TECHNICAL NOTE 220012/001

Subject:	Junction Assessment & Pedestrian Crossing Provision	**Produced by:**	JLH
Project:	Deansgrange Cycle Scheme	**Checked by:**	RK
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1.0 INTRODUCTION

This Technical Note is being undertaken in order to provide results of a traffic impact assessment at the R827 Deansgrange Road / R830 Kill Lane signal controlled junction (Deansgrange Junction). The junction was assessed in order to determine the impact within the junction as a result of the removal of the dedicated right turn lane on the R827 Deansgrange Road arm. The removal of this flare lane is necessary in order to provide a two way cycle facility along this section of the road and to maintain two way traffic along the Deansgrange Road.

This Technical Note also provides information regarding the existing priority pedestrian crossing along Kill Lane. The crossing is situated in close proximity to the Clonkeen Park entrance as well as a number of local amenities and, therefore, has a high level of demand. This Note will focus on the assessment of movements in this area and the resulting design decisions in relation to movements between the junction and entrance to the park.

2.0 DEANSGRANGE JUNCTION ASSESSMENT

Existing Junction Layout

Shown below in **Figure 2.1** is the Deansgrange signalised junction. This is a four arm junction with signal controlled pedestrian crossing facilities located on all arms. The pedestrian stage operates as an all red stage. The existing layout provides two traffic lanes on all arms, one long lane and a flare lane on approach to the stop line. The R827 Clonkeen Road arm also provides a left turn slip lane. The R830 Kill Lane (E) arm has a banned right turn movement within the junction.

Figure 2.1: Existing R827 / R830 Junction

Traffic Surveys

Traffic surveys were undertaken at the junction in January 2022. It is noted that these surveys were undertaken during Covid-19 travel restrictions, therefore, traffic levels may not reflect pre covid traffic conditions. This Note, however, is being undertaken in order to determine the impact levels as a result of traffic lane removal rather than the overall capacity within the junction. Therefore, the traffic surveys undertaken were deemed appropriate for use.

Shown in **Figure 2.2** below are the AM peak (08:00 – 09:00) and PM peak (15:15 – 16:15) traffic flows at the Deansgrange junction.

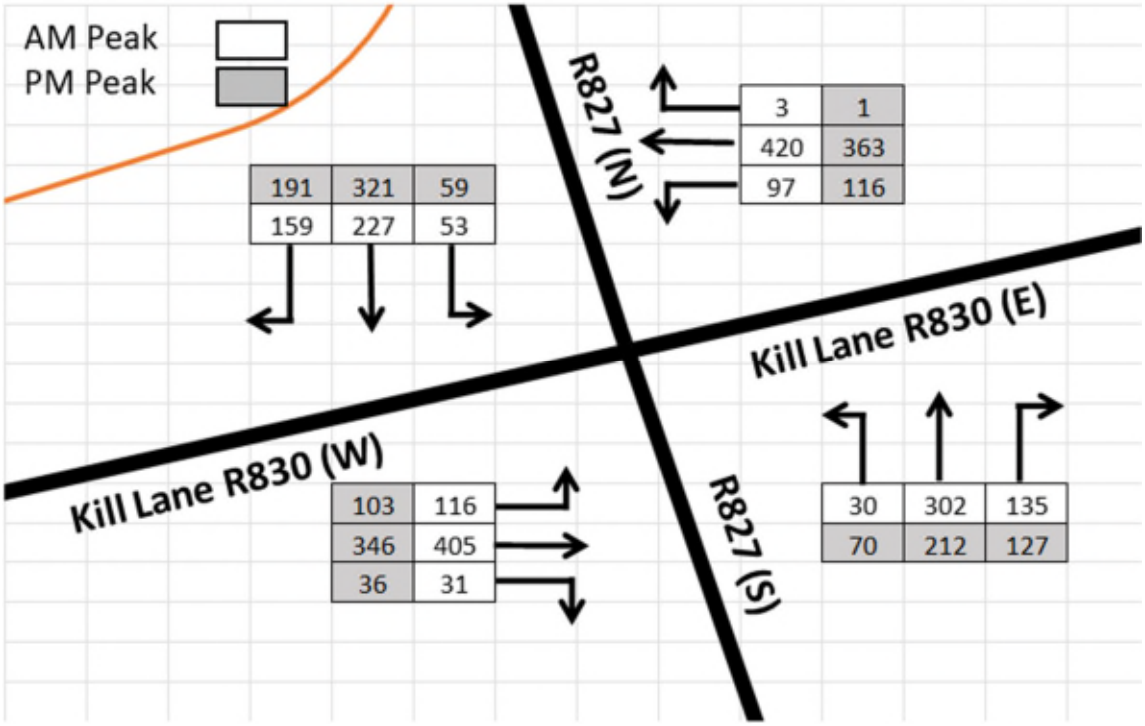


Figure 2.2: 2022 AM & PM Peak Hour Traffic Flows for the Deansgrange Junction

Results of the traffic surveys show that traffic levels are high in general through the junction for both peak hours, in particular, for the Kill Lane straight ahead movements for both east and west arms. The Deansgrange Road arm displays a moderate straight through movement in both peaks of 227pcu in the AM and 321pcu in the PM peak. This arm displays a right turning movement of 159 pcus in the AM peak and 191 pcus in the PM peak hour.

Proposed Junction Layout

The design of the proposed Deansgrange Cycle Route Scheme requires the removal of the existing right turn flare lane on the R827 Deansgrange Road arm in order to provide a two-way cycle track on the western side of the road while maintaining two-way traffic along Deansgrange Road.

A previous options study determined a one-way traffic operation along Deansgrange Road was the preferable option for the overall scheme, however, from extensive consultation undertaken with residents and business owners, a one-way system was not deemed appropriate. Therefore, Deansgrange was maintained as two way for this scheme.

A proposed layout for this junction was suggested when it was presented to the Elected Members in late 2021. An indicative junction layout is shown below in **Figure 2.3**.

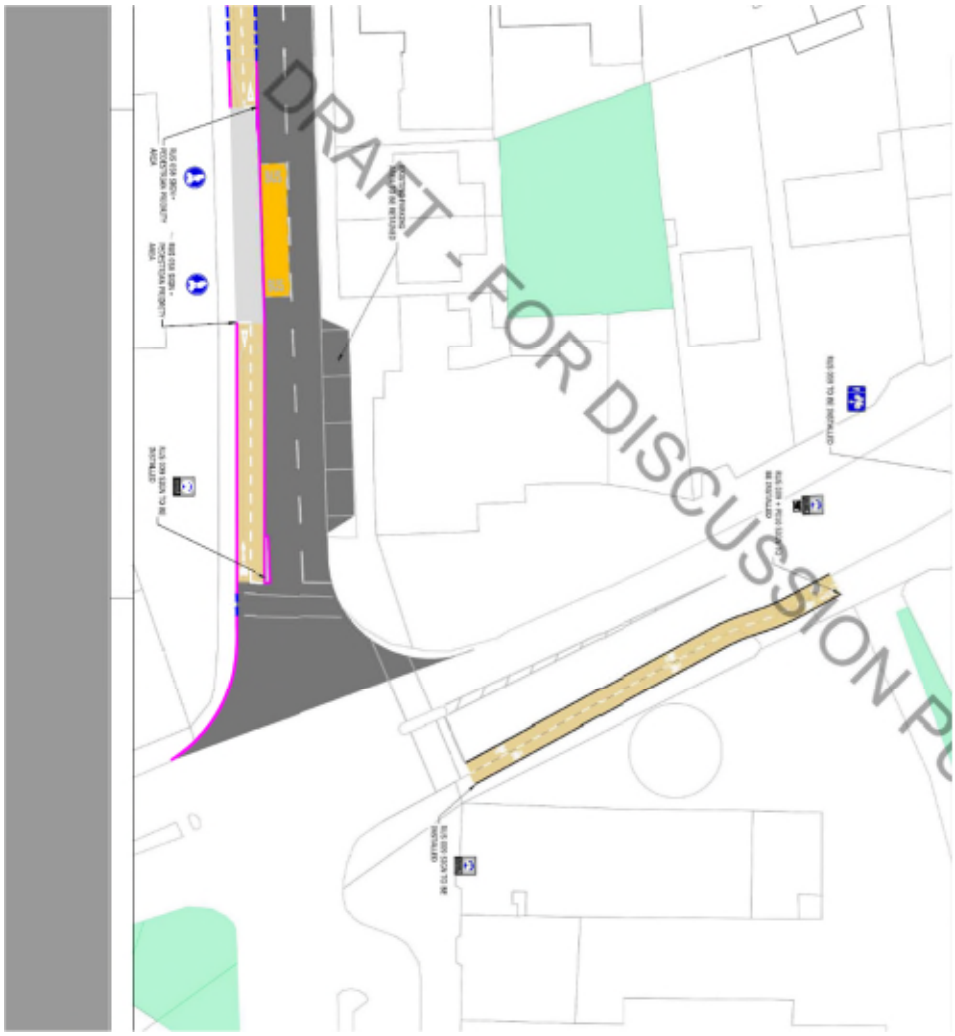


Figure 2.3: Indicative R827 / R830 Junction Layout

In order to maintain existing traffic capacity at the junction, the existing staging plan is proposed to be maintained as part of the revised junction layout. The right turning vehicles from the R827 (N) arm to Kill Lane (W) arm will be giving way to the R827 (S) arm straight ahead movement. The right turning movement will be monitored with regard to the operation of this movement. Should the right turning vehicles block straight ahead vehicles consistently on this arm, alternative staging arrangements may need to be reviewed.

Junction Assessment

A provisional junction assessment was undertaken in order to determine the level of impact as a result of the requirement to change the existing staging plan, should right turning vehicles block straight ahead vehicles consistently on the R827 (n) arm.

A base TRANSYT model was developed that displayed the existing junction layout as well as the existing staging and signal arrangement within the junction.

The existing staging plan is illustrated in **Figure 2.4** below. Stage 1 within the sequence runs the R830 east and west arms. This stage runs all movements on these arms which includes a straight and left for the R830 east arm and a left, straight and right for the R830 west arm. Stage 2 runs the R827 north and south arms together. This includes all movements on these arms with the exception of the left turn movement on the south arm which runs independently as a slip lane. Stage 3 runs an indicative arrow for the right turn movements on the R830. Stage 4 runs an all red traffic stage to allow for an all movement pedestrian stage. This stage is on demand, however, it was noted on site that this stage is called within the majority of cycles during the peak hour periods.

The existing cycle time within the junction is between 113 – 116 seconds.

Stage 1: R830 (E) & R830 (W) arms

All Movements

Stage 2: R827 (N) & R827 (S)

All Movements

Stage 3: R827 (N) & R827 (S)

Right Turn Indicative Arrow

Stage 4: Pedestrian Stage

All Crossing Movements

Figure 2.4: Existing Staging Plan at the R827 / R830 Signalised Junction

The base TRANSYT model was then adapted to remove the right turn flare lane on the R827 (N) arm. The staging arrangement was changed from the existing staging plan to a proposed staging plan that removed the conflict between the right turning vehicles and straight ahead vehicles. The proposed staging plan arrangement is illustrated below in **Figure 2.5**.

Stage 1: R830 (E) & R830 (W) arms

All Movements

Stage 2: R827 (S) – All Movements

R830 (E) – Left Turn

Stage 3: R827 (N)

All Movements

Stage 4: Pedestrian Stage

All Crossing Movements

Figure 2.5: Proposed Staging Plan at the R827 / R830 Signalised Junction

The proposed junction operation, as outlined in **Figure 2.5**, runs a 4 stage sequence, similar to the existing staging arrangement. The sequence runs Stage 1 as per the existing staging, which runs the R830 east and west arms with all movements. Stage 2 runs the R827 (S) arm for all movements. This stage also allows the continuation of the left turn on the R830 (E) arm. Stage 3 runs the R827 (N) arm for all movements. Stage 4 runs the all red traffic stage to allow for an all green pedestrian/cycle crossing stage.

The proposed cycle time is set at 120 seconds with the pedestrian and cycle crossing stage running in every cycle, as what is currently experienced within the existing scenario.

TRANSYT Results

Results of the base TRANSYT for the existing layout are outlined in **Table 2.1** below.

Existing Scenario						
Layout	**Scenario**	**Arm**	**Description**	**DOS %**	**Delay (s)**	**Queue (PCU)**
Existing	AM Peak	1/1 – Kill Lane West	Straight, Left	70	35.2	14.5
		1/2 – Kill Lane West	Right	16	24.9	0.65
		2/1 – Dean's Grange Road	Straight, Left	77	59.2	9.5
		2/2 – Dean's Grange Road	Right	83	84.6	6.6
		3/1 – Kill Lane East	Left	14	23.3	1.9
		3/2 – Kill Lane East	Straight	55	30.3	10.6
		4/1 – Clonkeen Road	Left	2	4.1	0.25
		4/2 – Clonkeen Road	Straight	81	63.4	10.6
		4/3 – Clonkeen Road	Right	71	65.3	4.6
	PM Peak	1/1 – Kill Lane West	Straight, Left	64	34.2	12.15
		1/2 – Kill Lane West	Right	20	27.1	0.79
		2/1 – Dean's Grange Road	Straight, Left	95	95.2	17
		2/2 – Dean's Grange Road	Right	97	142.4	11
		3/1 – Kill Lane East	Left	17	25	2.4
		3/2 – Kill Lane East	Straight	50	30.4	9
		4/1 – Clonkeen Road	Left	5	4.2	0.6
		4/2 – Clonkeen Road	Straight	52	44.8	6.1
		4/3 – Clonkeen Road	Right	65	58	4.2

Table 2.1: Base TRANSYT Results for the Existing AM and PM Peak Hour

A Degree of Saturation (DoS) of 100% indicates that the lane in question is operating at its theoretical capacity (point of full saturation), whilst a DoS of 90% or less indicates that the lane is operating within its Practical Reserve Capacity (PRC). A positive PRC indicates that a junction has spare capacity, whilst a negative PRC that the junction is over capacity and is suffering from traffic congestion.

The results show that in the AM peak, the junction is approaching capacity with the highest Degree of Saturation (DOS) of 83% and 77% shown for the R827 (n) (Deansgrange Road) arm for the right turn and straight ahead movement respectively. The R827 (s) (Clonkeen Road) arm also operates with a high DOS of 81% for the straight ahead movement and 71% for the right turn movement.

With regard to average queue levels, the highest queue was detected on the Kill Lane West arm which displayed an average queue length of 14.5pcus which equates to an average queue length of 87m.

Queue levels for the R827 (s) arm (Clonkeen Road) arm in the AM peak hour were an average 10.6pcus which equates to an average queue length of 63.6m. It was noted on site during the morning peak that this arm operates moderately well during the peak, however, queueing does occur for a period of 15 to 20 minutes that exceeds the average queue length of 63m.

Results for the PM peak hour show that the junction operates over capacity with the highest DOS shown on the Deansgrange Road arm with 95% for straight and left movement and 97% for the right turn movement. Average queue length on this arm is 17 pcus for the straight and left movement and 11 pcus for the right turn movement. This equates to an average queue length of 102m and 66m respectively.

All other arms operate moderately well in the PM peak hour. It is noted that Kill Lane east arm operates relatively well in both peak hours. From on site observations, queueing does back up along this road. There are many contributors to this which cannot be modelled within the TRANSYT model, including the access for Supervalu as well as a number of various access points along the road that result in high levels of vehicular activity along the road itself.

Results of the proposed TRANSYT layout are outlined in **Table 2.2** below.

Proposed Scenario						
Layout	**Scenario**	**Arm**	**Description**	**DOS %**	**Delay (s)**	**Queue (PCU)**
Proposed	AM Peak	1/1 – Kill Lane West	Straight, Left	97	97.5	24.9
		1/2 – Kill Lane West	Right	23	37.4	0.8
		2/1 – Dean's Grange Road	Straight, Left, Right	98	107.4	22
		3/1 – Kill Lane East	Left	11	17.7	1.7
		3/2 – Kill Lane East	Straight	76	50	14
		4/1 – Clonkeen Road	Left	2	3.1	0.23
		4/2 – Clonkeen Road	Straight	100	152.5	18.4
		4/3 – Clonkeen Road	Right	47	52	4.2
	PM Peak	1/1 – Kill Lane West	Straight, Left	99	117.8	23.8
		1/2 – Kill Lane West	Right	31	44.8	1
		2/1 – Dean's Grange Road	Straight, Left, Right	100	114.8	30.5
		3/1 – Kill Lane East	Left	15	22.8	2.4
		3/2 – Kill Lane East	Straight	78	55.8	12.5
		4/1 – Clonkeen Road	Left	5	3.2	0.5
		4/2 – Clonkeen Road	Straight	85	85.7	8.9
		4/3 – Clonkeen Road	Right	53	57.4	4.2

Table 2.2: Proposed TRANSYT Results for the Existing AM and PM Peak Hour

Results of the proposed TRANSYT model show a decrease in overall capacity within the junction during both peak hour periods. This is as a result of altering the staging plan within

the junction. The staging plan currently runs the Clonkeen Road arm and Deansgrange Road arm separately rather than together as in the existing scenario.

For the AM peak hour, the Clonkeen Road arm and the Deansgrange Road arm display the highest levels of DOS with 100% and 98% respectively. Average queueing levels on these arms have also increased with the Clonkeen Road arm displaying an average queue length of 18.4 pcus (110m) and the Deansgrange Road displaying an average queue length of 22 pcus (132m).

Results for the PM peak show that Deansgrange Road operates with the highest levels of DOS and queuing with 100% DOS and an average queue length of 30.5 pcus (183m). The Kill Lane West (straight and left) arm operates with a DOS of 99% and an average queue length of 23.8 pcu (142m).

Overall, the removal of the right turn flare lane on the R827 (n) (Deansgrange Road) arm may result in the requirement to alter the staging plan, which would have the impact of reducing the green time available for all traffic stages. The staging is not proposed to be altered at this time but if it was to be altered there may be an impact on the performance of the junction.

The pedestrian / cycle crossing proposed will not be impacted by the changes to the traffic layout within the junction and these will operate with 6 seconds all green time and 14 seconds intergreen time, which equates to a total of 20 seconds in every cycle.

It should be noted that the previously proposed one-way traffic system on Deansgrange Road would have allowed a similar phasing to the existing to be used and the two-way cycle facilities could have been introduced without the junction capacity impact noted above. Feedback from the public engagement phase carried out in 2021 was that the preference was to maintain two way traffic on Deansgrange Road and this preference may have an impact on the capacity at the junction should it be required to propose a new staging plan at the junction.

3.0 PEDESTRIAN CROSSING ON KILL LANE

This Technical Note also focuses on the operation of the existing priority pedestrian crossing located on Kill Lane, as shown below in **Figure 3.1**. The priority crossing is situated approximately 50m east of the Deansgrange Junction. The indicative scheme presented at the end of 2021 showed a two-way cycle facility on the Supervalu side of the crossing. This option allowed movements up and down to the signalised crossings at the junction on the same side of the road.

As outlined in **Figure 3.1**, the crossing is located within close proximity to a range of various amenities, including the pedestrian/cycle entrance to the Clonkeen Park, the local shops which includes a SuperValu as well as a Primary National School, which is accessed through the Clonkeen Park Entrance. It is noted that as part of this overall scheme, it is proposed to route cyclists from the Clonkeen Park entrance and along Kill Lane. Therefore, it was important to gauge the current movement of all modes of travel within this area.

Figure 3.1: Location of Priority Crossing on Kill Lane

It was noted, during the initial site visit, that this crossing had a high level of demand, in particular, during peak times.

A Conflict Assessment Survey was commissioned for this section of the scheme route in order to determine how all modes of travel, including vehicles, pedestrians and cyclists, currently operate within this area. This conflict assessment included the priority crossing on Kill Lane.

Figure 3.2: Extents of the Conflict Assessment on Kill Lane

The survey was conducted in January 2022 and ran for a 7 day period from 07:00 – 21:00 every day. In total, 190 conflict incidents were noted within the extents of the survey. These ranged from a severity level of 2 (most severe) to 5 (least severe). **Table 3.1** outlined the number of conflicts noted for each level of severity as well as the types of conflicts noted.

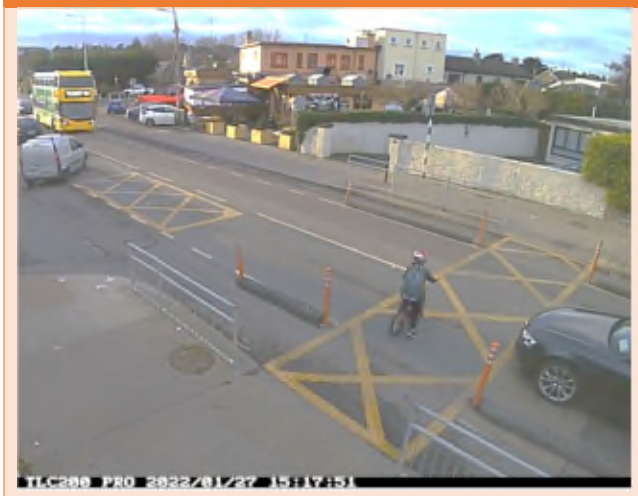
	Severity Level				
	2	**3**	**4**	**5**	Total
Vehicle / Vehicle	7	16	37	28	88
Pedestrian / Vehicle	4	16	15	32	67
Cyclist / Vehicle	10	5	7	4	26
Not Stopping				7	7
Pedestrian / Motorcycle				1	1
Vehicle / Motorcycle			1		1
Total	**21**	**37**	**60**	**72**	**190**

Table 3.1: Conflict Assessment Survey Results

Table 3.1 outlines that there were a total of 21 conflicts noted at a severity level of 2. Of these, there were 10 cyclist/vehicle conflicts as well as 4 pedestrian/vehicle conflicts. There were a total of 37 conflicts noted at severity level 3 with 5 of these relating to cyclist/vehicle conflicts and 16 relating to pedestrian/vehicle conflicts in this section. Severity levels 4 and 5

noted a total of 132 conflicts between them with 11 of these relating to cycle/vehicle conflicts and 47 relating to pedestrian/vehicle conflicts.

It is noted that a number of conflicts occurred at the priority crossing. Shown below in **Table 3.2** are image stills from conflict videos provided as well as details on the conflicts that occurred.

Conflict Image	Conflict Details
	**Conflict**: Cyclist / Vehicle **Severity Level**: 2 **Details**: Young cyclist emerges from the Clonkeen Park entrance to cycle across the priority crossing. The cyclist has to stop in the centre of the road as some cars travelling eastbound failed to stop to allow the cyclist to continue across the road.
	**Conflict**: Pedestrian / Vehicle **Severity Level**: 2 **Details**: Pedestrian emerges from the Super Valu car park and starts to cross the road at the priority crossing. The traffic on the nearside lane is stopped at the traffic lights. This allows a vehicle exiting from the Supervalu car park to make a right turn movement through the yellow box. The vehicle fails to see the pedestrian on the crossing and continues straight ahead.

	**Conflict**: Cyclist / Vehicle **Severity Level**: 2 **Details**: Young cyclist crosses the priority crossing with the vehicle on the far side requiring to make a forced stop to allow the cyclist to continue the movement. The young cyclist swerves out in anticipation of the vehicle continuing rather than stopping.
	**Conflict:** Pedestrian / Vehicle **Severity Level:** 3 **Details:** Three pedestrians waiting to cross at the priority crossing. Two of the pedestrians on the nearside of the crossing start to walk across, however stop in the middle of the crossing unsure of whether vehicles will stop. All vehicles do stop in this instance and all three pedestrians cross.

Table 3.2: Conflict Assessment Images

The results of the Conflict Assessment survey outlined a number of safety concerns that are evident at the priority crossing on Kill Lane. With the high level of demand, as well as the busy traffic conditions on the road, the incidents noted during the survey demonstrate the requirement for this crossing to be signal controlled. It is clear from the survey that the provision of a two-way facility to the Deansgrange junction on the Supervalu side of Kill Lane would not cater for the movements across Kill Lane heading towards Bakers Corner. It is also unlikely that users would travel down to the junction, cross and then return along Kill Lane.

A signal controlled crossing would provide improved safety in this location for all road users. It would provide pedestrians and cyclists with dedicated time and space to cross in one movement without being stopped within the road carriageway.

It is noted that signal controlled pedestrian crossings are in operation at Deansgrange junction, located approximately 50m west of the priority crossing. It would be possible to link this proposed crossing to the junction to allow the pedestrian phases to run together. This would remove any capacity impacts and could also facilitate turning movements into and out of the Supervalu entrance.

The provision of this crossing would remove the need to provide a two-way cycle facility on the Supervalu side of the junction and it is proposed to remove this from the scheme.

4.0 SUMMARY/CONCLUSION

Introduction

This Technical Note has been undertaken in order to provide an impact assessment at the Deansgrange junction. It is required, as part of the Deansgrange Cycle Route Scheme, to remove the right turn traffic lane on the R827 Deansgrange Road (N) arm in order to provide a two-way cycle track on the western side of the road. The assessment was undertaken to determine what impact the removal of this traffic lane would have on the capacity of the junction should a new staging plan be required.

The Technical Note also provided an assessment of the priority crossing along the R830 Kill Lane (E) arm. This crossing is currently uncontrolled and has a high level of demand for both pedestrians and cyclists due to the many amenities in close proximity to it.

Junction Assessment

It is noted that the existing staging plan for the Deansgrange Junction is proposed to be maintained as part of the junction upgrade. This will be monitored, however, and should it be assessed that the operation of the junction is not performing safely or suitably, an alternative staging arrangement may be required. Therefore, a provisional junction assessment was undertaken that proposed an alternative staging arrangement.

A TRANSYT model was developed for the base existing scenario in order to determine the existing capacity and operation of the junction. The results for the existing scenario showed that the junction operates close to capacity for the morning peak hour. The evening peak hour shows the junction operating over capacity for the existing scenario.

Results for the proposed TRANSYT layout (with alternative staging plan) show that overall capacity levels are reduced within the junction during both peak hours. This is due to the alteration of the staging plan within the junction which results in reduced green time available for each stage.

It is noted that the pedestrian and cycle crossing proposed is not impacted by the alternative staging plan or reduced traffic capacity within the junction.

In Conclusion, in order to maintain two-way traffic on Deansgrange Road, it is a requirement to remove the right turn flare lane on the Deansgrange Road arm. This will reduce capacity levels through the junction should an alternative staging plan be required.

Pedestrian Crossing on Kill Lane

A Conflict Assessment survey was undertaken adjacent to the priority crossing across Kill Lane. The crossing is located in an area with many amenities including the entrance to Clonkeen Park, a local primary national school as well as local shops. Therefore, the crossing has a high level of demand by both pedestrians and cyclists.

The Conflict Assessment survey showed a total of 190 conflicts noted over a 7 days survey. A high portion of these conflicts occurred at the priority crossing with some conflicts occurring with vulnerable school pupils on bicycles. The scheme proposed in 2021 would not cater for users wishing to cross Kill Lane heading towards Bakers Corner.

This Note recommends that the priority crossing be signalised to allow for safer crossing movements of pedestrians and cyclists in this location. The signalised crossing should be linked with the crossings located at the Deansgrange junction to mitigate any further capacity impacts.