally a 'Slow Zone' or a lower advisable speed limit appropriate to VRU priority in accordance with DMURS¹ should be applied to the internal estate roads, with clear signage within the 'Home Zone' area in particular. Signs for the reduced speed limit(s) should be posted in full view of motorists in a safe location with a minimum offset of 450mm from carriageway edge in a location

¹ Studies have shown that at an impact speed of 45-50 km/hr a pedestrian will have an estimated 27% chance of survival. At an impact speed of 60 km/hr or more the chance of survival is less than 1%. A reduction of 10 km/hr in travel speed reduces collision risk by 21% and fatality rates by 50%. Signage alone is unlikely to change driver behaviours, and some physical measures are usually necessary.

which does not obstruct the movement of pedestrians or cyclists. More conventional speed control measures with suitable vertical deflection should be considered throughout the site, and an investigation should be made into current speeds and the need for traffic calming on all links on approaches to the site where VRU desire lines will arise as a result of the development proposals to ensure risks are not exacerbated by any significant increase in traffic and VRU demands to access the site as a direct result of the development.

2.1.5 Problem – Parking

A traffic statement has been provided to the Audit Team including the anticipated traffic volumes and composition for the site, and the likely cumulative parking demand. Details are further shown on the legend of the architect's layout. Parking spaces have been provided to the left and right at a number of internal junctions within the site, and vehicles parked at these locations may create obstructions within visibility splays, which can increase the risk of right angled collisions and pulling out type incidents. Any demand for additional on street parking may also present issues in terms of safe two-way movement on links, as well as potential obstructions in visibility splays at nearby junctions. Perpendicular parking spaces have been provided at many locations throughout the road network surrounding the site, which may result in reversing manoeuvres into the path of Vulnerable Road Users (VRUs – including pedestrians and cyclists) and turning or passing traffic. At a number of locations, it was unclear if sufficient forward visibility and stopping sight distance has been provided towards vehicles potentially reversing from parking spaces, with building lines and/or proposed landscaping potentially causing obstruction.

Recommendations

All proposed junctions and links should cater for anticipated traffic demands and turning movements. Parallel parking to be provided wherever possible instead of perpendicular parking, to minimise the need for reversing manoeuvres within the site, particularly adjacent to likely pedestrian desire lines. Parking should be restricted adjacent to all junction visibility splays and at locations where intervisibility between road users could be compromised. Forward visibility and stopping sight distance at all junctions and along all links should be clear and unobstructed in accordance with traffic speeds. Parking on shared surface links to be closely monitored to

ensure vehicles do not obstruct the safe passageway of other vehicles or cause obstruction within desire lines for VRUs.

2.1.6 Problem – Boundary Treatment and Landscaping

The details provided on proposed boundary treatment throughout the site show provision for boundary heights ranging from 1.2-2m. Boundaries higher than driver eye height of 1.05m in close proximity to junctions and potential conflict points may restrict clear forward visibility towards oncoming traffic or reversing vehicles, and may also cause obstructions in visibility splays and compromise intervisibility between motorists and VRUs. The landscaping proposals for the site show proposed trees and landscaping located at positions which may also restrict forward visibility and intervisibility, both between parking spaces as well as between motorists and pedestrians wishing to cross on desire lines, depending on tree/landscaping heights. Trees located adjacent to pedestrian routes and footways can cause slippery conditions due to fallen leaves and can also compromise street lighting, with roots also potentially causing pavement damage over time.

Recommendations

Landscaping proposals to ensure that trees and landscaping are not located in positions which could increase the risk of conflict or have a negative impact on intervisibility at VRU desire lines within the site. Visibility splays at all junctions should be clear and unobstructed at all times in accordance with traffic speeds, hence any proposed landscaping or street furniture, signs, boundary treatments etc, including walls, which impact upon this visibility should be removed or relocated outside the visibility splay or maintained at a height less than 1.05m above ground level. Trees and landscaping should be offset a safe distance from the edge of running lane (recommended minimum 450mm) and ideally away from footways or areas where shedding leaves and tree roots may cause slip/trip hazards, or where street lighting luminescence may be compromised.

2.2 JUNCTION LAYOUT AND LINK ALIGNMENT/CROSS SECTION

2.2.1 Problem – Link and Junction Geometry

A swept path analysis has been provided to demonstrate that the proposed layout will accommodate the turning movements of all anticipated vehicle sizes, including emergency and refuse vehicles, with adequate margins of safety. The analysis shows encroachment into VRU areas and into the path of opposing vehicles at some locations, including on a number of relatively tight horizontal curves throughout the site, with no apparent provision for widening on the curves to facilitate safe two-way traffic movement at all times. Some vehicles waiting to turn from internal junctions will obstruct entering vehicles. VRUs are particularly vulnerable at tight radii where larger vehicles / HGV traffic can encroach into the footway and compromise pavement stability as well as increase the risk of conflict with VRUs.

Recommendations

The geometry should be reviewed to ensure that the proposed layout at all proposed junctions and links within the site will accommodate the turning movements of all anticipated vehicles sizes with adequate margins of safety, at all times, and to ensure that two-way movement will be possible, to prevent the risk of head on and side swipe collisions, and to ensure that vehicles waiting to turn from junctions on minor roads do not obstruct the movement of vehicles waiting to turn in from the major roads. Alternatively, the Designer should demonstrate that simultaneous access by larger vehicles will be infrequent.

2.2.2 Problem – Kerb and surfacing Details

There were no cross-section details provided to show kerb heights surrounding the site and details of surfacing types, as well as the treatment of joints between differing paving types, and no details are shown for the treatment of apparent level differences surrounding the castle tower, with no cross-section details provided to demonstrate safe slopes. Similar paving colours and types are also shown on the plan in respect of open space / pedestrian routes, parking areas, and through routes, with an example shown in figure 7, which may lead to confusion for both motorists and pedestrians, particularly the visually impaired. The distinction between similar

surface types can fade dramatically during wet and dark conditions, when the function of different areas becomes unclear and the risk of trip hazards are significantly increased. Figure 7 shows an ambiguous layout where it appears that vehicle movements will be possible immediately adjacent to a proposed playground, where young children will be playing and the risk of conflict is significantly higher.



Figure 7: Ambiguous Layout

Recommendations

The playground should ideally be offset from the neighbouring traffic routes and locations where vehicles will be passing or turning. Provision should be made for suitable dropped kerbs to facilitate vehicular access at driveways. All pedestrian routes and desire lines should be very clearly visually distinguishable from vehicular routes and parking areas wherever possible, including on shared surfaces at the same level. The treatment of joints between different paving types at similar levels should also be clarified, with trip hazards for pedestrians and obstructions for the mobility impaired to be minimised through provision of maximum kerb upstands of 6mm on all likely pedestrian desire lines across the path of moving traffic. Clearly visible and ideally textured delineation should be provided between level areas to be used by motorised traffic and those to be used by pedestrians for the benefit of the visually impaired.

2.2.3 Problem – Junction Form of Control

There are yield road markings shown at internal junctions within the site, which have a more onerous visibility requirement, which is unlikely to be satisfied within the proposed design layout.

Recommendations

The internal priority-controlled junctions should ideally be stop controlled, with appropriate signs and road markings. The treatment of all junctions should be rationalised and consistent where possible to enable a clear and predictable, self-explaining layout to be provided for all road users.

2.3 NON-MOTORISED USER PROVISION

2.3.1 Problem – Pedestrian Provision

A number of issues were noted in respect of the detailed design proposals for pedestrians throughout the site, including mobility and visually impaired pedestrians as follows:

- No dropped kerbs and tactiles have been provided across the mouth of internal site junctions for the benefit of visually and mobility impaired pedestrians
- Ambiguous crossing layouts are provided within site, which do not conform to standard layouts. A number of crossings located in close proximity appear to have different layouts/treatments, as highlighted in figure 8, which is likely to cause confusion for road users, who should be presented with consistent layouts throughout the same area. All crossings should generally conform either as controlled or uncontrolled to prevent confusion regarding rights of way.



Figure 8: Conflicting Layouts for Crossings

- details of pedestrian connectivity to the surrounding network should be considered prior to construction.

Recommendations

Pedestrian activity, desire lines and demands should be considered prior to construction taking into account all issues raised above, with dropped kerbs and suitable tactile paving to be installed on all desire lines to cross the carriageway across the path of moving vehicles. Footways should be clear and unobstructed at all times, with all street furniture located to rear of footway where possible in a location which does not compromise the footway width to less than the absolute minimum desirable width of 1.2m on isolated sections, and 2m elsewhere. All chamber covers effected by the works to be raised or lowered should be flush with surrounding pavement and ideally located outside pedestrian and cyclist desire lines.

2.4 ROAD SIGNS, MARKINGS AND LIGHTING

2.4.1 Problem – Lighting

A preliminary design has been provided for proposed lighting within the site. The new scheme will need to be adequately lit to minimise the risk of collisions occurring during the hours of darkness.

Recommendation

The detailed design drawings should include for new lighting where required throughout the site. All lighting columns should be placed to the rear of footway where possible, and ideally passively safe, particularly those located within the shared space areas, with all columns throughout the site to be located at a minimum offset of 450mm from the carriageway edge to avoid being struck by passing vehicles.

2.4.2 Problem – Signing and Lining Generally

A lining drawing has been provided showing the road markings and thus the priority at junctions. There is no signing schedule provided with the detailed design drawings for this planning stage, including Stop signs and road markings, cul de sac signs, signage warning of children at play, warning signs for pedestrian crossings, warning signs regarding vertical deflection, home zones and reduced internal speed limit signs.

Recommendations

Proposed signing and lining to be reviewed where necessary at detailed design stage in light of items raised above with a lining and signing schedule to be produced, commensurate with detailed design requirements. Any new signs should be placed in a location which is clearly visible to approaching motorists in accordance with traffic speeds. The lowest edge of all signs should be set at a height of 2.1m or higher over footway and at 2.4m or higher over a surface which may be used by cyclists, with all signs / street furniture to be located a minimum 450mm from the edge of kerb to minimise the risk of being struck by passing / turning vehicles.

All road markings and signage to be highly reflective material to ensure visibility during the hours of darkness.

3. AUDIT TEAM STATEMENT

We certify that we have visited the site and examined the drawings and information supplied. This examination 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 identified have been noted within the report, together with suggestions for improvements which are recommended to be studied for implementation. No one on the Audit Team has been otherwise involved with the design of the measures audited. This audit has been carried out in accordance with TII GE-STY-01024 December 2017.


Signed:



Date: 4/4/19

MIRIAM O'BRIEN

Signed:



Date: 4/4/19

ANTHONY SUMNER

APPENDIX A – ROAD SAFETY AUDIT BRIEF CHECKLIST

Have the following been included in the audit brief?: (if 'No', reasons should be given below)

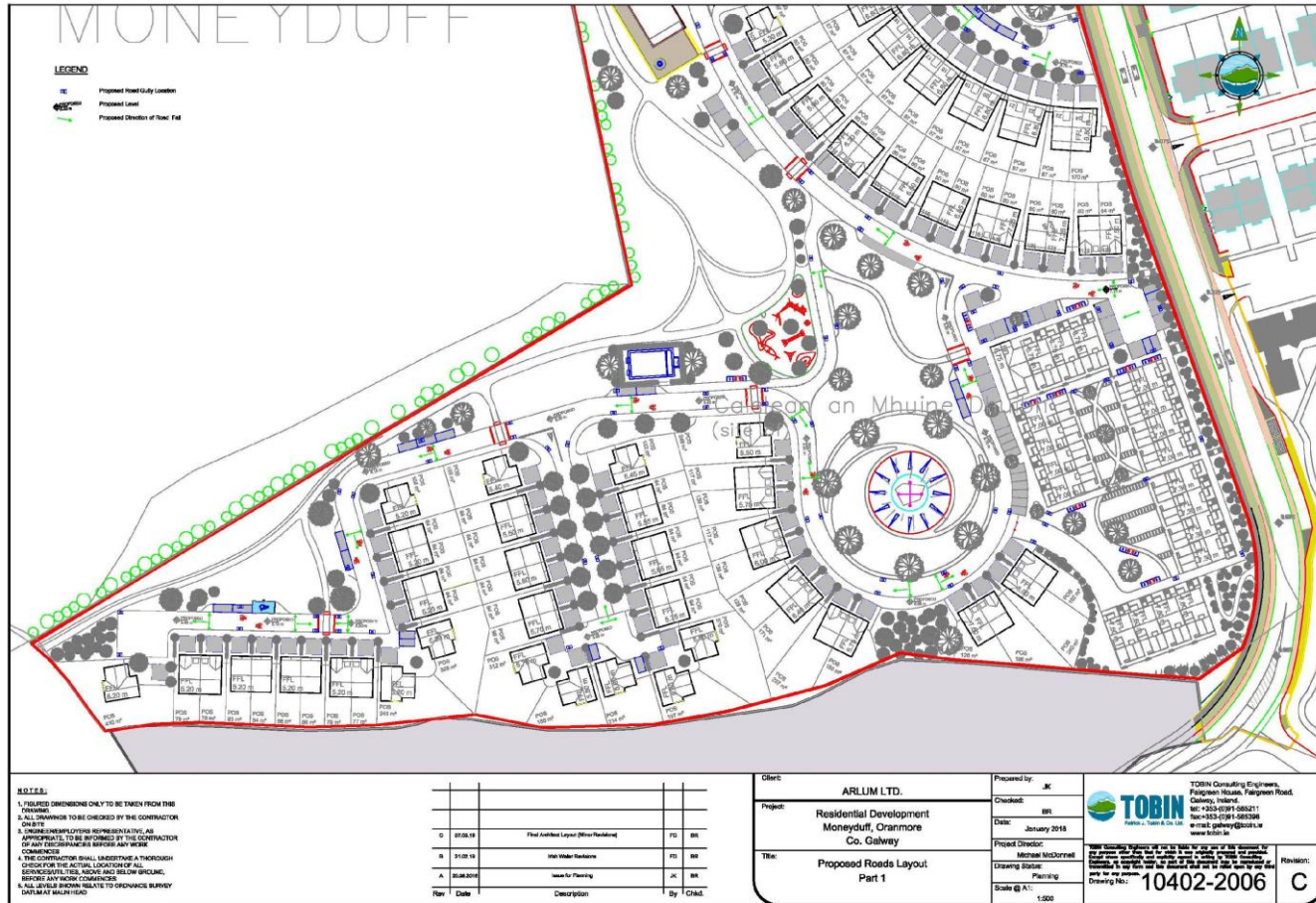
	Yes	No
1. The Design Brief	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Departures from Standard	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Scheme Drawings	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Scheme Details (e.g. signs schedules, traffic signal staging)	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Collision data for existing roads affected by scheme	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Traffic surveys	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Previous Road Safety Audit Reports and Designer Responses/Feedback Form	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Previous Exception Reports	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. Start date for construction and expected opening date	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Any elements to be excluded from audit	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Any other information?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Re 10. Audit scope includes internal site layout only. External infrastructure excluded

APPENDIX B – SITE PHOTOGRAPHS

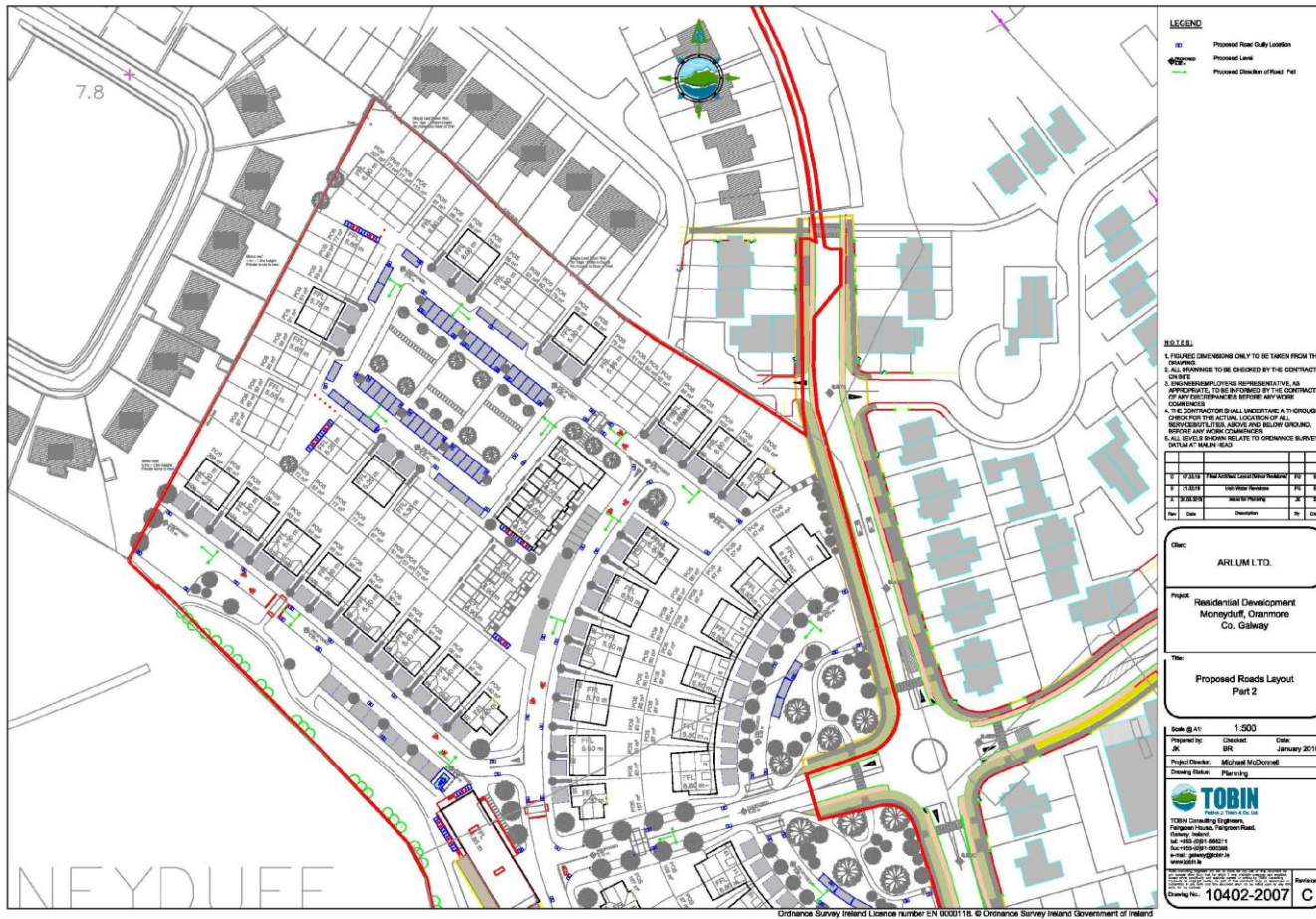






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LEGEND

- ▭ Proposed Footprint Location
- ▭ Proposed Lane
- ▭ Proposed Driveway of Road Foot

NOTES:

1. DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DIMENSIONS TO BE CHECKED BY THE CONTRACTOR.
3. ENGINEERING OFFERS REPRESENTATIVE, AS APPROPRIATE, TO BE PROVIDED BY THE CONTRACTOR OF ANY STRUCTURES BEFORE ANY WORK COMMENCES.
4. THE CONTRACTOR SHALL UNDERNOKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES UTILITIES ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES.
5. ALL LEVELS REFER TO DATUM AT MALIN ROAD.

NO.	REVISION	DATE	BY	CHKD.
1	ISSUED FOR TENDER			
2	REVISED			
3	REVISED			
4	REVISED			

Client:
ARLUM LTD.

Project:
Residential Development
Moneyduff, Oranmore
Co. Galway

Title:
Proposed Roads Layout
Part 2

Scale @ A1: 1:200

Prepared by: J.M.
Checked by: B.R.
Date: January 2018

Project Director: Michael McDonnell
Drawing Status: Planning

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Drawing No.: 10402-2007 **Revision:** C

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Road Safety Audit Feedback Form

Scheme: Residential Development, Moneyduff, Oranmore, Co Galway

Route No. N/A

Audit Stage: 1/2

Date Audit Completed: April 2019

	To Be Completed By Designer			To Be Completed by Audit Team Leader
Paragraph No. in Safety Audit Report	Problem accepted (yes/no)	Recommended measure accepted (yes/no)	Describe alternative measure(s). Give reasons for not accepting recommended measure	Alternative measures or reasons accepted by auditors (yes/no)
Section 2.1.4 Speed Limit at Site	Yes	Yes	Speed control measures revised. Speed limit signage detail to be investigated at detail design phase - provisionally 30 km/hr limit is envisaged aided by passive control through layout and uncontrolled pedestrian crossings (revised detail included with greater vertical deflection). Design will include for less signage and minimisation of hazards	Yes

Section 2.1.5 Traffic Volumes and Parking	Yes	Yes. Traffic Statement and parking layout revised	Parking Layout revised. The parking has been kept as far away from the junctions as possible and also kept on properties in order to keep traffic away from parking on kerbs etc where possible.	Yes
Section 2.1.6 Boundary Treatment and Landscaping	Yes	Yes	Landscape Layout updated. There will be a management company put in place to maintain the paths and keep them free from leaves and the company will carry out repairs etc. In terms of street tree specification we would intend to use <i>"Extra Heavy Standards / Trunk Girth 18-20cm / Height at planting 4.5-5m / Clear Stem Minimum 2m height"</i> i.e. all tree canopies will be minimum of 2m clear of ground level when planted ensuring clear sightlines. In general visibility to be maintained, e.g. tree crowns to be kept high to allow adequate visibility.	Yes
Section 2.2.1 Link and Junction Geometry	Yes	Yes	Swept path analysis provided. As it is in a residential development access by large vehicles will be infrequent and will not occur at the same time.	Yes
Section 2.2.2 Kerbs and Surfacing Details	Yes	Yes	Layout and details revised. The playground will be fenced and setback (see boundary treatment plan and Drg 2325-P-032).	Yes

			The architect has provided further details on dropped kerbs (example shown on Drg 2325-P-027), kerbs and colour contrast. Kerb and surfacing details are now provided.	
Section 2.2.3 Junction Form of Control	Yes	Yes	Road markings added to layout to provide clear direction to all road users.	Yes
Section 2.3.1 Pedestrian Provision	Yes	Yes	Details updated. Pedestrian route drawing and drop kerb details now available. Dropped kerbs to be provided at junctions. Layout of area in figure 8 revised. Footways at crossings have been widened. Footways to be kept clear. Full permeability provided (see excerpt from design statement).	Yes
Section 2.4.1 Lighting	Yes	Yes	Lighting Layout provided with adequate lighting throughout the site.	Yes
Section 2.4.2 Signing and Lining	Yes	Yes	Lining Layout provided. Detailed signage scheme to be provided at detailed design stage.	Yes

Signed: Breslan Ruelclass Designer Date 21/03/19

Signed: Duncan P. [Signature] Audit Team Leader Date 4/4/19