

Road Safety Audit
Stage 1
for
PROPOSED HOUSING DEVELOPMENT
AT
RATHMULLAN, CO MEATH

Date: June 2019

Report produced for: Waterman Moylan Consulting Engineers

Report produced by: Road Safety Matters

Reference: RSM/MOB/121118/RATHMULLAN RSA1

DOCUMENT CONTROL SHEET

Client	Waterman Moylan Consulting Engineers
Project Title	Proposed Housing Development, Rathmullan, Co Meath
Document Title	Stage 1 Road Safety Audit
Document Ref.	RSM/MOB/121118/RATHMULLAN RSA1
Status	FINAL

Record of Issue

Rev	Originator	Team Member	Date	Distribution
DRAFT 1	M O' B	AJS	5/6/19	Brendan Gallagher, Waterman Moylan Consulting Engineers
FINAL	M O' B	AJS	14/6/19	Bradley Warren, Waterman Moylan Consulting Engineers

BACKGROUND INFORMATION

The report which follows is the Road Safety Audit - Stage 1 for the proposed access and internal layout of a proposed residential development off Rathmullan Road in Rathmullan, Co Meath, based on the information supplied to the RSA Team as detailed below. The scheme will involve construction of 661 residential units on a 27 hectare site, to include a creche and an outdoor play area on the site which is located immediately east of the M1 motorway. The site development will include access roads, parking and all associated ancillary services. Vehicular access will be provided via the western arm of a new signal controlled crossroads junction on Rathmullan Road, as well as a total of four other priority controlled access points into the site on both side of the Rathmullan Road.

Table 1: Information Supplied

Item	Supplied	Comment	
A	Plans / Drawings	Y	18-014-P001 - Site Location Plan
			18-014-P002 - Road Layout, Levels GA
			18-014-P003 - Road Layout, Levels - Sheet 1 of 4
			18-014-P004 - Road Layout, Levels - Sheet 2 of 4
			18-014-P005 - Road Layout, Levels - Sheet 3 of 4
			18-014-P006 - Road Layout, Levels - Sheet 4 of 4
			18-014-P010 - Typical Road Construction Details Sheet 1 of 2
			18-014-P011 - Road Upgrade Works
			18-014-P012 - Typical Road Construction Details Sheet 2 of 2
			18-014-P013 - Auto Tracking GA
			18-014-P014-Auto Tracking-1-4
			18-014-P015-Auto Tracking-2-4
			18-014-P016-Auto Tracking-3-4
			18-014-P017-Auto Tracking-4-4
			18-014-P050-Proposed Roundabout Details
18-014-S008 (S/S)			
Site Location Plan 2			
B	Traffic Volume Information	N	
C	Speed Count Data	N	

Table 1 Contd....			
D	Collision Data	N	
E	Departures from Standards	N	
F	Audit Brief	Y	RSA 1 Preliminary Design Road Safety Audit
G	Other Data / Documents	N	

TABLE OF CONTENTS

	Page
Document Control Sheet	1
Background Information	2
1. Introduction.....	5
2. Issues Raised by the Stage 1 Rd Safety Audit.....	7
3. Audit Team Statement.....	40
Appendix A - Road Safety Audit Brief Checklist	
Appendix B - Photographs from Site Visit	
Appendix C - Scheme Drawing(s)	
Appendix D - Feedback Form	

1. INTRODUCTION

- 1.1 This report results from a Stage 1 Road Safety Audit (RSA) of the internal layout and access to a new residential development off Rathmullan Road in Rathmullan, Co Meath, carried out at the request of Waterman Moylan Consulting Engineers. The site is located to the southwest of Drogheda Town, immediately east of the M1, at the location shown in figure 1. The internal site layout is illustrated in figure 2. This Audit examines the road safety implications associated with a number of proposed access junctions into the site off Rathmullan Rd, and includes an overview of safety on the internal site layout, which includes the access roads, carparking and all associated ancillary works.



Figure 1: Site Location Plan

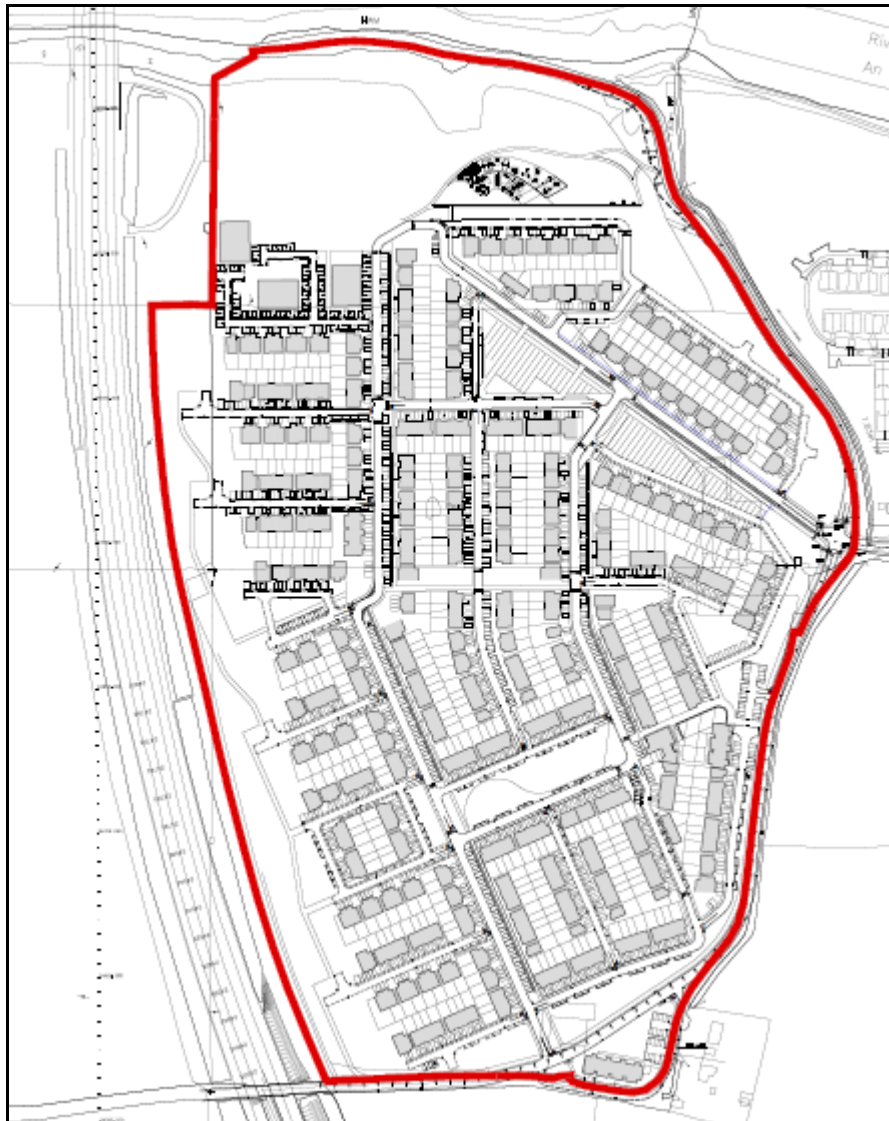


Figure 2: Proposed Internal Site Layout

1.2 The RSA was carried out during November 2018 and May 2019, and included a site visit by the Audit Team on Monday 12th November 2018 during daylight hours. The weather at the time of the site visit was dull and wet, and the surface of the road was wet. Traffic conditions were light, and the posted speed on Rathmullan Rd was 80 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, MCIHT

- 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 internal site layout with reference to the Design Manual for Urban Roads and Streets (DMURS) have also been included where relevant, in respect of the 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 – including pedestrians and cyclists), 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 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 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.

2.1.3 No information was provided on any existing collision statistics in the vicinity of the site. A review of the Road Safety Authority (RSA) online collision database indicates that there was one serious collision recorded on the existing road network immediately adjacent to the proposed development site between 2005 and 2015 inclusive, at the location shown in figure 3. The collision involved a head on conflict, and it was noted on site that the carriageway cross section is relatively narrow at this location, which is likely to preclude safe two way movement at all times, and which should be considered in improvement of the road network surrounding the site.

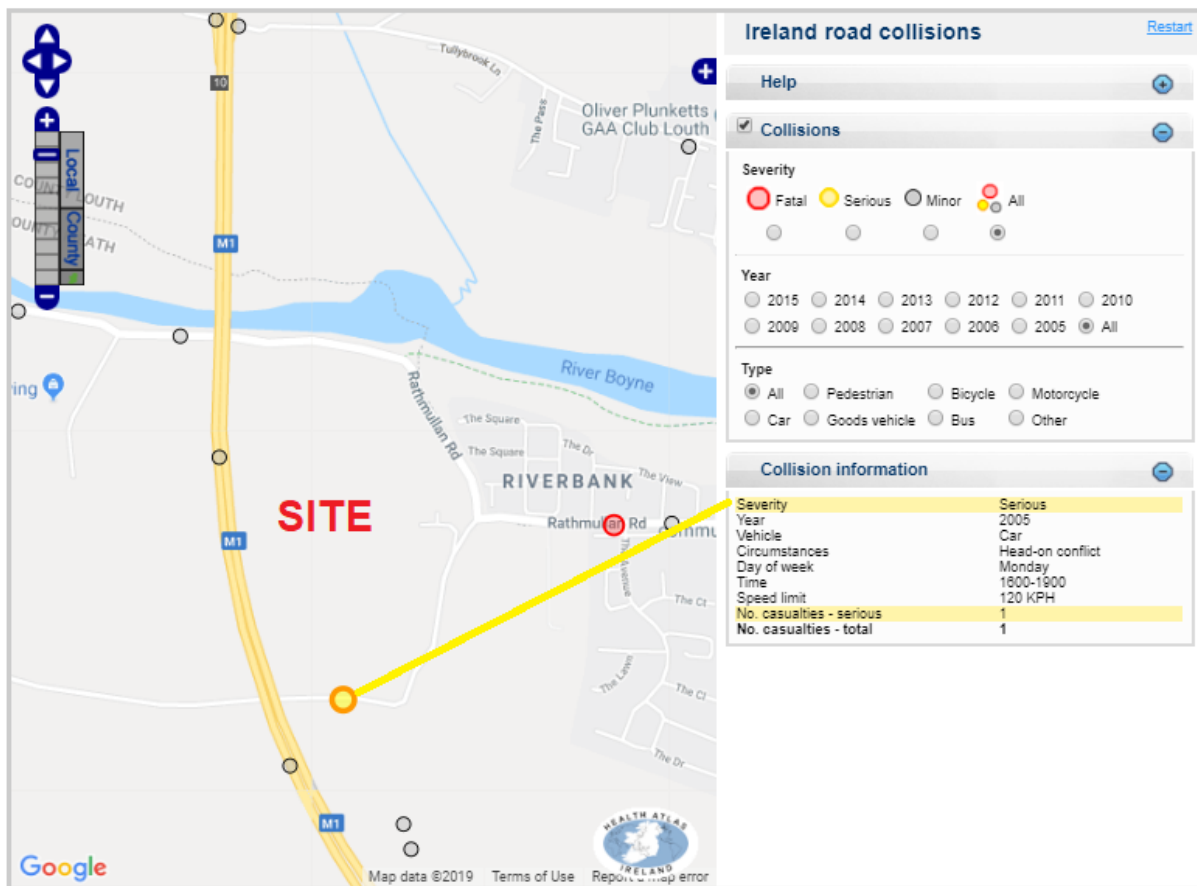


Figure 3

An existing speed camera sign, shown in figure 4, was also noted on Rathmullan Road on the southbound approach to the existing priority controlled junction which will be reconfigured to form the signalised crossroads at the main site access point. The criteria for installation of a speed camera include installation at locations which have higher than average collision rates for recorded volumes (per million vehicle kilometres) on similar road classifications, including collisions which result in high casualty severity. 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, to include an investigation into installation criteria for the speed camera.



Figure 4

2.1.4 Problem – Speeds and Speed Limits Surrounding Site

There was no 85th percentile speed survey data provided for the existing link adjacent to the site, however the site is located within the rural speed limit zone of 80 km/hr, with the entry to the urban speed limit zone of 50 km/hr currently located approximately 150m east of the site, and the proposed signalised crossroads. The current speed limit changeover location is shown in figure 5, and there is no 60 km/hr speed limit transition zone at present between the urban and the rural classifications. A rural speed limit of 80 km/hr would be inappropriate for the site and for the

roads surrounding the site, based on the scale and urban nature of this proposed residential development. Inappropriate speeds will increase the risk of collision for all road users, particularly VRUs travelling to and from the site.



Figure 5

Recommendations

A review of the location and suitability of the current speed limit on the network surrounding the site is advisable on all approaches to the site at detailed design stage, to include an extension of the 50 km/hr speed limit zone and the inclusion of a 60 km/hr transition zone and entry treatment to the urban area at a suitable location on approaches to the site.

2.1.5 Problem – Internal Site Speeds and Speed Limit

There is no provision for reduced speed limit signage (e.g. 30 km/hr) or ‘Slow Zone’ signage within the site. The posted rural speed limit of 80 km/hr or even a reduced urban speed limit of 50 km/hr would be inappropriately high for the internal roads in a residential environment, where high proportions of VRUs should be anticipated, and where a number of relatively long links have been provided, with limited provision for traffic calming. As the design includes for raised

tables/ramps at sporadic locations on the new access road network throughout the site, and the proposed internal road dimensions within the site are relatively narrow with tight corner radii, the geometry and proposed layout should naturally encourage low internal speeds within the site, however advisory speed limit signage may be of benefit on entry to the site, particularly if child pedestrians are likely to play in the vicinity of the access roads or green areas.

Recommendations

A lower speed limit / slow zone signage should be installed on entry to the development site, with supplementary and more frequent vertical deflection to be considered where necessary on long straight links throughout the site, in addition to that shown on the preliminary layout plans.

2.1.6 Problem – Landscaping and Boundary Treatment

There were no details provided for proposed landscaping/boundaries within the site and along the site boundary. Retaining walls have been shown indicatively at two locations, however no levels have been provided for roads/footways at either side and the preliminary design earthworks or proposals for regrading of existing embankments elsewhere. Dense hedging and relatively steep overgrown embankments are currently located along a significant proportion of the site boundary, as shown in figures 6 and 7, with some overhanging trees and vegetation leading to the potential for slippery conditions on the adjacent carriageway, and hedging also leading to reduced sightlines at other locations, and the preliminary design layout does not show proposals for removal of this vegetation.



Figure 6



Figure 7

Inappropriately located landscaping or boundaries exceeding 1.05m in height along the site frontage or along any of the links throughout the site, particularly in the vicinity of junctions or curved sections of road, may compromise visibility splays and sightlines, and may compromise intervisibility between pedestrians or motorists, or to and from vehicles reversing from

perpendicular parking spaces within the site. Trees and landscaping located adjacent to pedestrian routes and footways can cause slippery conditions due to fallen leaves and can also compromise street lighting.

Recommendations

Landscaping proposals should be clarified at detailed design stage, with all trees and landscaping to be located away from positions which could increase the risk of conflict or have a negative impact on intervisibility at VRU desire lines, or where shedding leaves may cause slip/trip hazards. Proposed or existing landscaping and boundary treatments throughout and surrounding the site, should be located outside visibility splays or provided at a height less than 1.05m above ground level. Internal boundaries, walls and landscaping should also be offset a safe distance from the edge of carriageway, and forward visibility and stopping sight distance at all junctions and along Rathmullan Road adjacent to the site and all internal links should be clear and unobstructed in accordance with traffic speeds.

2.1.7 Problem – Drainage

The preliminary design layout includes provision for gullies along the realigned Rathmullan Road and along all links within the site, however gullies have been provided within footways and on pedestrian desire lines throughout the site, where they will present a hazard to pedestrians. Elsewhere within the site, there were no gullies provided adjacent to ramps at the end of relatively steep gradients on links, where ponding may arise. Externally on the existing road network, it was noted that there are also a number of exposed ditches immediately adjacent to the existing carriageway on Rathmullan Road, as shown in figure 8, and no details have been provided on treatment of these hazards on the new alignment.



Figure 8

The new layout will need to be adequately drained to minimise the risk of ponding and build-up of surface water, which can increase risks for all road users and increase the risk of skidding and loss of control.

Recommendations

The detailed design drawings should include drainage details along the site frontage, including treatment of existing exposed water hazards and ditches within the clearzone of the new road alignment surrounding the site. Gullies should be provided at a suitable location to each side of the ramps/tables to address surface water runoff. All new gullies throughout the site and on approaches to the site should be flush with the surrounding pavement, and placed in a location which is outside the desire line for pedestrians and two-wheeled vehicles.

2.1.8 Problem – Carriageway Proposals

There were no details provided on the extent of new carriageway and cross sections or long sections along Rathmullan Road to determine gradients and the extent of new surfacing. The site access proposals will include for provision of controlled pedestrian crossing points on all four

arms of the proposed signalised crossroads, and there is no provision for high friction surfacing/anti-skid on the carriageway on the approaches to these crossing points, to minimise the risk of skidding, loss of control, and overshooting the stoplines on the approach to the crossings, leading to an increased risk of pedestrian/vehicular conflict. The risk is highest on the westbound approach to the crossroads which is on a significant gradient, and where the nearside vegetation compromises sightlines on a left hand curve on the approach.

Recommendations

Detailed design should include for long and cross sections for the proposed carriageway widening along Rathmullan Road. The extent of all new carriageway and surfaces, with longitudinal joints between old and new carriageway to be avoided at any locations where the existing road is being widened or realigned. Suitable high friction surfacing and clear forward visibility should be provided towards the proposed controlled crossings at the signalised junction.

2.1.9 Problem - Site Clearance and potential hazards in clearzone

There were no details provided on site clearance proposals to determine treatment of all existing features within and surrounding the site which will be displaced by the works, including services and overhead power lines. A number of other features will be displaced by the site proposals, including existing gates and utility poles and the final locations of any of these features to be retained are not clear from the plans supplied. It was noted that existing solid boundary walls are located immediately adjacent to the running lane, as shown in figure 9 (approx. chainage 120-150m highlighted in figure 10), and there is no provision for a suitable offset on the proposed layout at this location. Inappropriately located features adjacent to the Rathmullan Rd carriageway may present a hazard within the clearzone or a strike hazard to passing and turning vehicles.



Figures 9 & 10

Recommendations

Detailed design should also include site clearance to show treatment of all existing features on the site which will be effected by the proposed works, including buildings, mature trees/vegetation, gates, services, walls and utilities. All potential hazards should be located outside the clearzone where possible, and at a sufficient offset from carriageway edges.

2.1.10 Problem – Parking Generally

There was no information provided to the Audit Team on the cumulative parking demand for the development site to determine any issues arising. Most internal links have been designed with a relatively narrow cross section, which is likely to restrict two-way traffic movement. Any demand for on street parking will limit safe two-way access along internal links. Vehicles parked on street in close proximity to junctions are also likely to restrict available space for turning manoeuvres.

It was noted that a number of internal parking spaces are configured as perpendicular spaces, and are located in close proximity to junctions where vehicles will be queuing and turning, and where vehicles parked are likely to present obstructions in visibility splays, with examples of where this may occur shown in figures 11-13. Obstructions in visibility splays increases the risk of pulling out and right angled collisions. Vehicles parked adjacent to pedestrian desire lines can also restrict intervisibility between approaching motorists and pedestrians waiting to cross, increasing the risk of pedestrian/VRU conflict.



Figures 11-13: Perpendicular Parking near Junctions

Recommendations

Total parking demands for the site should be assessed, with on street parking to be restricted adjacent to all junction visibility splays and at locations where intervisibility between road users could be compromised, and with visibility splays to be clear and unobstructed at all times in accordance with traffic speeds. Parking configuration to be parallel where possible, with perpendicular parking and the potential for reversing manoeuvres to be avoided adjacent to junctions and likely pedestrian desire lines to cross the carriageway. Any parking demands on street should be closely monitored to ensure vehicles do not obstruct the safe passageway of pedestrians or restrict the turning movements and visibility of other vehicles.

2.1.11 Observation – Traffic Volumes and access junction proposals

There was no information provided on existing and anticipated traffic volumes to determine any potential safety issues arising from the proposed geometry for each of the access junctions into the site, as well as all internal junctions. The design does not include for provision of right turn reservoirs at the access junctions, which may lead to queuing traffic obstructing the path of through traffic on Rathmullan Rd.

It was noted that an adjacent greenfield site, indicatively shown in figure 14 with one of the current access points into the site shown in figure 15, which will be located in relatively close proximity to proposed access junctions into the subject site. It is understood that this site has recently received a decision to grant permission for development. The Audit Team considered that the cumulative impact of traffic generated by both sites combined will have a significant impact on the capacity of Rathmullan Road and the safe operation of all proposed access

junctions, and both sites are also likely to generate significant desire lines for VRU access to and from the Drogheda direction. There are no current VRU facilities on Rathmullan Rd surrounding the site, and the preliminary design layout does not appear to include provision for cyclists within the cross section of Rathmullan Road, with provision for pedestrians along one side of the carriageway only, and limited provision for crossing opportunities.



Figure 14



Figure 15

Recommendations

Traffic volumes, compositions and turning movement proportions should be examined, and the Designer should demonstrate that the geometry of each of the proposed access junctions will be sufficient to accommodate all anticipated volumes and vehicle sizes and that the cross section on the major road can accommodate all anticipated vehicle movements, including the cumulative impact from all committed developments and modes.

2.2 JUNCTION LAYOUT AND LINK ALIGNMENT/CROSS SECTION

2.2.1 Problem – Existing Alignment and visibility at Proposed Junctions

Relatively tight radii have been provided along the existing Rathmullan Rd alignment, which appear substandard for a 80 km/hr link. The proposed link will predominantly follow the existing alignment, however the proposed design speed for the realigned link is unclear from the plans supplied. The Audit Team considered that visibility to and from proposed access points to the site are unlikely to be satisfied along the existing alignment for the current posted speed limit, taking into consideration existing sightline obstructions created by boundary treatment, vegetation and embankments, as outlined previously. Obstructions within junction visibility splays can lead

to an increased risk of pulling out type collisions and right-angled collisions. Restricted sightlines on the horizontal/vertical alignment can lead to an increased risk of rear shunt collision with slow moving vehicles or queuing vehicles.

Figure 16 shows the existing horizontal alignment on the westbound approach to the signalised crossroads, where clear forward visibility towards the nearside primary signal head aspect is likely to be restricted. This approach is also located on a significant downhill gradient, which may effect stopping sight distance, particularly in wet and icy conditions. Figure 17 shows the southbound approach to the proposed signals, where vegetation and embankment on the offside of the right hand bend are compromising sightlines at present towards the junction, and where the proposed radius will be tighter than the existing, which may lead to reduced visibility towards the signals and towards queing vehicles. Figures 18 and 19 show the horizontal alignment further north adjacent to the Boyne River, where the cross section is very narrow and where vehicles cannot pass safely without stopping. Carriageway condition is also poor in this locality. Existing safety issues in the locality may increase risks to road users accessing the development site.



Figure 16



Figure 17



Figures 18 & 19

Figures 20 and 21 show the relatively tight radius and limited SSD on the existing link between chainages 310m and 420m approximately, where a significant portion of the existing link will be retained to provide access to existing properties and new parking/development, which are shown in figure 20. The preliminary design does not include for alignment or SSD improvements at this location.



Figures 20 & 21

Recommendations

The Designer should demonstrate that unobstructed visibility splays can be achieved at all proposed priority controlled access junctions into the site, and that the junction intervisibility zone will not be obstructed at the signalised crossroads. Suitable forward visibility and stopping sight distance should be provided along the Rathmullan Road, including towards the rear of any anticipated queues at any of the proposed junctions and access points. Likely vehicle speeds on the link should be considered in determination of the visibility and minimum cross section requirements, with sufficient traffic calming and speed control measures to be considered as necessary, if DMURS reduced visibility splays are to be considered, with more formal entry treatment into the urban zone as necessary, as recommended previously.

2.2.2 Problem – Proposed Geometry at Site Access Points

The swept path analysis provided demonstrated that the proposed access geometry for the priority controlled access points to the site will generally accommodate the turning manoeuvres of the design vehicle (refuse vehicle), and which will require relatively infrequent access, although encroachment into the path of oncoming vehicles was noted. The analysis shown in figure 19 shows that vehicles waiting to turn out of this junction will significantly restrict movement for vehicles turning in. There were a number of movements to and from the site and at the signalised crossroads which have not been included in the analysis provided, and which may present difficulties for some vehicles. These locations have been highlighted in figures 22-24.



Figures 22-24

Recommendations

The proposed geometry at each access point should safely accommodate the anticipated turning manoeuvres of all vehicle sizes with adequate margins of safety, on all permissible movements.

2.2.3 Problem – Internal Site Geometry

The swept path analysis provided for the internal site layout demonstrates that there is no margin of error for vehicles turning on narrow links within the site, with encroachment into the footway and VRU areas at a number of locations, no provision for widening on curves and limited opportunity for safe two-way movements. The swept path analysis has been undertaken for refuse vehicles, which are likely to require relatively infrequent access, however it is unclear if the proposed geometry will accommodate safe two way movements at all times for more frequent vehicle types, such as SUVs.

Recommendations

The Designer should ensure that the geometry of all proposed internal junctions and links will safely accommodate simultaneous two way movements for frequent vehicles types, and that turning vehicles will not need to mount kerbs or encroach into the footways, where pedestrians will be more vulnerable. Vehicles waiting to turn from internal junctions should not obstruct entry for other vehicles. The design should ensure that radii values used will safely accommodate two-way vehicular movement, without presenting a head on or side swipe collision risk, with widening where necessary.

2.2.4 Problem – Vertical Alignment

There are significant level differences within the site, leading to gradients of 5-8% at some locations, including a 5% gradient on the eastbound approach to the stoplines at the signalised crossroads, which will present difficulties for some road users. Figure 25 shows a location where there is a 1/20 gradient in 3 directions with no level dwell area at the access point/intersection with Rathmullan Road. The general details in this area are unclear in respect of permissible movements, accessibility, alignment to the south and clearance to the proposed retaining wall. Inappropriate levels and relatively steep gradients on links within the site are likely to present difficulties for wheelchair access or for access for those with buggies or for elderly pedestrians. There were no cross sections provided for links throughout the site to determine any potential issues in terms of trip hazards or kerb heights, which may also present difficulties for mobility and visually impaired pedestrians.

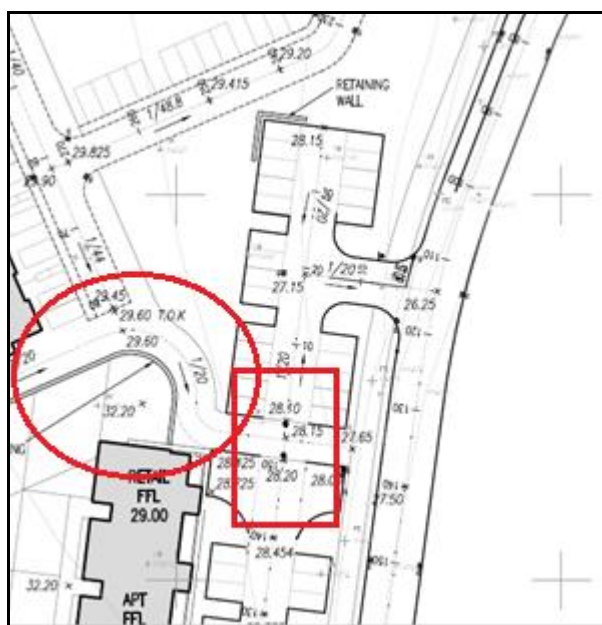


Figure 25

Recommendations

The gradients and vertical design should be reviewed throughout the site, and a longitudinal profile produced at detailed design stage to demonstrate that all gradients throughout the site will be safe for use by all road users, and to minimise the risk of larger vehicles overturning on bends or encroaching into the path of oncoming vehicles, creating a head on collision risk. The proposals for access and clearance adjacent to the retaining wall shown in figure 25

should also be clarified. A recommended 600mm clearance should be provided to all solid boundaries within the site from the edge of carriageway, with a minimum 450mm clearance to be provided to all other boundaries, street furniture and signage.

2.2.5 Observation – Proximity of Adjacent Access Points

A number of existing access points may be effected by the proposed works, which have not been shown on the preliminary design layout, with an example shown in figure 26. Figure 27 shows two proposed access junctions to the north and south of Rathmullan Road where there is minimal stagger offset between the junctions, which increases risks to vehicles turning to and from these locations. There is no stagger offset provided at a number of internal junctions within the site, which have been configured as crossroads junctions. Crossroads junctions typically have higher collision rates than suitably staggered junctions due to the higher risk of crossover and right angled collisions, particularly where there may be obstructions in visibility splays to the left or right.



Figure 26

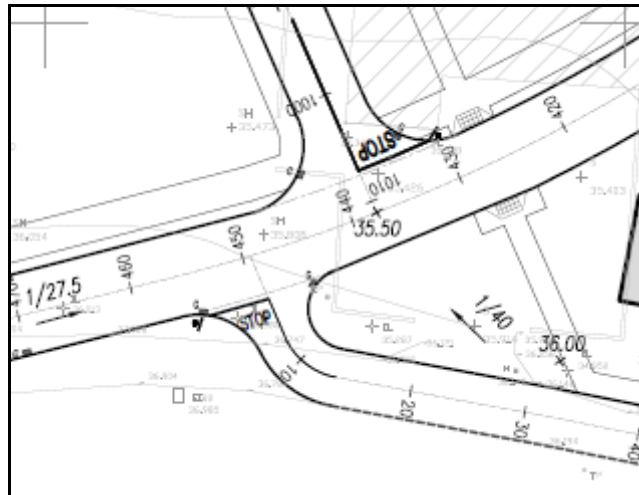


Figure 27

Recommendations

The design should include provision for suitable stagger offsets at junctions and access points to minimise the risks arising from multiple potential points of conflict in close proximity. Detailed design should show all existing access points to be retained along the Rathmullan Road, and the designer should demonstrate that safe access to and from these points will not be effected by the proposed works.

2.2.6 Observation - No form of control at a number of internal junctions

There is no provision for form of control and priority at a number of the internal junctions, although stop markings, lines and signs have been shown at others. Lack of clear guidance regarding rights of way and priority throughout the site may lead to misinterpretation and confusion for some road users, and an increased risk of conflict.

Recommendations

Rights of way and priority should be clear and unambiguous at all internal intersection points throughout the site.

2.3 NON-MOTORISED USER PROVISION

2.3.1 Problem – Pedestrian Provision

There was no information provided on anticipated pedestrian demands and desire lines, however a site of this size is likely to generate a significant demand for access on foot. There were a number of issues noted in respect of current pedestrian accessibility to and from and within the site, which can be summarised as follows:

- There were a number of pedestrians observed walking within the carriageway of Rathmullan Road at the time of the site visit, where there is no current provision for and footways. The preliminary design layout shows a disconnected and discontinuous footway network along Rathmullan Road which is unlikely to fully cater for all existing and future demands.
- There is no footway continuity at the following locations:
 - on the southern side of the carriageway on the eastern arm of the signalised crossroads
 - on the eastern side of the southern arm of the signalised crossroads
 - On the western side of the northern arm of the crossroads
 - Figure 28 shows proposals for a footway on the northern side of the eastern arm of the crossroads, which appears to be tying into the existing verge, with a row of trees at this location, as shown in figures 29 and 30.

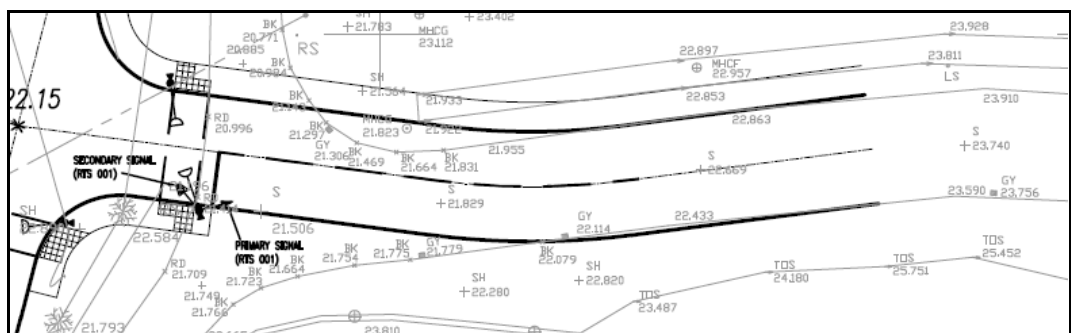


Figure 28



Figure 29



Figure 30

- The footpath also terminates abruptly adjacent to the southern section of the site, however provision has been made for an informal pedestrian crossing point at this location. Clear forward visibility to and from both sides of the crossing from a point 2m back from the kerbline will be required at this location. It was noted that the sign provided at the stop controlled junction at this location is likely to obstruct the footway, and should be moved to

the back of footway and installed on a cranked pole, or the footway width increased, with a minimum 450mm clearance to be provided from the edge of signface to the kerb edge.

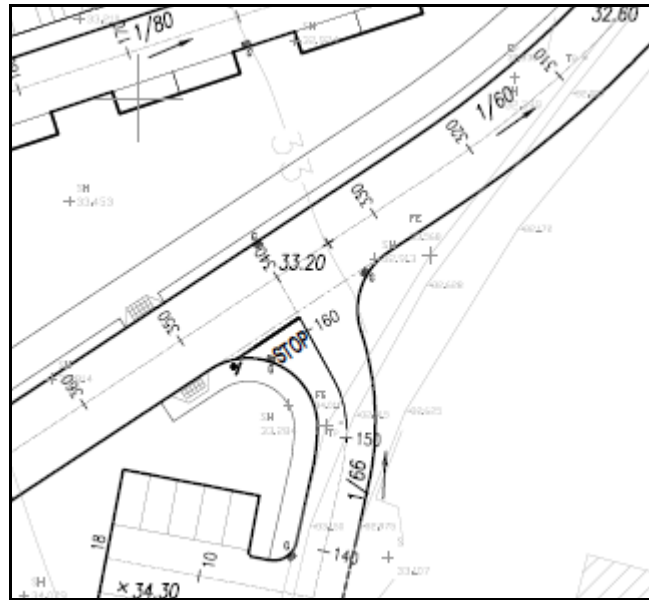


Figure 31

- Within the site, some of the proposed cross sections on links will provide a 4.8m wide carriageway with 1.2m footways, which will be very restrictive and will constrain movements for road users, and result in increased risks for VRUs within the limited 1.2m section. The absolute minimum footway width of 1.2m should be provided on isolated sections only.
- Elsewhere throughout the site footways appear narrow, and there is also no provision for verges between the narrow carriageways and the footways anywhere throughout the site. Verges provide a buffer zone and lateral clearance between VRUs and passing vehicles, hence VRUs will be more vulnerable at these locations.
- There is no provision for formal or informal pedestrian crossing facilities anywhere within the site. Tactile paving has not been provided at potential vehicular / pedestrian conflict points on pedestrian desire lines, and there are no dropped kerbs or tactile paving provided across the mouth of the access junctions, aside from at the signalised crossroads, or at the internal junctions for the benefit of visually and mobility impaired road users.

- Gradients at the north of the site may present difficulties for some road users, including on the proposed footways through a steep embankment, and including within the proposed playground, which are shown in figure 32. Provision should be made for fencing and regrading where necessary to protect children from potentially steep slopes and height differences at this location.

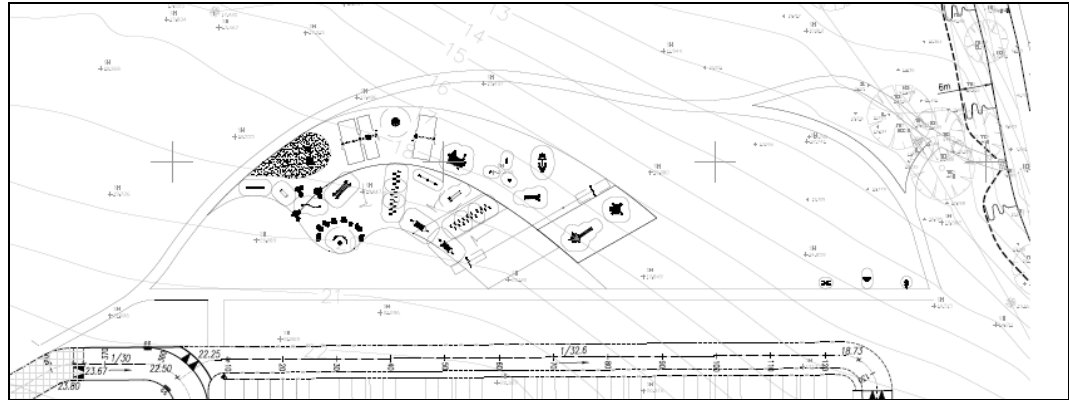


Figure 32

- The continuity of the footway shown in figures 32 and 33 is unclear from the plans supplied, and there appears to be provision for pedestrians to cross the carriageway to access the river walkway, which is shown in figures 34-36. Visibility to and from pedestrians waiting to cross at the potential crossing point shown in figure 33 is likely to be compromised by horizontal curvature, embankments and dense vegetation. Visibility to and from all formal and informal crossing points throughout the scheme should be clear and unobstructed in accordance with traffic speeds, with pedestrians to be visible from a point 2m back from the road edge. Safe connectivity to the river walkway should be provided on both side of the carriageway.
- Within the site it was noted that there is no consistent provision for footways to the rear of all parking spaces. At locations where no footways have been provided, e.g. figure 37, pedestrians will need to walk within carriageway in an uncontrolled manner to access the footpath network, where the risk of conflict with passing vehicles will be higher.
- It was noted that there is a significant level difference at present along the southern boundary of the site, on the approach to the M1 overbridge, as shown in figure 38. The site proposals indicate provision for a footway along this boundary, which is shown in

figure 39, however the design plans do not show details for earthworks or fencing at this location to address the level difference.

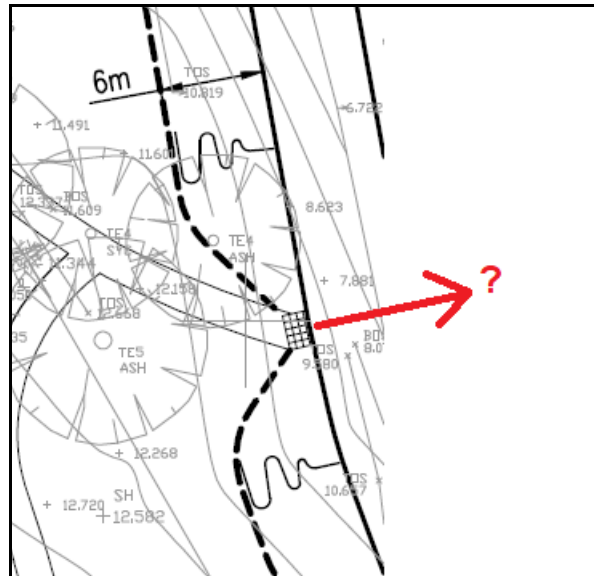


Figure 33



Figure 34



Figure 35



Figure 36

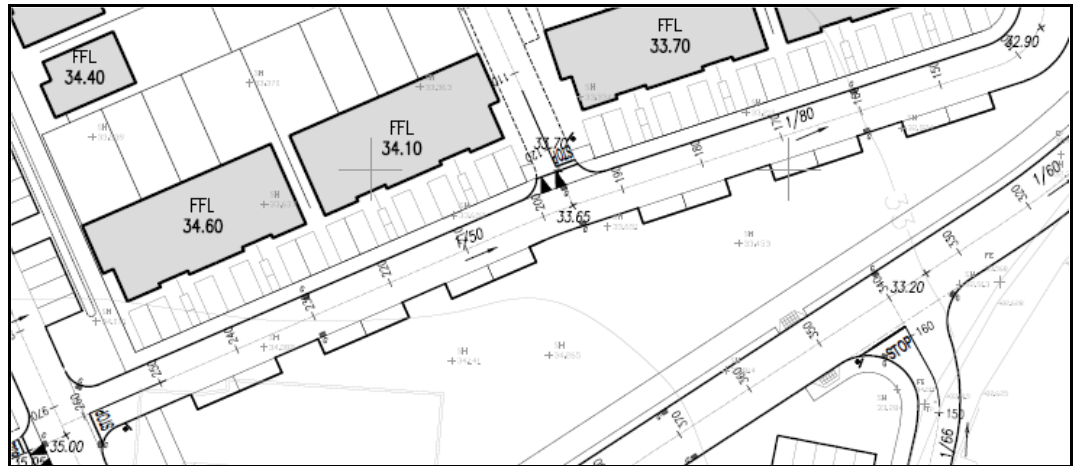


Figure 37



Figure 38

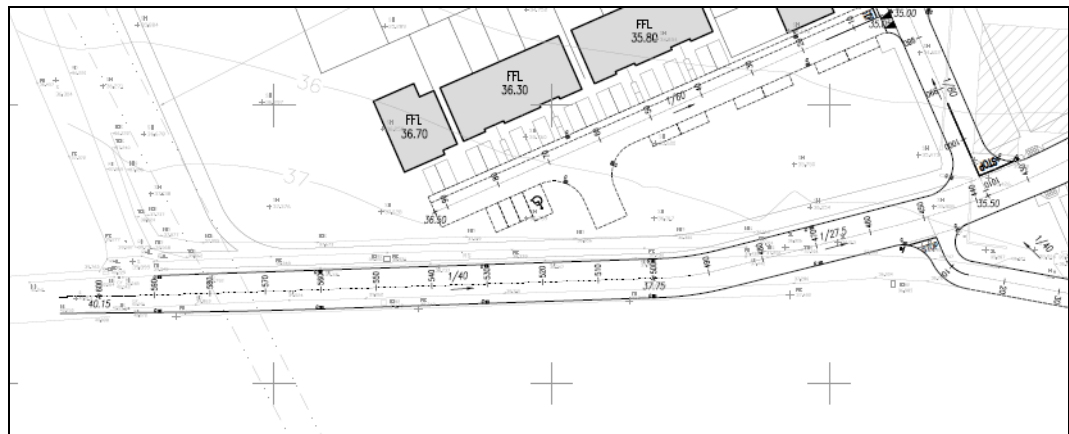


Figure 39

- The proposals for the area to the west of the site, shown in figure 40, are unclear from the plans supplied. This area is located immediately adjacent to the M1 motorway, where there are significant embankments, level differences and dense vegetation, as shown in figures 41 and 42. The proposals for this area should be clarified at detailed design stage to ensure there is no impact on the motorway operation, including the potential for lighting interference, with safe secure fencing to be provided to prevent child access onto the motorway.

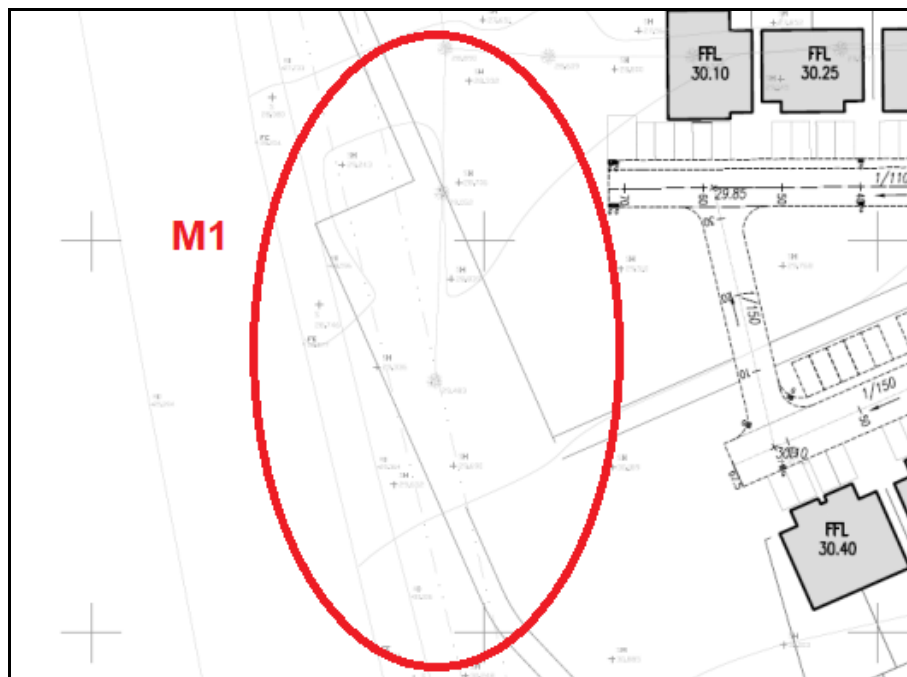


Figure 40



Figure 41



Figure 42

Recommendations

Pedestrian activity, desire lines and demands should be considered both within the site and on tie-in points on the routes used to access the site, with detailed design layout to be finalised taking into account all issues raised above. Details of all kerb heights to be clarified at detailed design stage, with a maximum kerb upstand of 6mm to be installed on all desire lines to cross the carriageway across the path of moving vehicles, and dropped kerbs ideally flush with the adjacent road surface. Footways should be clear and unobstructed at all times, with a minimum continuous width of 2m to be provided in an urban zone, and a minimum crossing width of 2.4m,

to be increased to 4m if crossing is to be shared with cyclists. All street furniture should be located to the rear of the footways 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. All chamber covers and gullies should be flush with the surrounding pavement and ideally located outside pedestrian and cyclist desire lines. The details of any proposed crossing points should be clarified, with the layout to be consistent and predictable, and conform to standardised layout in respect of controlled or uncontrolled crossings. Intervisibility at all crossing points within the site and surrounding the site should be clear and unobstructed at all times in accordance with traffic speeds.

2.3.2 Observation- Cyclist Provision

There was no information provided on anticipated cyclist demands and desire lines to and from the site, and there are no formal cycling facilities on the surrounding road network, and no provision for cyclists within the proposed design layout for the site.

Recommendations

Likely cyclist volumes and desire lines should be considered in enhancing accessibility to and from and within the site, in line with the aspirations of DMURS in an urban environment.

2.4 ROAD SIGNS, MARKINGS AND LIGHTING

2.4.1 Problem – Lighting

There were no proposed lighting details provided for the site. Inappropriate lighting can increase the risk of conflict during the hours of darkness, and inappropriately located lighting columns can obstruct footways and VRU movements, and can also present a hazard to errant vehicles if located too close to the carriageway edge or within the clearzone of the major road.

Recommendations

Detailed design should include for new lighting proposals throughout the site and along the site frontage. All lighting columns should be placed to the rear of footway where possible in a position which does not obstruct the movement of VRUs, with all columns along Rathmullan Rd to be

passively safe and columns throughout the site to be located at a minimum offset of 450mm from the carriageway edge and away from areas where vehicles may wish to park, to avoid being struck by passing, turning and reversing vehicles. Lighting design should ensure there is no potential for dazzle or interference with lighting on the adjacent M1 motorway.

2.4.2 Problem – Signing and Lining

There was no signing and lining schedule provided to accompany the design, however a number of potential lining and signing issues were noted as follows:

- Stoplines appear to be located too close to crossings at the signalised crossroads, as shown in figure 43, presenting an increased risk of vehicular over-run and potential for vehicular/pedestrian conflict.

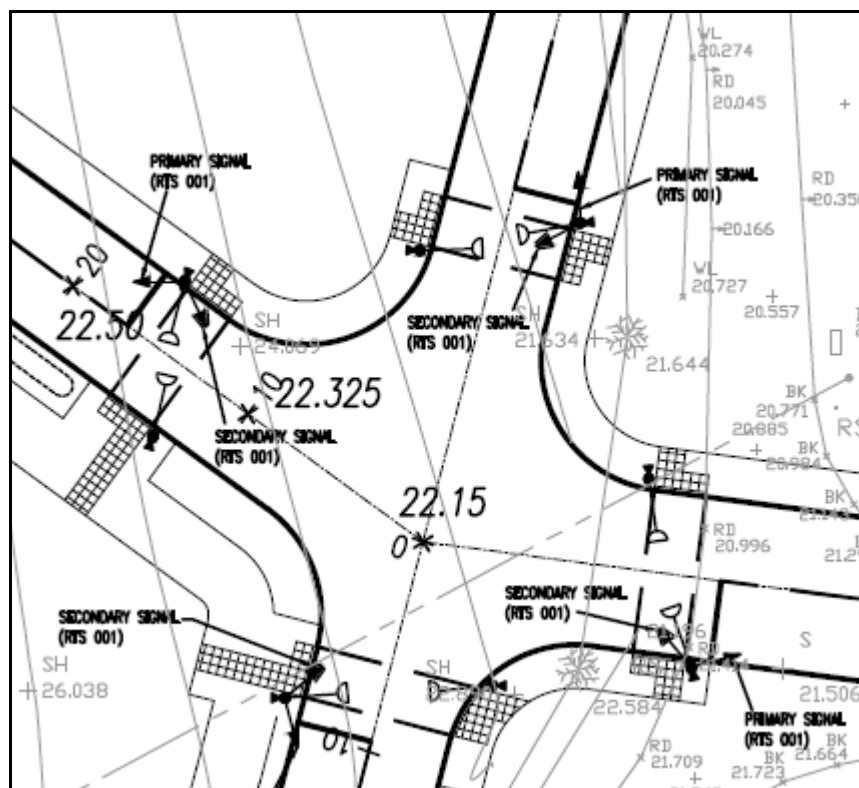


Figure 43

- Traffic lights ahead warning signs will be required on approaches to the signalised crossroads where clear forward visibility towards the layout and signal head aspects may be compromised, particularly on two of the approaches, as outlined previously in this report.
- No provision for warning signage in advance of any raised tables / ramps throughout the site
- There is no provision for form of control at a number of internal junctions throughout the site, which can create ambiguity regarding rights of way and priority and misinterpretation of the layout, leading to increased collision risks.
- There is no provision for reduced speed limit signage/slow zone signage or children at play signs within the site.
- On the external network, there is no provision for centreline road markings on the major road.
- A number of existing signs are likely to be displaced by the scheme proposals, e.g. figure 44, or do not relate to the proposed layout and will be made redundant and should be removed.
- The mounting height and location of existing signs is likely to present a hazard to VRUs if retained in their current location.



Figure 44




Figure 45

Recommendations

A signing and lining schedule should be produced taking into account issues raised above, to include details of all proposed signs and lines throughout the site. Signs should be posted in full view of motorists in a safe location with a minimum offset of 450mm from the sign face to the carriageway edge, in a location which does not obstruct the movement of pedestrians. 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. 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: 
MIRIAM O'BRIEN

Date: 14/6/19

Signed: 
ANTHONY SUMNER

Date: 14/6/19

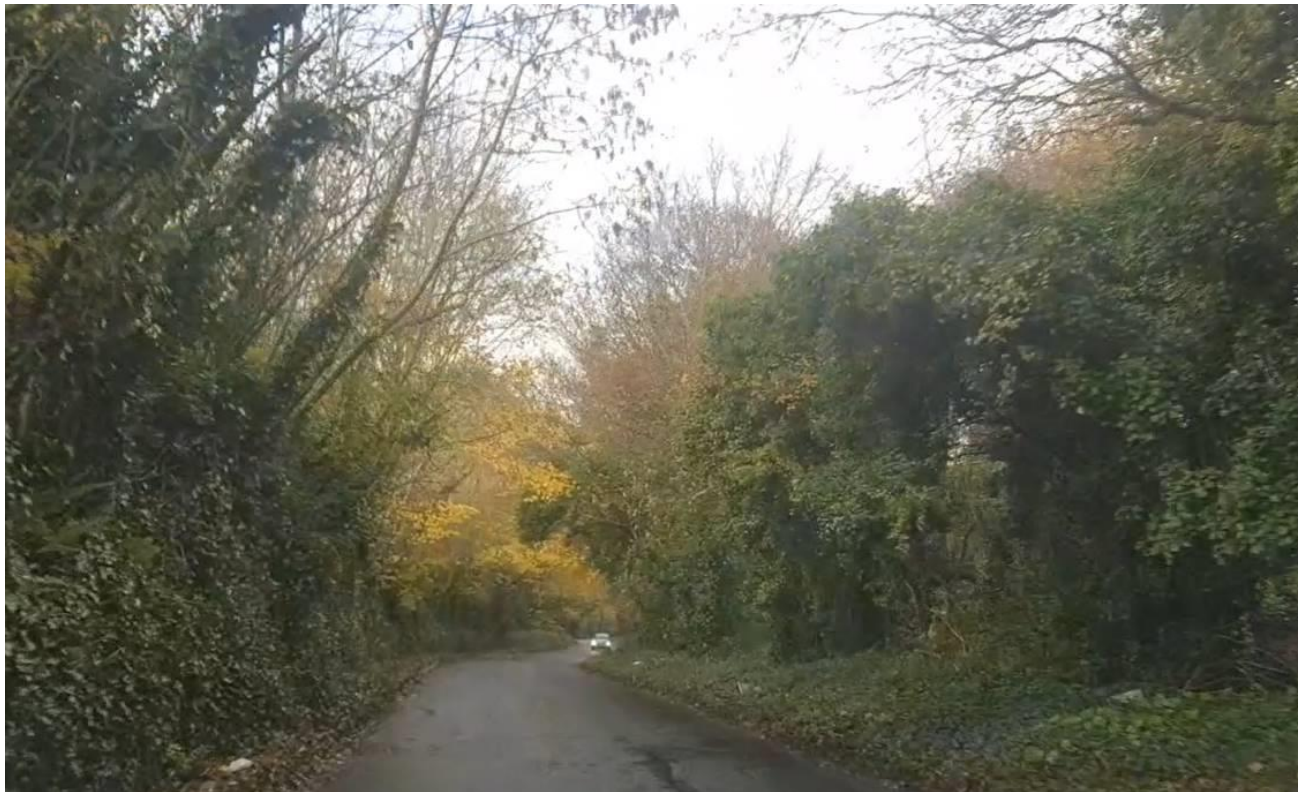
APPENDIX A – ROAD SAFETY AUDIT BRIEF CHECKLIST

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 type="checkbox"/>	<input checked="" type="checkbox"/>
Any other information?	<input type="checkbox"/>	<input checked="" type="checkbox"/>

APPENDIX B – SITE PHOTOGRAPHS









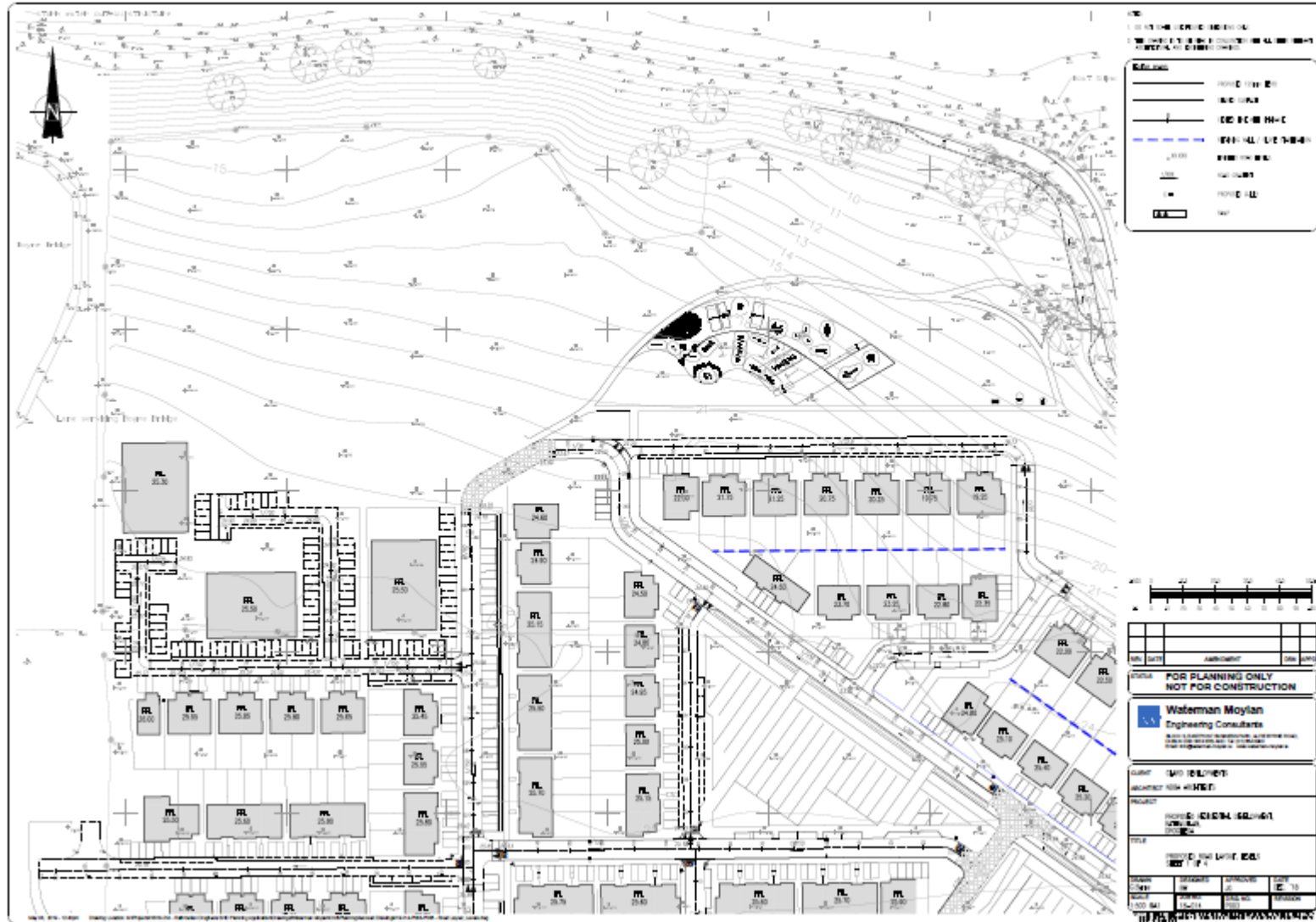




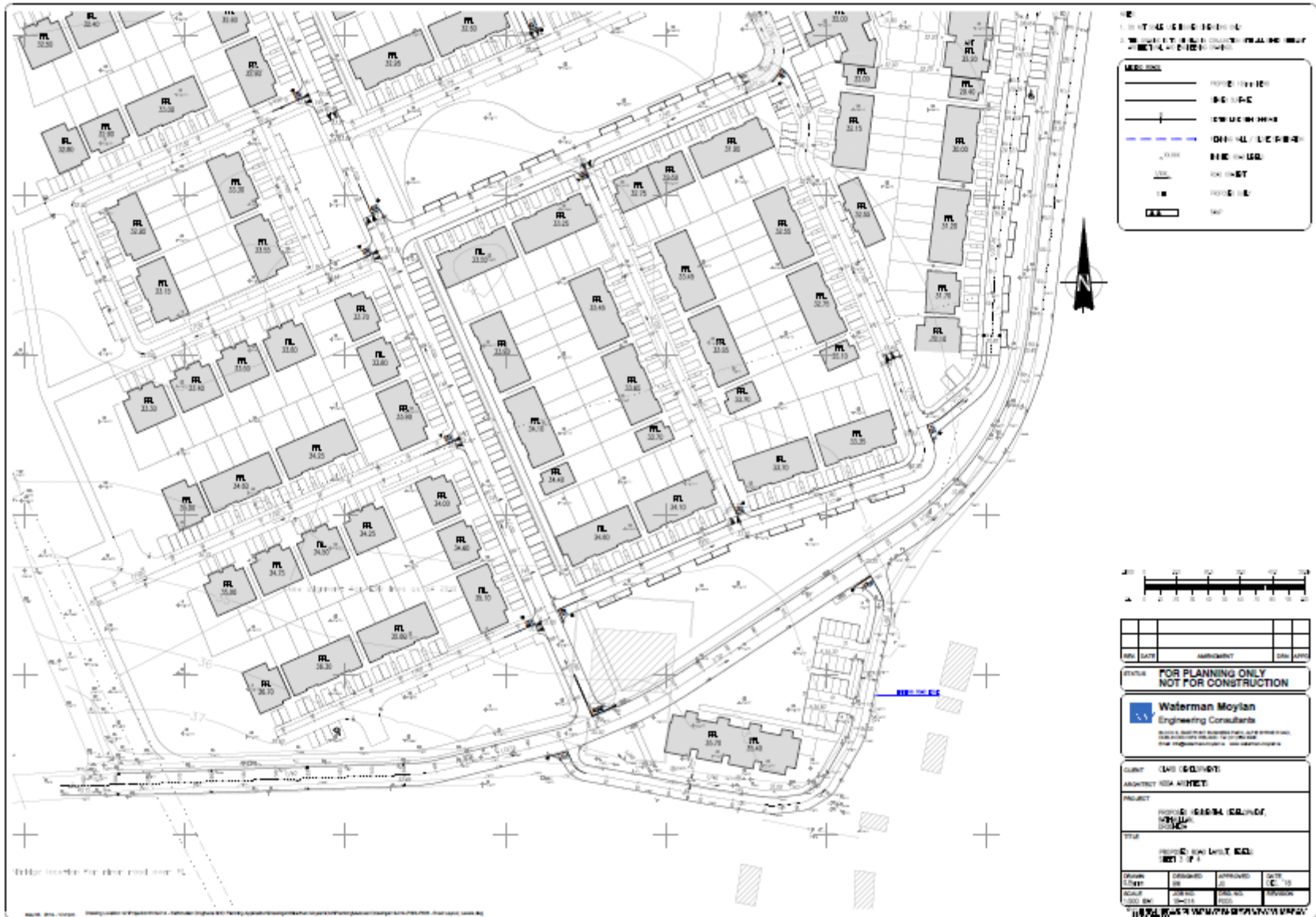


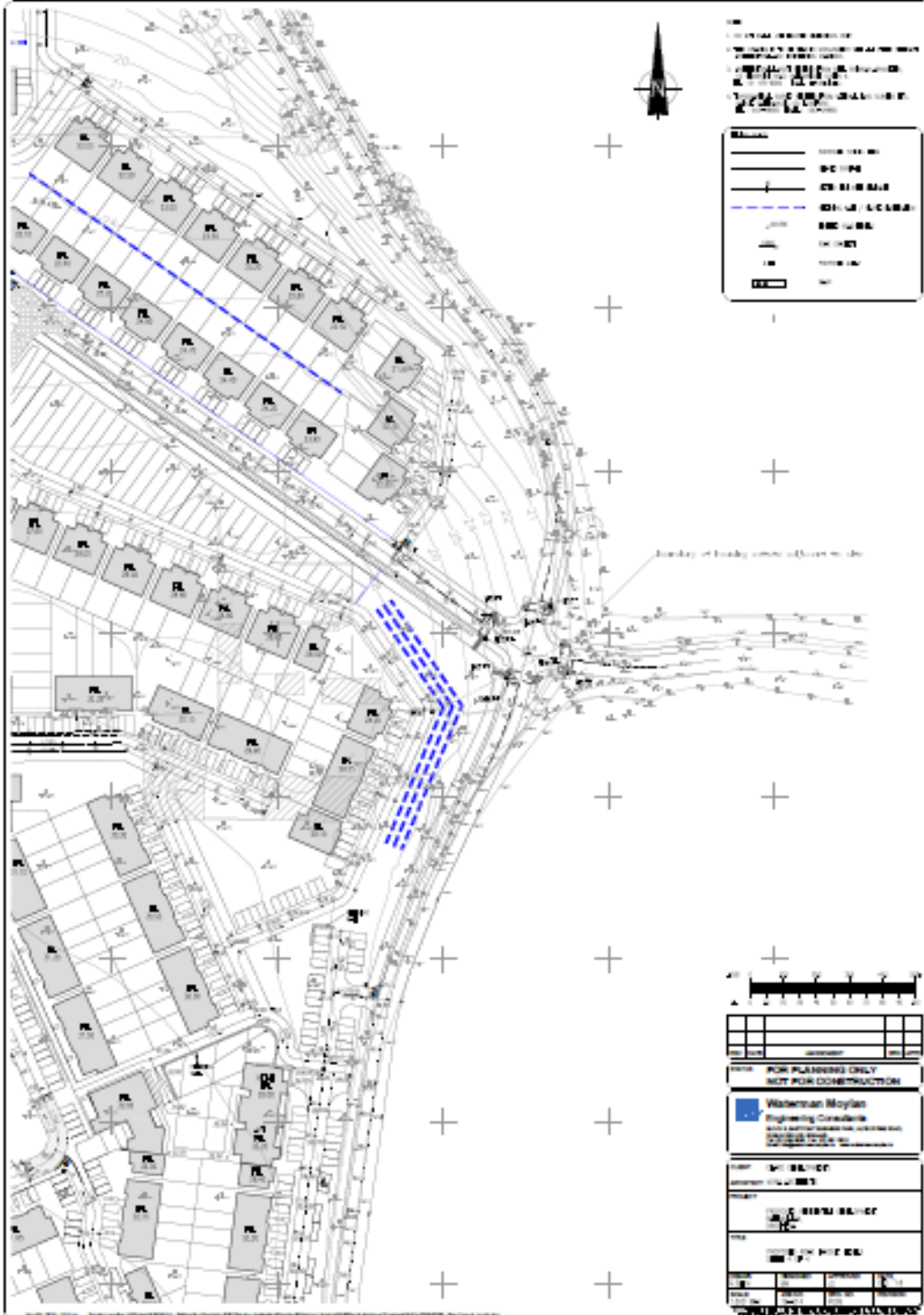












Road S
 Urlingford Rd, Johnstown
 Co Kilkenny, Ireland E41 W721
 Tel +353 (0)56 883 8428
mobrien@roadsafetymatters.net
www.roadsafetymatters.net

Company Registration No 386966 V.A.T. Reg No 6763608 D

APPENDIX D – FEEDBACK FORM

Road Safety Audit Feedback Form

Scheme: Residential Development, Rathmullan Rd, Rathmullan, Co Meath

Route No. N/A

Audit Stage: 1

Date Audit Completed: Jun 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)
2.1.4 Problem - Speeds and Speed Limits Surrounding Site	Yes	Yes - agree, it is proposed to extend the 50 km/hr speed limit zone to the road network surrounding the proposed residential development and provide 60km/hr transitional zones as appropriate. MCC to advise on road speeds.		
2.1.5 Problem - Internal Site Speeds and Speed Limit	Yes	Yes - agree that internal speed limits are to be 30kph. Advisory signs will be provided as necessary.		
2.1.6 Problem - Landscaping and Boundary Treatment	Yes	Please see attached proposed landscaping plan (18306-2-101 LMP) prepared by CSR Land Planning & Design. Appropriate VRU desire lines and visibility splays will be facilitated.		
2.1.7 Problem - Drainage	Yes	Yes - The drainage drawings have been updated to show gullies positioned as required. The treatment of existing ditches is also shown with culverts / realignment works being provided along the site frontage		

		where appropriate. Please refer to attached drawing No's 18-014-P021, P022, P023 and P024.		
2.1.8 Problem - Carriageway Proposals	Yes	Yes - detailed long and cross sections and construction details for the proposed carriageway widening along Rathmullan Road will be provided at detailed design stage. A typical section of the proposed road widening is shown on attached drawing No. 18-014-P012.		
2.1.9 Problem - Site Clearance and potential hazards in clearzone	Yes	Site clearance proposals will be clarified as part of the detailed design process. The proposed treatment of the existing overhead lines is shown on drawing No. 18-014-P052 and will be subject to agreement with ESB.		
2.1.10 Problem - Parking Generally	Partially	Yes - Car-parking has been provided to comply with the Meath County Council Development Plan. Figure 11 - It is proposed to set these spaces back and have an apron adjacent the road to ensure sightlines are achieved. Parking demands on-street to be monitored at operational stage.	Figure 12 - It is our opinion that the car-parking is set a sufficient distance from the junction given the low speed environment and the various traffic calming measures implemented within the scheme. Figure 13 - There is a raised table at this intersection which will provide sufficient traffic calming at this location. It is not proposed to relocate these parking spaces.	Yes
2.1.11 Observation - Traffic Volumes and access junction proposals	Yes	A traffic and transport assessment (TTA) has been prepared as part of the subject application and is available under separate cover.		
2.2.1 Problem - Existing Alignment and Visibility at Proposed Junctions	Yes	It is proposed that the speed limit along Rathmullan Road adjacent the proposed development is reduced to 50 km/hr. Sightlines will be provided in accordance with DMURS. Figure 16 - road is being re-aligned on approach to the signalised junction to		

		<p>ensure forward visibility. If required by MCC, anti-skid surfacing can be provided prior to junctions where gradients are steep. Figure 17 - The road has been re-aligned to ensure a 104m radii curve, and therefore sufficient forward visibility, as per DMURS requirements for 50kph. Figure 18 & 19 - Road being widened to 6m and can re-surface if required by MCC. Embankment to be set back as required to ensure 45m forward visibility is provided as per DMURS for 50kph.. Figure 20 & 21 - This area will be a low speed environment (i.e. 30kph) and is part of the proposed residential estate. Furthermore, this road only serves an apartment block and 2 No. existing dwellings and traffic volumes are expected to be low.</p>		
2.2.2 Problem - Proposed Geometry at Site Access Points	Yes	<p>Yes - The proposed geometry at each access point has been reviewed and updated to facilitate safe turning movements. The corner radii is generally 6m at the site entrances which is in compliant with DMURS. Please see attached drawing No. 18-014-P030, P031, P032 and P033 which illustrate the revised swept path analysis in this regard.</p>		
2.2.3 Problem - Internal Site Geometry	No		<p>We would note that road widths and corner radii have been designed in compliance with DMURS in order to encourage a low-speed environment where VRU's are prioritised over vehicles. This is further emphasized through the provision of speed reducing measures such as raised crossings, shared surface / home zone areas and on-street parking. The current road widths of 6.0m facilitate the safe passing of standard vehicles,</p>	<p>Yes - subject to post construction monitoring of speeds and operation</p>

			particularly given the low speed residential street environment promoted within the scheme. We would not propose to increase turner radii and / or road widths.	
2.2.4 Problem - Vertical Alignment	Yes	Longitudinal profile of roads to be produced at detailed design stage. In relation to Figure 25, levels have been reviewed and a dwell area can be provided at the access point / intersection with Rathmullan Road. Access proposals at this location are shown on drawing No. 18-014-P006 with additional information provided on the landscaping site masterplan.		
2.2.5 Observation - Proximity of Adjacent Access Points	Partially	Yes - All existing access points along Rathmullan Road will be retained as required.	We do not agree that internal junctions require additional staggering given these are within a low speed environment with suitable signage and traffic calming measures provided. Figure 27 - There are not expected to be any traffic movements across the main road at this location given that the southern arm only serves an apartment block and 2 No. existing dwellings. It is highly unlikely cars will access this road from the estate road to the north.	Yes
2.2.6 Observation - No form of control at a number of internal junctions	Yes	The proposed development incorporates a roads hierarchy which informs priority / rights of way at the various internal junctions, please see attached drawing No. 18-014-P015. Stop signage and marking has been provided to indicate right of way at junctions. Please refer to drawings No. 18-014-P003, P004, P005 and P006 in this regard.		
2.3.1 Problem - Pedestrian Provision	Yes	Yes - pedestrian activity, desire lines and demands to be considered at detailed design		

		stage. Details of all kerbs to be provided as part of the detailed design. Footpaths within the site are a minimum of 2m and are in compliance with DMURS. The 1.2m pedestrian strips are proposed locally within home zone / shared surface areas which is also permitted under DMURS. Crossing points are identified on the updated layout drawings, please refer to drg No's 18-014-P003, P004, P005 and P006. These drawings also include for the provision of tactile pavement as necessary.		
2.3.2 Observation - Cyclist Provision	Yes	Potential cyclist activity has been reviewed in the context of the area, with 0.86% of work trips and 0.95% of school trips in South Drogheda (St Mary's Electoral Division) made by bicycle according to 2016 census data. The internal site layout allows for cyclists to share the road space within the traffic calmed 30kph in accordance with DMURS. A shared pedestrian and cyclist link is also proposed through the development. This is indicated on the attached landscape architects site masterplan, drg. No. 18306-2-101 LMP.		
2.4.1 Problem - Lighting	Yes	Lighting design will be carried out at detailed design stage and will comply with Local Authority Standards whilst noting the recommendations outlined in the RSA.		
2.4.2 Problem - Signing and Lining	Yes	Signage and lining to the appropriate standard will be provided throughout the development.		

Signed:  Designer Date 14/06/19

Signed:  Audit Team Leader Date 14/6/19