

N52 TULLAMORE TO KILBEGGAN LINK

Option Selection Report

Volume F – Environmental Appendices

Appendix F1 – Population and Human Health

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1 INTRODUCTION

This report outlines the comparative assessment of options in relation to population and human health for the seven options for the N52 Tullamore to Kilbeggan Link Scheme. This assessment will form part of a Phase 2 – Option Selection Report which is a deliverable under Phase 2 – Options Selection of the TII PMG 2019. The purpose of the Option Selection Report is to present the project constraints and the assessments that were undertaken in order to identify the Preferred Option for the project.

This report assesses the impact of each option shortlisted for Stage 2 from a population and human health perspective. While not a requirement of PAG, population and human health is included in the analysis to be fully aligned with the criteria listed under the EIA Directive and the need, under the Directive, to provide an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects. Assessment of population and human health can typically include the following aspects; settlements, zoning, residential amenity, public amenity, community facilities, severance, tourism, and visual amenity.

For the proposed study area, the key aspect assessed in terms of population and human health relates to the number of properties directly impacted by the road scheme. This includes both impacts to amenity value of properties as well as potential for health impacts, and many of these issues are addressed elsewhere in terms of noise, air quality, severance, and visual.

1.1 Guidance

This analysis was undertaken by means of a desktop assessment based on the following guidance and information sources:

- Transport Infrastructure Ireland “*Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis*” (2016);
- An Post GeoDirectory (2021);
- Offaly County Development Plan (CDP) 2014-2020 and Draft CDP 2021-2027;
- Westmeath County Development Plan (CDP) 2014-2020 and Draft CDP 2021-2027;
- EPA Maps Tool (2021) - <https://gis.epa.ie/EPAMaps/>;
- Aerial photography (Google Maps and Google Earth);
- Ordnance Survey Ireland (OSi) Mapping;
- Central Statistics Office (CSO) Data;
- Health Service Executive (HSE) County Health Profiles;
- The EPA Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (2017);
- EIA Directive 2011/92/EU as amended by Directive 2014/52/EU;
- UK Highways Agency “*Design Manual for Roads and Bridges Sustainability & Environment Appraisal, LA 112 Population and human health, Revision 1*” (January 2020).

It is a requirement of the EIA Directive 2011/92/EU as amended by Directive 2014/52/EU (together “the EIA Directive”) to describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on population and human health. Population and human health, while not a requirement of PAG, is included in the option selection analysis to be fully aligned with the criteria listed under the EIA Directive and the need, under the Directive, to provide an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

1.2 Project Appraisal Guidelines Requirements

The TII “*Project Appraisal Guidelines for National Roads Unit 7.0 - Multi Criteria Analysis*” (PAG) do not make specific reference to population and human health, however it states that for a Stage 2 appraisal Physical Activity should be considered in the route corridor selection:

“Summary of nature of physical activity impacts including impacts on particular groups of road users such as pedestrians and cyclists. Examples of where the assessment of these impacts may be required include road schemes which provide new cycling facilities or where enhancements to existing pedestrian and/or cyclist facilities are included as part of a road scheme. Further information on the assessment and quantification of these impacts is provided in PAG Unit 13.0. Where possible, this will include a quantification of benefits in the areas of absenteeism, ambience and health risk reduction derived from using different transport modes”.

Physical Activity is addressed in Section 7.8 of the Option Selection Report.

1.3 Assessment Criteria

The Stage 2 Appraisal Process was carried out using the full range of sub criteria recommended in PAG unit 7.0, and with regard to the objectives of the scheme, so as to take account of all the predicted impacts of each option or alternative. In many cases there is a strong overlap between the objectives of the scheme and one or more of the PAG sub criteria.

All appraisal criteria use a standard scale. Each impact is scored on a scale of 1 (major or highly negative impact) to 7 (major or highly positive impact). A score of 4 represents a neutral or not significant impact. Each impact is scored as per the system presented in **Table 1-1**.

Table 1-1: Project Appraisal Guidelines Scoring

Score	PAG Score
7	Major or highly positive
6	Moderately positive
5	Minor or slightly positive
4	Not significant or neutral
3	Minor or slightly negative
2	Moderately negative
1	Major or highly negative

All scores refer to impacts measured relative to the Do-Minimum. The Do-Minimum consists of doing nothing further to improve the N52 route. The Do-Minimum would therefore by definition be scored as Neutral (relative to itself) under all sub criteria.

PAG 7.0 notes that simply adding up the scores of the different sub-criteria gives an indication of the overall performance of each option under a given criterion, but this is not to be used in a mechanistic way as a decision process. The performance of each option in meeting the scheme objectives was then considered to be one of the criteria presented in **Table 1-2**.

Table 1-2: Qualitative Scoring

Score	PAG Score
Preferred	The choice which most fully meets the project objectives.
Good	Where project objectives are met notably better than with the intermediate choices but notably not as well as with the best choice.
Intermediate	Where project objectives are met considerably less well than with the best choice but considerably better than with the worst choice.
Poor	Where project objectives are met notably less well than with the intermediate choices but notably not as well as with the best option.
Least Preferred	The choice which does least to achieve the project objectives.

Having regard to the full range of impacts assessed in each case. This is a high level of ranking of the options or alternatives. The scoring process allows for options or alternatives to be identified as being “Good”, falling between “Intermediate” and “Preferred”, or as “Poor”, falling between “Least Preferred” and “Intermediate”.

For some options there will be very little between their impact scores and some may even have the same impact scores. In such circumstances, the author has applied expert judgement and evaluated each option comparatively against the other options, taking into account the quantitative and qualitative assessments. This has allowed the author to determine a preference for each option. In some instances, similar options may have the same preference.

2 EXISTING ENVIRONMENT

2.1 Baseline

The scheme Study Area encompasses an area of 38,218,400m², with the majority of the study area situated in County Offaly. The study area commences at north Tullamore Town and extends approximately 8.2km north to Kilbeggan south incorporating the existing Tullamore to Kilbeggan section of the N52 national primary road and the surrounding lands including their respective tie-in points. The study area extends approximately 6km east to west in its central section, with the eastern and western boundaries of the study area running adjacent to the existing N52 at varying distances. The county boundary between County Offaly (to the south) and County Westmeath (to the north) crosses the study area.

County Offaly and County Westmeath are geographically central to the island of Ireland. County Offaly occupies a land area of approximately 199,981 hectares, and Westmeath occupies a land area of approximately 183,000 hectares.

County Offaly is geographically located in Leinster and is part of the Midlands Region of Ireland. It is predominantly a rural county in terms of land use, with a large rural population. Approximately 60% of the population reside in rural areas. The county had a population of 76,687 in the 2011 Census, increasing to 77,961 inhabitants in the 2016 Census. Tullamore is the County Town, other towns and villages include Birr, Edenderry, Clara and Portarlinton. Tullamore is located in the centre of the county and had a population of 14,607 in the 2016 Census. The town is situated on both the Grand Canal and the Tullamore River.

Westmeath is also located in the province of Leinster and Midlands Region, and like Offaly, Westmeath is predominantly a rural county in terms of land use, with a large rural population. Approximately 51.46% of the population reside in rural areas. The county had a population of 86,164 in the 2011 Census, increasing to 88,770 inhabitants in the 2016 Census. Westmeath has an array of towns and villages ranging from the gateway centres of Mullingar and Athlone to market towns such as Moate and Kinnegad. Rural villages such as Multyfarnham and Glasson are also in the county. Kilbeggan is located in the south the county and is situated on the River Brosna and had a population of 1,288 inhabitants in the 2016 Census.

The scheme study area is classified as rural and falls within several Electoral Divisions (ED) which are the smallest legally defined administrative areas for which Small Area Population Statistics (SAPS) which are published from the 2016 Census. See **Table 2-1** for the ED population breakdown by SAPS (2016).

Table 2-1: Population Breakdown within the Study Area by Electoral Division for County Offaly and County Westmeath

County	Electoral Division (ED)	ED Population (2016)	Males/Females	Numbers that commute daily
County Offaly	Tullamore Urban	11,437	5,534/5,903	6,607
	Tullamore Rural	3,218	1,587/1,631	2,150
	Durrow	759	377/382	539
	Tinnycross	433	215/218	299
	Ballycommon	599	328/271	423
	Kilbeggan	1,604	826/778	1,003
County Westmeath	Ardnaglew	276	131/145	186
	Lauree	205	101/104	126
	Rahugh	273	138/135	181
	Silverbrook	771	391/381	550

In the 2016 Census, for County Offaly 44,640 (out of the 77,961 recorded) stated they were in “Very good” or “Good” health. In the settlement of Tullamore, of the 14,607 recorded inhabitants, 12,145 stated they were in “Very good” or “Good” health. According to its HSE Health Profile 2015, County Offaly has an average or

below average national death rate for the main causes of death and for all ages, except for respiratory deaths for all ages, which is above the national rate.

For County Westmeath, 77,471 inhabitants (out of the 88,770 recorded) stated that they were in “Very good” or “Good” health. In Kilbeggan (ED), 1,407 of the 1,604 recorded inhabitants stated that they were in “Very good” or “Good” health. According to the HSE (2015), in County Westmeath the death rate for the main causes for all ages is only marginally higher than the national rate.

2.2 Study Area and Options

2.2.1 “Do-Something” Options

The scheme study area is mainly rural with the settlement pattern within the study area in general comprising of linear or scattered one off properties. Of the six “Do-Something” options proposed one is completely online (Option 1), with the five other options (Options 2, 3, 5 and 2-3) being offline to varying degrees and located at varying distances to the east of the existing N52 roadway, along which are located a number of one-off properties.

The Draft Westmeath CDP (2021-2027) Settlement Hierarchy outlines seven settlement types, they are; *Regional Growth Centres, Key Towns, Self-Sustaining Growth Towns, Self-Sustaining Towns, Towns and Villages, and Rural (serviced)*. Kilbeggan is classified as a *self-sustaining growth town*, which are defined as “*towns with a moderate level of jobs and services – includes sub-county market towns and commuter towns with good transport links and capacity for continued commensurate growth to become more self-sustaining*”.

The Draft Offaly CDP (2021-2027) Settlement Hierarchy outlines five settlement types, they are; *Key Towns, Self-Sustaining Growth Towns, Self-Sustaining Towns, Towns, and Rural*. Tullamore is classified as a “*Key Town*” and described as “*a large economically active county town that provides employment for its surrounding area and with high quality transport links and the capacity to act as a growth driver to complement the Regional Growth Centre of Athlone. It has potential to accommodate commensurate levels of population and employment growth facilitated by its location on high quality public transport corridors and aligned with requisite investment in services, amenities and sustainable transport*”.

The main settlement located along the existing N52 route is Durrow, classed as a Rural Village under the Offaly draft CDP (2021-2027), which are defined as “*“Rural” encompasses villages, Sráids and the wider open countryside. There may not be good public transport or regional connections and may be highly car dependent. Promote and identify regeneration and revitalisation projects of villages and support local employment and services and targeted rural housing policies*”.

Population and Human Health receptors are present along the existing N52 and the local roads which intersect with the N52 between Tullamore and Kilbeggan. Durrow National School and Saint Colmcille Church Durrow, with a graveyard, are located within the scheme study area just east of the N52 at its junction with the L2006. The school, church and graveyard are each located within the central section of the study area. Another school, Tullamore Educate Together NS, is situated just beyond the study area boundary in the south west section of the study area west of the R421 in north Tullamore. A Church of Ireland and associated graveyard (St. Columbas Church and Graveyard) are situated close to the existing N52 alignment just off the L2005, c. 50m east of the existing N52 alignments junction with Four Roads Cross and the L2005.

Each of the six route options brought forward for Stage 2 assessment are described below:

- Option 1 (8.54km) follows existing N52 closely in horizontal and vertical alignment. The proposed cross section is wider than the existing carriageway in sections and will involve land take along the edges of the road. Multiple existing field accesses along N52 will be joined by parallel collector roads or diverted to the local roads minimizing field access points to the new carriageway.
- Option 2 (8.17km) follows the existing N52 closely in horizontal and vertical alignment from the Tullamore Bypass roundabout until chainage 2050. At chainage 2050 it diverges east from the existing N52 and joins back to the existing alignment at chainage 6400. The 4350m new offline road allows for elimination of substandard junctions at Four Roads and Durrow Village. The Option 2 will cross Derrygolan Esker at chainage 5050 to 5200. Option 2 contains the shortest offline section, trying to utilise as much as possible of the existing road. Option 2 skirts to the left of the national monument of Meeneglish avoiding direct impact on the monument at chainage 5700. Four crossings of waterbodies will be required on Option 2 at chainages: 2150, 3850, 5900 and 7000.

- Option 3 (7.90km) diverges east from the existing N52 at chainage 600. It crosses Molloy's Quarry at chainage 1250-1600 and the source protection area at chainage 1000-2100. Three road crossings are proposed along the Option 3: at chainage 2240 with L2003, at chainage 3120 with L2005 and at chainage 4790 with L2006. Three crossings of waterbodies will be required on the Option 3 at chainages: 2150, 5780 and 6800. Option 3 joins the existing N52 alignment at chainage 7000 following to the M6 junction.
- Option 4 (8.09km) is an eastern option and diverges east from existing N52 at chainage 250. It crosses Molloy's Quarry at chainage 1750-1950 and the source water protection area at chainage 1000-2400. Two road crossings are proposed along Option 4: at chainage 3200 with L2005 and at chainage 4900 with L2006. Option 4 avoids crossing Derrygolan Esker passing it on the east at chainage 4900. It then goes north west passing west of Pallas forest at chainage 6000. Two crossings of waterbodies will be required on Option 4 at chainages: 2730 and 7050. Option 4 joins the existing N52 alignment at chainage 7850 and follows to the M6 interchange.
- Option 5 (8.05km) diverges east from the existing N52 at chainage 2300 making use of an already upgraded alignment of N52 up to this point. The proposed alignment east of the existing N52 replaces two substandard junctions at Four Roads and Durrow Village and substandard horizontal and vertical alignment of N52 at the middle section. Two road crossings are proposed at Option 5: at chainage 3480 with L2005 and at chainage 4990 with L2006. Option 5 crosses Derrygolan Esker at chainage 4900-5000. Two crossings of waterbodies will be required on Option 5 at chainages: 2150 and 7050. Option 5 joins the existing N52 alignment at chainage 7850 and follows to the M6 interchange.
- Option 2-3 (8.10km) was developed during the course of the scheme development and appraisal as a combination of Options 2 and 3 above. This option combines the southern part of Option 2 with the northern part of Option 3 and has been developed as a means of further minimising impact on the Ballybought Castle site identified for Option 2.

2.2.2 Management Option

As a result of the TII review process (July 2021), an additional "Management Option" has been put forward for consideration/assessment within the Stage 2 Options Assessment Phase. The proposed "Management Option" follows the existing N52 Tullamore to Kilbeggan alignment (8.54km) and would involve upgrading a number of sections, mainly along the centre of the existing scheme. This would result in a single carriageway in each direction with roundabouts at junctions, including the following elements:

- Three roundabout junctions proposed; at R42-N52 junction, at Four Roads Cross / L2005, and Durrow Village / Balleek Beg;
- Priority junctions at L2003-N52 Junction north of existing Silver River Bridge and at the L2006-N52 junction north of Durrow Village / Balleek Beg;
- Carriageway to be upgraded to Type 1 Single Carriageway Cross Section (circa chainage 2500);
- Proposed *cul de sac* at L2005-N52 Junction; and
- Carriageway to be upgraded to Type 1 Single Carriageway Cross Section with localised green verge narrowing between proposed *cul de sac* at L2005-N52 Junction and Durrow Village / Balleek Beg.

Regarding the context of this additional option, this is a Management Option as opposed to a Do-Minimum option. This option sits between a Do-Minimum and the Do-Something options proposed. This Management Option considers a short to medium term solution that may be able to achieve some of the objectives of the scheme.

In comparison to Option 1 (Brown), while the Management Option will follow the same centre line (i.e. the existing N52 Tullamore to Kilbeggan alignment), it is proposed as a single carriageway (Type 1 single) rather than a dual-carriageway as per the other Do-Something options. This option provides at-grade roundabouts at the key junctions, rather than grade separated junctions. However, this Management Option does not address the significant private accesses onto the N52 while Option 1 (Brown) requires a significant number of parallel roads to accommodate private accesses.

The southern and northern sections will require only minimal intervention as these have been recently upgraded, and it is essentially the middle section of the route that requires the most intervention (from the R421 junction to a point approx. halfway between the L2006 High Road and the M6 interchange). Across this

section there is still likely to be hedge line loss to accommodate the wider carriageway (on both sides), although the extent of this loss will be considerably lower than Option 1.

In terms of impacts on Durrow Demesne, while Option 1 will potentially directly impact on the boundary at Durrow Demesne with tree and hedge line loss and the design can try to reduce the impacts on the wall, there is potential that there would be direct impact to the boundary wall with Option 1. This tree and hedge line loss impact would be more limited for the Management Option with less road widening and no impact on the boundary walls.

3 OPTION SELECTION

3.1 Methodology

The assessment for the population and human health section of the OSR focuses on the potential impact on settlements in terms of residential amenity, population, and community aspects within the study area, as well as other environmental issues that have potential for impact on human health, i.e. noise and air emissions. The Zone of Influence (Zoi) for the population and human health aspects being assessed is 300m either side of the options being assessed.

Consideration of the location of social and community facilities and associated socio-economic impacts have been taken into account during the development of options.

With regard to human health impacts associated with road projects, the main issues relate to impacts to air quality as well as exposure to emissions from traffic and noise. These aspects are covered in detail separately under the appendices relating to Air Quality (Appendix F4), and Noise (Appendix F6). Impacts on landscape and visual amenity are addressed in Appendix F11 (Landscape and Visual).

3.2 Residential Properties

This assessment compares the options with respect to potential impact on residential properties. It does not specifically identify noise impacts, traffic delays / disruption impacts or visual impacts etc. as these topics are dealt with in separate assessments by the relevant specialists. Instead, it considers the potential overall impact to residential amenity in terms of the proximity of each of the options to residential properties. Data from the An Post GeoDirectory system was utilised to calculate the number of properties within four bands of 0-50m, 50-100m, 100-200m, and 200-300m from the centreline of each option. Properties within the 0-50m band will experience a more negative impact to residential amenity than those in the 50-100m, 100-200m and 200-300m bands.

The An Post GeoDirectory data categorises properties into residential, commercial, both or unknown. For the purposes of this assessment, “residential” and “both” categories have been considered together to represent the various numbers of residential properties. The “unknown” properties have been excluded for the purposes of this assessment as they appear to be disused residential and farm properties.

According to GeoDirectory data for the scheme study area, there are 837 properties identified within the study area. Of these 762 are residential, 23 commercial, 41 both commercial and residential and 11 unknown; a further breakdown in terms of residential properties within each of the four bands is outlined in the following section.

Commercial properties are addressed in Appendix F3 Material Assets (Non-agricultural).

As referred to in Section 2.2, an additional option, the Management Option, has been considered as part of the TII review process. As such, a residential property count for each of the seven route options proposed is summarised in **Table 3-1** which provides a breakdown of the residential properties and those identified as “both” between 0 and 300m of each route alignment. Property status is identified “residential”, i.e. solely residential in nature, and as “both”, i.e. consisting of both residential and commercial elements. In rural areas, properties with the status of “both” generally tend to refer to farms, agricultural businesses or similar with a residential element. Analysis of the residential amenity present along each of the route options can give an indication of the population receptors present in the vicinity.

Residential amenity may be more impacted by road upgrades than commercial properties. Of the options proposed, the Management Option and Option 1 (Brown) are the longest routes proposed at 8,544m, however these are completely online, following the existing alignment of the N52 between Tullamore and Kilbeggan.

Due to being aligned along the existing N52, the Management Option and Option 1 have considerably more properties located within 300m relative to the other Do-Something options presented. However, the Management Option has a lower number of properties of these two online options given the smaller footprint of this single carriageway route relative to the dual carriageway Option 1.

Overall, the Management Option has approximately 96 residential properties, and 6 properties identified as “both”, within 300m of the route. While Option 1 has approximately 115 residential properties, and 6 properties identified as “both”, within 300m of the route.

Table 3-1: Residential Property Count Breakdown (Source: GeoDirectory, 2020)

Route Option	Property Type	Buffer Band				Total Count
		0-50m	50-100m	100-200m	200-300m	
Management Option	Residential	25	18	16	37	102
	Both	1	0	2	3	
Option 1 (Brown)	Residential	39	16	29	31	121
	Both	1	0	2	3	
Option 2 (Purple)	Residential	17	14	23	42	102
	Both	0	0	2	4	
Option 3 (Orange)	Residential	17	12	10	33	81
	Both	1	1	3	4	
Option 4 (Blue)	Residential	14	12	16	38	87
	Both	1	0	3	3	
Option 5 (Green)	Residential	13	12	19	36	85
	Both	1	0	2	2	
Combination Option 2-3	Residential	12	14	18	42	93
	Both	0	1	1	5	

Option 2 (Purple) (8,185m total length) is the second longest route option; however, it has the shortest offline length of new offline road of the routes proposed, at 4,300m, aiming to utilise as much as possible of the existing N52 road. This option also allows for elimination of substandard junctions at Four Roads and Durrow Village; these areas were highlighted as problem areas in submissions received during the public consultation. A total of 17 residential properties were identified within 50m of this route and would be directly impacted by the proposed option. Overall, this option has approximately 96 residential and 6 “both” status properties (102 in total) within 300m of the route; this option shares the same total number of properties within 300m of its route as the proposed Management Option. Option 2 crosses local roads at three points, the L2006, L2005 and the junction of the N52/L2003, and also intersects with a number of local lanes/accesses.

Option 3 (Orange) has the shortest total length of the route options proposed at 7,899m. However, the offline section of this route is the second longest of the options proposed, at 6,400m, passing mainly through agricultural lands. A total of 17 residential properties, and one property identified as “both”, were identified within 50m of the route and so would be directly impacted by this option. Overall, this option has approximately 72 residential and 9 “both” properties, within 300m of the route. This option also passes a number of local lanes/accesses. Access to these areas and properties will be impacted by road construction activity associated with the development.

Option 4 (Blue) (8,085m) has the longest offline length of all five route options proposed at 7,500m, passing mainly through agricultural lands. Like Option 3 (Orange), this option has one of the lowest number of properties within 50m, with 14 residential and one “both” type properties identified. Overall, this option has approximately 80 residential properties, and 7 properties identified as both, within 300m of the route. This route will require two road crossings; the L2005 and L2006. This option also passes a number of local lanes/accesses.

Option 5 (Green) (8,053m) has an offline length of 5,350m, the second shortest of all five route options proposed; like Option 2, this route aims to utilise as much as possible of the existing N52 road. This route passes mainly through agricultural lands. A total of 13 residential and one “both” type properties were identified within 50m of Option 5. Overall, this option has approximately 85 residential properties (80 residential properties, and 5 properties identified as “both” within 300m of the route.

A combination option of Options 2 and 3 has been proposed. This route follows the same alignment as the proposed Option 2 travelling north from Tullamore, to where it traverses the L2006 at Balleek Beg, where it then diverges north-east for 550m before joining the proposed Option 3 alignment, continuing towards Kilbeggan. This Option is approximately 8,100m in length, with an online section of 3,300m, and 4,800m of new offline road required. Like Option 2, this option also allows for elimination of substandard junctions at Four Roads and Durrow Village. A total of 12 residential properties were identified within 50m of this route

and would be directly impacted by the proposed option. Overall, this option has approximately 86 residential and 7 “both” properties within 300m of the route. Like Option 2, this option crosses three local roads at three points (L2006, L2005, N52/L2003 junction), and also intersects with a number of local lanes and accesses.

3.3 Community Facilities

This section focuses on the number and type (sensitivity) of community facilities such as schools, churches, amenity grounds such as playing pitches and walkways, medical facilities and childcare service providers located within or near the options. This section focuses on the number and type (sensitivity) of community facilities such as schools, churches, amenity grounds such as playing pitches and walkways, medical facilities and childcare service providers located within or near the options.

A minor or slightly negative rating is applied to options where there are very low numbers of receptors within an option and the receptors identified serve relatively small number of people that do not comprise particularly sensitive groupings. A major or highly negative scoring would be assigned where there is potential for direct significant or profound impacts to facilities serving large population numbers (e.g. large hospitals or major recreational facilities) or a large number of locally important facilities or where particularly sensitive groupings are substantially affected. A moderately negative scoring is assigned to impacts which lie between these parameters, whereby local facilities are potentially impacted to a significant extent or larger facilities could be impacted but to a lesser extent than a direct significant or profound extent.

A number of community facilities and religious institutions, have been identified within the scheme study area boundary, including schools, sports facilities/grounds, and churches/places of worship.

No hospitals, primary care centres, medical centres, clinics, dental or general practitioners services were identified within 300m of any of the proposed route options. The closest hospital identified is the Midland Regional Hospital Tullamore (Ardan Road), situated c.400m south-west of Ardan Roundabout where all options commence leaving Tullamore.

No second level schools were identified within 300m; the nearest identified are all beyond the scheme study area boundary, with three situated in Tullamore town, and one in Kilbeggan town.

In terms of primary level schools two were identified within the scheme study area boundary. Tullamore Educate Together National School is situated on Collins Lane in north Tullamore town, close to the scheme study area boundary, however, this school is beyond the 300m Zol set out in this assessment. The second school, Scoil Naomh Colmcille (Durrow National School) is situated in the central section of the scheme study area boundary, along the L2006 at Durrow/Balleek Beg. No childcare facilities were identified within the scheme study area.

A number of community facilities and places of worship, are situated close to the existing N52, including; Saint Colmcilles Church and graveyard at Balleek Beg, St. Columbas Church, Durrow Abbey at Durrow Demesne, and Durrow GAA club. Access to these facilities may be temporarily impacted by road works and construction activity in the vicinity.

Management Option and Option 1: Scoil Naomh Colmcille (Durrow National School) is located c.170m east of the existing N52, and as such are in the vicinity of both the proposed Management Option and Option 1 alignment and its junction with the L2006. Furthermore, a number of community facilities and places of worship, are situated in the vicinity of the alignment of these two online options, located off the existing N52, including;

- Saint Colmcilles Church and graveyard at Balleek Beg (c.80m east);
- Durrow GAA club (directly adjacent to the existing alignment);
- St. Columbas Church of Ireland and Graveyard (situated off the L2005 c. 50m east of the existing N52 alignment); and
- St. Columbas Church, Durrow Abbey at Durrow Demesne is also in the vicinity of this route option, however, it is situated c.480m west.

The Management Option proposes to manage the existing N52 route with upgrades and improvements including three roundabouts, improved junctions, and carriageway upgrades. This option does not propose to widen the existing route, as is proposed for the alternative online route, Option 1. Due to this, of all options proposed, the Management Option will require limited landtake, mainly at the locations of the proposed new roundabout junctions; there will be limited land take or severance of community facilities. This option will

have a potentially adverse direct impact on the Durrow GAA Club and St. Columbas Church of Ireland, which are directly adjacent to the existing N52 alignment at Four Roads Cross (west and east side of the N52 respectively), in terms of access and disruption during construction/upgrade works.

With Option 1, minimal private non-agricultural land take or severance will be required; the proposed option is wider than the existing carriageway in sections and will require some land take along road edges. In addition, this option will have a potentially adverse direct impact on the Durrow GAA Club which is directly adjacent to the existing N52 alignment. Potential partial land take of the club grounds would be a significant adverse impact for the club.

All other route options assessed are situated at varying distances to the east of the existing N52 alignment, Management Option and Option 1 (Brown), and so are further from the public facilities identified above:

- **Option 2:** No schools or places of worship were identified within 300m of this route option. Saint Colmcille Church Durrow (L2006), Scoil Naomh Colmcille (L2006), and Durrow GAA (L2005) club are all located in the vicinity, to the west of this option, however, all are c.450m or further from the route.
- **Option 3:** No schools, community facilities, sports grounds, or places of worship were identified within 300m of this route option. Like Option 2, Saint Colmcille Church, Scoil Naomh Colmcille and Durrow GAA Club are all located west of this route, however, all are c.600m or further from its proposed alignment.
- **Option 4:** Option 4 is the furthest east route of all seven options proposed and so is the furthest from school and facilities identified in Durrow/Balleek Beg. Overall, no schools, community facilities, sports grounds, or places of worship were identified within 300m of this route option.
- **Option 5:** Option 5 is the second furthest east option from the school and facilities identified at Durrow/Balleek Beg. Overall, no schools, community facilities or places of worship were identified within 300m of this route option.
- **Option 2-3:** No schools or places of worship were identified within 300m of this route option. Like Options 2 and 3, Saint Colmcille Church Durrow (L2006), Scoil Naomh Colmcille (L2006), and Durrow GAA (L2005) club are all located in the vicinity and to the west of this option, however, all are beyond 300 m.

3.4 Human Health

Air Pollution

Air quality impacts can be on a local scale or a regional/national scale. Local air quality impacts such as dust can have health and nuisance impacts in the vicinity of construction activities and vehicle and plant emissions generate greenhouse gases (GHGs) such as carbon dioxide (CO₂). The latest report from the EEA on the data submitted by Member States under the NEC Directive indicates that air pollution is the greatest environmental health risk in Europe. Under the revised National Emissions Ceiling (NEC) Directive (2016/2284/EU), Ireland is therefore required to limit the annual national emissions of the following transboundary pollutants: sulphur dioxide (SO₂), nitrogen oxides (NO_x) volatile organic compounds (VOC), ammonia (NH₃) and fine particulate matter (PM_{2.5}).

The EPA releases an annual report titled “Air quality in Ireland”. The most recent revision of the report provides a synopsis of air quality in the country during 2019. The report was published in May 2020. In total, there are 84 monitoring stations in the national network. The nearest air quality monitoring station to the study is in Tullamore. The proposed scheme is situated within Zone D - Rural Ireland, i.e. in an area with the absence of any major sources of air pollution. Air quality in Zone D is generally described as “good” given the absence of major pollution sources. Existing sources of pollution in the area include road traffic on the local road network including the N52 and the M6, agriculture (dusts, odours, etc.) and space heating (e.g. domestic heating systems).

Air quality is discussed in detail in the Environmental Appendix F4 Air Quality.

Noise

Noise is also recognised as affecting health and wellbeing. Exposure to noise is recognised as being both an environmental pressure to wildlife as well as human beings and can affect human health and general wellbeing by causing stress, anxiety and disruption of activities such as sleep. The degree to which noise

exposure impacts disease incidence is less well understood compared to air pollutant exposure. Exposure to excessive noise has also been linked to an increased risk of heart attack, stroke and premature death. People are generally exposed to the most noise from transport-related sources, particularly road traffic.

Railways, airports and industrial activities are also sources of noise. Urban areas can exacerbate the impacts of noise to human health, in particular because air pollution levels are often higher, creating in-combination effects.

Noise is discussed in greater detail in Environmental Appendix F6 Noise and Vibration.

Water Pollution

Clean water is important to a population's general health. Ireland has in general good water quality and consequently the health of the population benefits from having it. There are many potential contaminant sources that pose a risk to a clean water supply. The main potential risks to human health come from biological sources (verotoxigenic *E. coli* [VTEC], *Cryptosporidium* etc.) and chemical sources (fertilisers, pesticides, herbicides, trihalomethanes (THMs), heavy metals and pharmaceuticals etc.). In addition, the development of infrastructure may have the potential to have a negative impact on water quality and supply in some instances.

Water supply and drinking water quality are discussed under the Environmental Appendix F9 Water (Hydrology and Hydrogeology).

4 OPTION SUMMARY

Table 4-1 summarises the impact score matrix for all options proposed for the scheme.

Based on the property counts and supplementary qualitative analysis, Option 1 potentially impacts the highest number of residential, commercial and amenity properties along its route with 121 properties impacted (including all four of the amenity properties). In addition, this option will have a potentially adverse direct impact on the Durrow GAA Club which is directly adjacent to the existing alignment. As such, while Option 1 likely results in a largely neutral impact for health by retaining the traffic source close to the properties along the existing N52, it will also have potential negative impacts both on residential amenity and the GAA club in terms of a general loss of amenity through the widening of the carriageway at these properties. For these reasons Option 1 is scored as slight negative and a “poor” option preference. The impact level relative to baseline is classed as minor or slightly negative given the largely identical alignment to the existing and an impact score of 3 is applied.

The Management Option potentially impacts 102 properties along its route, including all four amenity properties. Although this option has a higher number of properties present within 300m than the offline options (Options 3, 4, 5, 2-3), there would be limited impact to these properties due to these properties already being present in vicinity and/or along the alignment of the existing N52, as well as the nature of the Management Option, which is completely online, with no requirement for widening, limited landtake, and lower levels of construction work required.

During construction, works associated with the Management Option at the three proposed roundabouts junctions, will have potential temporary impacts on residential properties and amenities in the vicinity in terms of access/disruption, in particular at the junction of Four Roads Cross and the L2005 and the junction of the N52 and L2006 (Durrow/Balleek Beg), where a number of community facilities/amenities are situated; St. Columbas Church at Durrow Abbey, Durrow Demesne, Durrow GAA Club, St. Columbas Church of Ireland and graveyard (L2005), Saint Colmcilles Church and graveyard (Durrow/Balleek Beg), and Scoil Naomh Colmcille (Durrow National School).

For these reasons the Management Option is scored as neutral and an “intermediate” option preference. The impact level relative to baseline is classed as neutral given the identical alignment to the existing N52, no widening of the existing route and limited landtake, and an impact score of 4 is applied. For the remaining route options (Options 2, 3, 4, 5, 2+3), the impacts in terms of residential amenity are lower given the significantly lower number of properties impacted when compared to Option 1. It should be noted, like the Management Option, Option 2 also has a property count of 102 properties within 300m of its alignment, however, a proportion of these would be situated along or in the vicinity of the new offline section of this option. Each of these five options will all move the traffic away from the higher density areas along the existing alignment, which has the highest number of residential properties and community facilities along its route, to lower population density areas, leading to significant reductions in traffic and HGVs in the vicinity of the existing N52 alignment. A reduction in traffic and HGVs will also contribute positively to health, in terms of Air Quality and Noise.

While there is some amenity loss and potential impact for these affected properties, on a regional level these options represent a population gain relative to Option 1. In this regard, these options are given an impact score of 5 (minor or slightly positive) and each is assigned a “good” preference with the exception of Option 2-3 which impacts on the lowest number of residential properties in close proximity to the route (12 within 50m) and therefore assigned the “preferred” option.

A summary of Population and Human Health impacts and preference ratings is presented in **Table 4-1**.

Table 4-1: Population and Human Health Impact Score Matrix

Option	Summary of Impacts	Impact Level	Impact Score	Preference Rating
Management Option	<ul style="list-style-type: none"> • Completely online. • Lowest level of construction work required compared to other options. • Impacts the second highest number of properties; 26 properties within 50m and 102 properties within 300m. 	Neutral	4	Intermediate

Option	Summary of Impacts	Impact Level	Impact Score	Preference Rating
	<ul style="list-style-type: none"> Limited impact to properties as is a management option and these properties are already present in vicinity of existing N52. No widening: limited residential land take or severance required. Very limited land take or severance of community facilities. Would continue to impact the primary school and place of worship at Durrow and potential for disruption during construction. Potential for disruption impact to Durrow GAA Club and St. Columbas Church of Ireland during works. 			
Option 1 (Brown)	<ul style="list-style-type: none"> Completely online. Impacts the highest number of properties; 40 properties within 50m and 121 properties within 300m. Would continue to impact the primary school and place of worship at Durrow. Potential for direct impact to Durrow GAA Club. 	Minor or slightly negative	3	Poor
Option 2 (Purple)	<ul style="list-style-type: none"> Impacts low number of properties within 50m (17). 102 properties within 300m. All amenity locations outside the 300m zone from this route with negligible impact. 	Minor or slightly positive	5	Good
Option 3 (Orange)	<ul style="list-style-type: none"> Impacts low number of properties within 50m (18). 81 properties within 300m. All amenity locations outside the 300m zone from this route with negligible impact. 	Minor or slightly positive	5	Good
Option 4 (Blue)	<ul style="list-style-type: none"> Impacts low number of properties within 50m (15). 87 properties within 300m. Furthest route option from Durrow/Balleek Beg: School/Church etc. 	Minor or slightly positive	5	Good
Option 5 (Green)	<ul style="list-style-type: none"> Impacts low number of properties within 50m (14). 85 properties within 300m. All amenity locations outside the 300m zone from this route with negligible impact. 	Minor or slightly positive	5	Good
Combination of Option 2-3	<ul style="list-style-type: none"> Impacts low number of properties within 50m (12). 93 properties within 300m. All amenity locations outside the 300m zone from this route with negligible impact. 	Minor or slightly positive	5	Preferred