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AI JUNCTIONS PHASE 2 ROAD IMPROVEMENT SCHEME

ENVIRONMENTAL IMPACT
 ASSESSMENT REPORT (EIAR)

NON-TECHNICAL SUMMARY



I68014-RPSB-EGN-XX-RP-EN-00002

RPS

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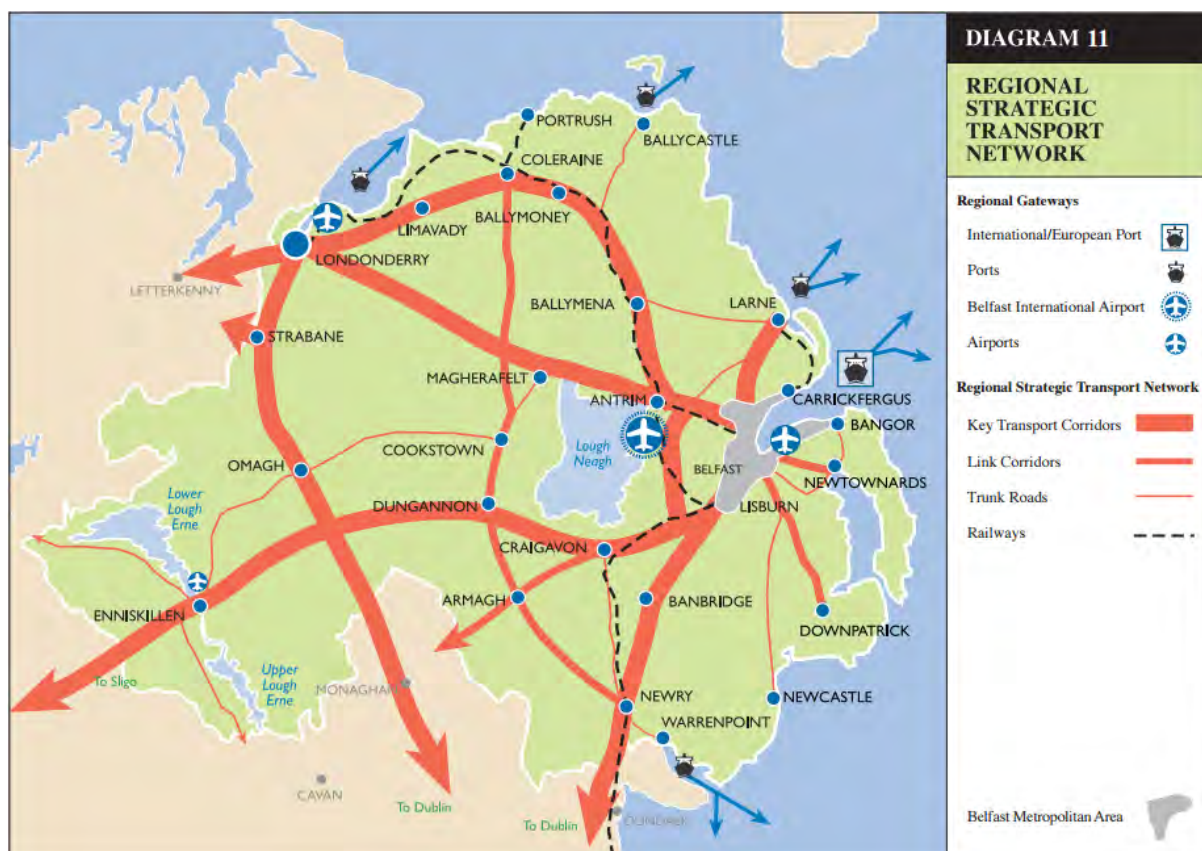
1.0 INTRODUCTION

1.1 BACKGROUND

The A1 road is an all-purpose dual carriageway and forms part of the strategically important principal north-south arterial route linking the capital cities and principal gateway ports of Belfast and Dublin. It is identified within the Trans-European Transport Network Priority Project 13 and is classified as a Key Transport Corridor within the Regional Strategic Transport Network as illustrated in Figure 1.1.

The A1 also acts as the key link between the towns and villages that lie within the corridor and as well as being the primary road linking these towns and villages to Belfast, it also provides a key link for communities both east and west of the route corridor. As such it is considered to have economic and social importance both regionally and locally.

Figure 1.1: Regional Strategic Transport Network



The Department for Infrastructure (DfI) Roads is developing the A1 Junctions Phase 2 Road Improvement Scheme (A1J2) (here after referred to as the proposed development) that is the current phase of an on-going improvement strategy for the corridor between Hillsborough Roundabout and Loughbrickland. This follows on from the A1 Junctions Phase 1 scheme completed in 2010, which provided four Compact Grade Separated Junctions (CGSJs) located at Dromore Road (Hillsborough), Banbridge Road (Dromore), Dromore Road (Banbridge) and Dublin Road (Loughbrickland).

The section of the A1 under consideration in the proposed development is a 25.2 km long stretch of all-purpose dual carriageway, extending from the Dublin Road Junction at Loughbrickland in the south to the Hillsborough Roundabout in the north. This section of dual carriageway has undergone staged development over a number of decades since 1971. Currently there is a combination of grade separated and at grade junctions as well as a significant number of private and farm accesses which have direct

1.2 WHAT IS AN ENVIRONMENTAL IMPACT ASSESSMENT REPORT?

An Environmental Impact Assessment Report (EIAR) has been prepared for the proposed development. An Environmental Impact Assessment Report is a detailed report of the findings of the Environmental Impact Assessment process. In particular, it predicts the environmental effects that the proposed development would have, and details the measures proposed to reduce or eliminate those effects. It informs the final decision on whether the proposed development should be allowed to proceed. Its function is to give stakeholders including the public and statutory environmental bodies, an opportunity to express an opinion before the scheme is initiated. It identifies, describes and assesses the significant environmental effects of the proposed development.

The Environmental Impact Assessment report is issued in accordance with the EIA Directive and Article 67 (5) (e) of The Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 which amends Part V of The Roads (Northern Ireland) Order 1993.

The structure of the EIAR that can be read with this Non-Technical Summary is set out in the following volumes:

- Volume I: Environmental Impact Assessment Report – Main Text
- Volume II: Environmental Impact Assessment Report – Drawings & Figures
- Volume III: Environmental Impact Assessment Report – Appendices
- Non-Technical Summary – this document

1.3 ALTERNATIVES CONSIDERED

The Design Manual Roads and Bridges, a national roads guidance document, lists the scope of the three main stages of assessment of road schemes as:

- Stage 1 – identify the environmental, engineering, economic and traffic advantages, disadvantages and constraints associated with broadly defined improvement strategies.
- Stage 2 – identify the factors to be taken into account in choosing alternative routes or improvement schemes and to identify the environmental, engineering, economic and traffic advantages, disadvantages and constraints associated with those routes or schemes; and
- Stage 3 – identify clearly the advantages and disadvantages, in environmental, engineering, economic and traffic terms, of the Overseeing Department's preferred route or scheme option. A particular requirement at this stage is an assessment of the significant environmental effects of the project, in accordance with the requirements of Article 67 of the Roads (Environmental Impact Assessment) Regulations (Northern Ireland) 2017 which amends Part V of the Roads (Northern Ireland) Order 1993.

The Stage 1 assessment for the A1J2 scheme was completed and published in October 2011. The Stage 2 assessment was published in March 2014. The Stage 3 Assessment will be published in tandem with the EIAR.

Stage 1 Scheme Assessment

The preferred strategy emerging from Stage 1 proposed the closure of all median gaps and the construction of further Compact Grade Separated Junctions additional to those provided within the A1 Junctions Phase 1 scheme. This strategy eliminated right turn and u-turn manoeuvres as well as nearside to offside weaving and the dangers this created as a result of vehicles slowing in the 'fast-lane' of the dual carriageway. Furthermore the closure of all median gaps would provide an enhanced

standard of dual carriageway, improving route consistency between Belfast and Dublin. Despite the safety benefits to all road users, it was acknowledged that properties with direct access onto the A1, or indirect access at a side road not connected to a CGSJ would be displaced as a result of the removal of right turning facilities; furthermore there would be some reassignment of traffic through the towns of Dromore, Banbridge and Loughbrickland due to the changes.

Having established the preferred strategy, the next step was to determine the number and location of additional CGSJs. It was determined that new compact grade separated junctions would be required at or close to the following three locations:

- Listullycurran Road;
- Gowdystown Road; and
- Skeltons Road.

A review of turning movements at side roads along the A1 confirmed that both Waringsford Road, north of Banbridge, and Old Manse Road, Banbridge, are relatively heavily-used junctions where there are significant right turn movements. It was decided to adjust the strategy to provide a CGSJ at Waringsford Road and a northbound on-slip at Castlewellan Road, which will cater for the heavy right turn movement out of Old Manse Road.

Due to the nature of compact grade separated junctions, a wide range of design options are normally available when considering potential improvements. Following identification of the five junction locations, a series of preliminary layout options were drawn up for consideration. Separate Workshops were held for each junction to consider the issues associated with the potential layout, omit any options that were considered unfeasible, and ultimately refine the number and type of the options to be taken forward into Stage 2 of the assessment.

Stage 2 Scheme Assessment

A minor road junction strategy was developed in conjunction with the proposals for the closure of the central median and further grade separation of junctions along the scheme route. The strategy assessed each of the minor road junctions within the scheme extents individually to determine which junctions it would be beneficial to close, and which junctions it was appropriate to retain and improve within the scheme.

It was recommended that of the existing thirty-six minor road junctions within the scheme extents, eight minor side roads are to be closed and twenty-two are to be retained, operating as left in left out only. The remaining minor road junctions are to be incorporated into the proposed CGSJs. The minor road junction strategy also identified that a link road should be provided between Milebush Road and the Hillsborough Road CGSJ, Dromore.

The junction option assessments identified a preferred option at each of the junction locations and these were taken forward for further consideration at Stage 3.

Stage 3 Scheme Assessment

At Stage 3, due to continued engagement with the public and consideration of associated concerns raised, the decision was made to increase the number of merge lanes where it was safe to do so. This was largely dictated by the distances between existing and proposed junctions. The close proximity of the proposed merge and diverge lanes could potentially lead to additional collisions on account of substandard weaving lengths.

Furthermore, the opportunity was taken to reduce the number of side roads to 21 by closing the Backnamullagh Road and connecting it directly to the new Junction at Listullycurran Road. This has the added benefit of reducing detours within the vicinity, increasing local connectivity and reducing the requirement for local farmers to drive slow agricultural machinery on the mainline.

Recommendations from Stage 3 include:

- The construction of four new CGSJs at Listullycurran Road, Gowdystown Road, Skeltons/ Drumneath Road and Waringsford Road;
- The construction of a new northbound on slip from the Castlewellan Road (Banbridge) onto the A1;
- The construction of a link road connecting the Milebush Road to the Hillsborough Road CGSJ Dromore;
- The closure of all gaps within the central reserve;
- Installation of a continuous safety barrier along the full length of the scheme;
- The closure of 9 minor road junctions;
- The conversion of 21 existing minor road junctions onto the A1 to Left In - Left Out configuration
- The provision of 16 Merge lanes;
- Closure of a number of private accesses along the route with the remainder operating as left-in / left-out only;
- Closure of all mainline bus-stops with new bus stops provided at the four new CGSJs; and
- Provision of a number of driver information and communication systems at strategic locations along the route to improve safety and efficiency.

A full description of the proposed development is included in EIAR Volume 1 Chapter 2 Project Description, which is accompanied by drawings that illustrate the proposed development along with drawings in this Non-Technical Summary (NTS).

Do Nothing Scenario

The Do Nothing Scenario considers what the consequences would be for the existing road without the proposed development and with no maintenance or intervention. Obviously if the proposed development did not precede the existing safety issues relating to this section of A1 corridor would remain which is not an acceptable long term alternative option.

Do Minimum Scenario

The Do Minimum Scenario considers what the consequences would be if the proposed development did not proceed and that the existing road would continue to be maintained under the current regime. Again the existing safety issues relating to this section of A1 corridor would remain which is not an acceptable long term alternative option.

2.0 PROJECT DESCRIPTION

An overview of the proposed development described here is contained within Figures 2.0.1 to 2.0.6 within this Non-Technical Summary (Appendix 1).

The principle aim of the proposed development is to improve road user safety by the closure of all gaps within the central reservation, construction of a series of Compact Grade Separated Junctions (CGSJs) and the closure or conversion of existing side road junctions to left in left out (LILO) only. This will be achieved by constructing the following;

- A CGSJ at Listullycurran Road (including Backnamullagh Link)
- A CGSJ at Gowdystown Road
- A CGSJ at Skeltons/ Drumneath Road
- A CGSJ at Waringsford Road
- A new link road connecting Milebush Road to the Hillsborough Road Underpass
- A new slip road connecting the Castlewellan Road to the A1 at Banbridge
- Closure of 111 gaps in the central reserve and installation of a continuous safety barrier

Research has indicated that the presence of the 111 gaps, which facilitates right turn and u turn manoeuvres, within the central reserve contributes to a significant proportion of collisions along the A1. Each of the proposed CGSJs listed above will be of a similar layout to the overbridge CGSJs previously constructed within the A1 Junctions Phase 1 scheme such as Pantridge Link in Hillsborough and Dromore Road, Banbridge to maintain route consistency (as illustrated in Figure 2.7 below).



Figure 2.7 Existing Compact Grade Separated Junction on A1 at Hillsborough

In addition to the CGSJs, a slip road will be provided linking the Castlewellan Road to the North bound carriageway of the A1. This is to cater for the high number of movements from the Old Manse Road across the A1 southbound lanes onto the northbound carriageway, therefore reducing potential congestion within Banbridge Town.

There are currently a total of 36 side roads connecting to the A1 within the scheme extents. It is proposed that 21 of these roads will remain open on a Left-In/Left-Out (LILLO) basis, 9 will be closed and 6 will be incorporated into the proposed CGSJs. It is acknowledged that in the interests of safety, the A1 will continue to be monitored, in the same way that all roads are monitored, and that there may be a need in the future for further safety measures that may include minor road closures. It is noted that any future requirement for safety measures, including minor road closures, would require appropriate assessment and consultation at that time.

Private accesses affected by the works have been maintained or alternative access provided where necessary. Where possible, private accesses onto the A1 within the vicinity of work zone areas have been considered for closure on safety grounds and alternative accesses provided where appropriate. Accommodation lanes have also been provided at a number of locations in order to mitigate excessive detours for affected farm holdings.

Approximately 17,100 metres of safety barrier will be installed in the road central reservation that will consist of a double sided vehicle restraint system similar to that installed to date on the A1. The safety barrier installation will enable 20 Emergency Crossing Points to be retained along the route, which will

enable flexibility in the management of incidents along the route, in addition to facilitating online maintenance without having to detour traffic for excessive distances off the mainline.

Development work has involved liaising with Translink to develop a bus stop strategy for the route. There are currently 37 bus stops along the mainline within the scheme extents. These bus stops typically have very low passenger figures, with an average of 1-2 passengers recorded at the more frequented stops. They are also of poor standard with no dedicated diverge, merge or layby facilities, resulting in the buses stopping on the hard shoulder at the designated bus stop locations for pick-up / drop-off, which creates a potential hazard to mainline traffic. Therefore, it is proposed that the bus stops currently located on the mainline are removed and replaced with bus stop facilities at the four proposed compact grade separated junctions.



Figure 2.8: Illustration of typical bus stop facility proposed

On account of the heavily trafficked, high-speed nature of the existing carriageway, pedestrian and cycling activity is minimal and it is not considered appropriate to encourage any further pedestrian and cycling activity along the mainline. Further, there are no dedicated equestrian facilities within the scheme extents. However, a number of opportunities have been identified to improve conditions for both cyclists and pedestrians and these have been identified within the EIAR.

Each of the proposed Compact Grade Separated Junctions will consist of a two span integral bridge with a concrete beam and slab deck with reinforced earth abutments in a similar manner to those installed previously (see Figure 2.7 above).

Additional infrastructure in the form of enhanced Intelligent Transport System infrastructure is to be provided on the A1. These installations will enhance the movement of people and goods by optimising the effective management of the road infrastructure, by providing reliable and timely travel information. The provision of Intelligent Transport System will consist of three elements, variable message signs, CCTV and Automatic Number Plate Recognition.

The construction of the scheme will require the demolition of two residential properties, located at Milebush Road (North) and Gowdystown Road East respectively, in addition to several disused sheds. Consultation with a number of statutory bodies within Northern Ireland has taken place for input into the design. Amongst these were Northern Ireland Electricity, Northern Ireland Water, British Telecom,

Rivers Agency and Firmus Gas who have been contacted in relation to their existing utility infrastructure. Each utility supplier has provided proposed service diversions and costs where applicable. The majority of installations are to be either lowered or raised locally or placed in new underground ducts within the proposed verges of the new roads and junctions.

The proposed drainage design for each of the junctions and mainline works will consist of a number of drainage collector systems which will be designed, subject to design requirements as stipulated by the Rivers Agency and guidance contained within the Design Manual for Roads and Bridges. These collector systems include kerbs and gullies, combined kerb and drainage blocks, linear drainage channels, surface water channels, combined surface and groundwater filter drains, over the edge drainage and grassed surface water channels. Attenuation ponds, will be provided at each of the proposed junctions (see Figure 2.9), which will also treat runoff as well as attenuating flow rates. The ponds will act as a natural flow attenuation mechanism, while promoting flora and fauna to some degree.



Figure 2.9 Illustration of typical attenuation pond

The current conceptual design for the proposed works will require the removal of material in cuttings and areas of known poor ground and the placement of material to construct the new road design profiles. This will create a cut-fill imbalance for the construction of the proposed works. The preliminary estimate of the earthworks cut/fill volumes indicate that the total gross volume of cut material i.e. material to be excavated is approximately 552,220m³. The preliminary estimate of the total gross volume of fill material required is approximately 352,522m³. Due to poor ground conditions and the construction of flyover type junctions a further 265,635m³ of material will have to be imported to site from other sources, however there may be opportunities for the contractor to utilise ground improvement techniques to reduce this volume. It will be the responsibility of the contractor appointed to identify suitable locations from which to source materials, for example local borrow pits or construction sites with excess materials, and locations for disposing excess unsuitable spoil.

The overall construction period is anticipated to be in the region of 3 years to construct the entire A1 Junctions Phase 2 Works if the project is awarded in one package. It is acknowledged that there is scope to deliver the Works in a phased manner by prioritising sections of mainline works and associated junctions and delivering these as discreet works packages. For the purposes of the EIAR, it is assumed that the Project will not be phased and will be delivered as a single contract.

During construction it is envisaged that construction compounds at each junction location will be setup with a central main compound elsewhere on the route corridor to store materials etc. During this stage the site boundary will be fenced off and site access points will be constructed to provide access for construction vehicles from the existing road network. Aspects of the construction will involve works adjacent to existing roads and may require temporary traffic diversions for periods of time during construction. These detours will be the responsibility of the contractor who shall ensure they are correctly signed and managed.

Upon completion of the project the operation and maintenance of the new mainline works will be undertaken by Amey under a Design, Build, Finance and Operations (DBFO) contract. The maintenance and operation of the adjacent side roads will be undertaken by Department for Infrastructure Roads.

3.0 ENVIRONMENTAL EFFECTS

The published Environmental Impact Assessment Report that accompanies this Non-Technical Summary sets out to identify, describe and assess in an appropriate manner, the significant environmental effects of the project on a range of environmental topics and sets out the specific characteristics of the proposed development and of the environmental features likely to be affected by it. The following text summaries the key findings of the assessment for each considered environmental topic.

Where the proposed development has been predicted to potentially cause adverse impacts, mitigation measures have been proposed along with any monitoring requirements. The mitigation measures will be incorporated into the design and construction of the proposed development.

Construction stage mitigation and monitoring measures for each environmental topic below where appropriate will be set out in a Construction Environmental Management Plan (CEMP) that contains details of all environmental protection measures and procedures to be employed during the construction stage for the proposed development. The appointed contractor will be required to update and maintain the CEMP during the construction stage.

3.1 POLICIES AND PLANS

This Chapter provides an overview of Planning Policy and Plans, and Roads Policy and Plans, which are applicable to the proposed development.

Regarding the assessment of impacts the Roads and Planning Legislation, Regional and Local Planning Policies and Plans as outlined within this section are relevant and material considerations for this proposed development. Each of the material considerations has been assessed within the various chapters of the EIAR. The key aim of this infrastructure proposal is to bring forward infrastructure proposals which will protect and enhance the safety of road users. The proposal has strived to balance all elements of sustainable development, including economic considerations, conservation interest and environmental objectives, and as such is considered compliant with all relevant planning policy. This conclusion is backed up by the conclusions of each of the individual environmental assessments contained herein which demonstrate that impacts are within acceptable parameters. No mitigation measures are necessary.

3.2 LANDSCAPE AND VISUAL

The purpose of the Landscape and Visual Impact Assessment is to identify and determine the effects on landscape character, landscape features, visual receptors and visual amenity as a result of the proposed development.

The impact assessment of proposed development and associated environs lies within areas covered by the Belfast Metropolitan Area Plan (BMAP) 2015 and the Banbridge, Newry and Mourne Area Plan 2015, which have been reviewed to establish and identify areas of protected landscapes or landscape designations that are relevant to the assessment.

A total of twenty four (24) viewpoints have been selected and assessed as part of the assessment, with viewpoint locations selected to represent; views from where the main direction of the view is towards the proposed development.

A residential visual amenity assessment has also been undertaken with groups and individual properties identified and assessed.

With regards to predicted effects of the proposed development during the construction phase on designated landscapes such as Historic Parks and Garden's and Local Landscape Policy Area's, it is considered that the influence of the proposed development is limited by existing topography and intervening vegetation such that no significant landscape or visual impacts are predicted for any of these designations.

With regards to predicted impacts on Local Landscape Character Areas during the construction phase, localised significant effects which are considered to be temporary in duration have been predicted to occur within the Gently Undulating Agricultural Landscape limited to land associated with the formation of new junctions at Listullycurran Road, Gowdystown Road, Skeltons Road, Waringsford Road and the formation of new link road at Milebush Road. Remaining portions of these Local Landscape Character Areas are predicted to experience no significant effect as a result of the proposed development.

Localised significant effects are predicted to be experienced during the construction phase of the north bound on slip at Castlewellan Road, affecting a small portion of the Urban Local Landscape Character Area. These identified effects are considered to be temporary in duration with remaining portions of the Urban LLCA predicted to experience no significant effects during the construction phase.

Of the twenty four viewpoints selected for assessment purposes, seventeen are predicted to experience significant visual effects during the construction phase of the proposed development due to the formation of new overbridge crossings, major ground remodelling works and works required to form new junctions, all of which lie in close proximity to the selected viewpoints.

With regards to predicted impacts on landscape character during the operational phase (without mitigation), localised moderate effects are predicted to occur within the Gently Undulating Agricultural Landscape Character with effects limited to those portions of the Landscape directly impacted upon by the formation of the new junctions and the proposed link road at Milebush Road.

Localised minor to moderate effects are predicted to be experienced during the operational phase (without mitigation) of the north bound on slip at Castlewellan Road, affecting a small portion of the Urban Landscape.

Of the twenty four viewpoints selected for assessment purposes, fourteen are predicted to experience significant visual effects without mitigation during the operational phase of the proposed development due to the introduction of new features such as overbridge crossings and associated ground remodelling, all of which lie in close proximity to the selected viewpoints.

Mitigation measures proposed consist of extensive the landscape planting at effected areas including re-creation of new field boundary hedgerows and enhancement of existent hedgerows with trees and new woodland planting all of which will be appropriate to the local setting. Monitoring of implemented mitigation measures shall be carried out to ensure that the proposed mitigation measures become well established and aid the integration of new elements associated with the proposed development into the surrounding landscape.

Following establishment of the proposed mitigation measures, predicted landscape and visual effects associated with the proposed development will be reduced. However, it is considered that bridge structures and embankments in close proximity to residential dwellings will continue to cause long term effects, although such features would gradually integrate into the surrounding landscape, as mitigation planting matures, and will be perceived as part of the visual pattern of the route.

Gantries/signage and lighting, proposed at new junctions and at other locations along the proposed development, would also result in new permanent features, though such features are not considered to be uncommon along this established route.

3.3 SOILS, GEOLOGY & CONTAMINATED LAND

The assessment of soils, geology and hydrogeology was based on a desk study of publicly available information such as geological maps, historical borehole logs and maps, consultation with Local Authorities, a site walkover survey and an intrusive ground investigation that identified the ground conditions at each junction location that forms part of the proposed development.

The impacts on soils, geology and hydrogeology during the construction phase will be moderate adverse and short term in nature.

Following development of the site which will entail earthworks and implementation of the recommended mitigation measures the operational impact will be neutral. Mitigation measures include; preparation of a Site Waste Management Plan at construction stage; construction activities should be conducted in a safe environmentally conscious manner and in line with all health and safety guidelines; best practice measures with regard to soil management procedures for the restoration of temporary areas of agricultural land required for construction; the inflow of groundwater will require managing during excavation; drains may need to be installed on the cut slopes to control water ingress; filter drains near the toes of slopes will likely offer the best method of draining cuts and drawing the water table down below formation level.

With regards to Waste and in conjunction with the proposed mitigation measures, including a CEMP and Site Waste Management Plan, wastes generated during the distinct phases of the works of the proposed development will have a neutral or slight effect on waste management in the area. The proposed development will have a neutral or slight effect on waste management in the area. There are a range of suitable permitted waste sites with capacity to accommodate waste arising from the proposed development and furthermore there are a number of management options available on site such as soil stabilisation and pre-loading and offsite such as agricultural improvement, landfill restoration and quarry restoration off-site prior to consideration of disposal to landfill. It is concluded that the development, which includes the safe and proper management of waste streams will have a neutral or slight effect on the environment in relation to waste management.

3.4 WATER ENVIRONMENT

This Chapter of the EIAR addresses the potential Water Quality, Flood Risk and Aquatic Ecology impacts of the proposed development.

The proposed development does not directly impinge upon any European Designated Natura 2000 site, but there are three areas designated as Special Protection Areas (SPAs) under the Habitats Directive (92/43/EEC) downstream of the proposed works which have been considered with regard to impact assessment.

A number of watercourses are crossed by the proposed scheme, the majority of which are minor unnamed streams which can be considered as low importance in terms of their hydrological attribute and the assessments indicate that the watercourses in question are small order streams, many of which have already been modified to either accommodate the existing road network or for adjacent agricultural

practices. As such, further physical modifications to the affected watercourses from the proposed development are not deemed to be significant impact.

An outline fisheries habitat quality assessment was also conducted in each stream potentially impacted by the proposed development. In general the watercourses were of low quality with little fisheries or ecological potential. However, it was concluded that at two locations, Junction 2 and Junction 3, precautionary electrofishing should be carried out as a mitigation measure prior to the works in order to relocate any resident trout or other fish present in these streams.

The assessment has established that the pollution risk associated with the discharge to water courses is low and the predicted impacts are acceptable. The impact significance is therefore assessed to be negligible and no mitigation is therefore required, notwithstanding the fact that attenuation ponds will be provided in the treatment train to attenuate storm water which will also provide water quality benefits. A comprehensive range of mitigation measures, based on industry best practice and NIEA Standing Advice on pollution control, have been specified to reduce the residual negative effects of potential habitat loss and pollution to the aquatic environment which will be considered during the preparation of construction method statements and inclusion in the CEMP. With the successful implementation of the mitigation measures proposed along the length of the scheme, the residual impact on water quality and aquatic ecology is not considered to be significant.

A 'Flood Risk & Drainage Assessment' report identifies any areas of flood risk. RPS have considered all sources of flooding that may affect the proposed junction improvement works. There are no designated watercourses that will be impacted by the proposed works. All of the proposed junction locations, with the exception of Castlewellan Road, are affected by minor watercourses which will require either diverting or culverting.

In each location the design of the works to the watercourses has been chosen to minimise the amount of works required and the impact on the floodplain. Hydraulic modelling has been used to demonstrate that there is no increase in flood risk as a result of the proposed development.

The works have been designed to avoid watercourses where possible. Where works are proposed that will impact the watercourses, consideration will be given to providing access to facilitate future maintenance. Where possible, a 5m buffer has been allowed for on all watercourses.

A Drainage Assessment has been completed and the risk of flooding from a drainage aspect to the proposed development and surrounding area can be considered to be low. Culverting is required at a number of locations, but each of these has been carefully considered to minimise the extent of the works required. The proposed works have been discussed with Department for Infrastructure Rivers Area Office representatives who have not highlighted any issues with the proposals. Schedule 6 applications will be submitted for the proposed culverting works at a later date. The proposed works has been shown to be outside of the inundation area of any controlled reservoir.

The development has been shown to be fully compliant with current planning policies.

The significance of the effects of the road project on flood risk is therefore 'Neutral'. The Drainage Assessment has shown all storm runoff will be attenuated using SuDS and the significance of this impact is therefore 'Neutral'. The net impact of the proposals is neutral, because it results in no appreciable effect, either positive or negative, on the identified attributes.

A series of mitigation measures proposed provide a level of protection to reduce the impact from any flooding event as far as reasonably possible.

3.5 BIODIVERSITY

This chapter identifies, describes and assesses in an appropriate manner, the direct and indirect significant effects of the proposed development on terrestrial biodiversity in accordance with relevant

Chartered Institute of Ecology and Environmental Management guidelines. Habitats Regulations Assessment has also been undertaken. A suite of ecological surveys of land along the route of the proposed development were undertaken, including Extended Phase 1 Habitat Survey together with ecological surveys for bats, badger and breeding birds.

The Extended Phase 1 Habitat Survey recorded, categorised and mapped the following habitats along the route of the proposed development; broadleaved semi-natural woodland; broadleaved plantation woodland; coniferous plantation woodland; mixed plantation woodland; scattered broadleaved and conifer trees; scrub; semi-improved grassland; improved grassland; marshy grassland; amenity grassland; running water; quarry; arable; hedgerows; bare ground; and buildings and hardstanding. Hedgerows are considered a Northern Ireland Priority Habitat. The invasive non-species Japanese knotweed is present at the Gowdystown Road Junction and the Listullycurran Road Junction. Potentially significant effects were predicted in the absence of any mitigation or monitoring measures on downstream designated sites, hedgerow habitat, bats, badgers and wild birds.

Mitigation measures have been incorporated into the design of the proposed development in order to avoid and/or reduce negative effects on the ecological environment. An Ecological Clerk of Works will be appointed to provide advice on the timing of works and the implementation of mitigation and compensation measures outlined in the CEMP including applying for relevant derogation licences and monitoring the mitigation measures.

Other targeted mitigation measures include reinstatement of habitats within the scheme extents; further licenced bat surveys prior to building demolition and tree removal; specific measures for badger including artificial badger setts and the setting up of zones where no construction works will be permitted; measures for Japanese knotweed including provision of a Japanese Knotweed Management Plan and the setting up of zones where no construction works will be permitted; the timing of works to avoid the bird breeding season; and protection of bats, otter, badger and birds during construction works in accordance with Departmental Standing Advice.

The following monitoring is proposed during the construction period:

- Bat Roost Inspection Survey of Buildings to be demolished
- Bat Roost Inspection Survey of Trees to be felled
- Newly constructed artificial badger setts and badger activity
- Pre-clearance check for breeding birds
- An Ecological Clerk of Works will monitor badger activity throughout construction
- Badger sett and invasive species exclusion zone fencing will be inspected daily
- Exclusion zones around Japanese knotweed will be inspected daily by the Contractors Nominated Representative to ensure that it is in working condition.

3.6 AIR QUALITY

This Chapter of the EIAR considers the potential impacts of the proposed development on air quality during construction and operation. The existing air quality throughout the area is characterised by the existing emissions from road traffic. Air quality modelling was undertaken to determine the potential for changes to air quality as a result of the proposed development, and any related impacts on representative sensitive receptors. The assessment used air quality monitoring data, nationally available background data and modelling to consider the following pollutants emitted from vehicles; nitrogen oxides, nitrogen dioxide (NO₂) and particulate matter (PM_{2.5} and PM₁₀).

During the construction phase of the proposed development (specifically junction locations as part of the proposed development), the appointed contractor will be required to implement appropriate dust control measures and as such, the proposed development is not expected to have any significant residual impacts. Construction of the proposed development would temporarily impact air quality as a result of dust from construction activities, such as earth moving and excavations, and emissions from construction traffic and equipment/plant. Mitigation measures in the CEMP would include those for dust

suppression, control and use of equipment/plant and construction traffic management. These would minimise the temporary impacts during construction activities. Through good site practice and the implementation of suitable mitigation measures however, the effect of dust and PM₁₀ releases will be reduced and excessive releases prevented. The residual effects of on-site construction activities on local air quality would not be significant.

For the operational phase, impacts of the proposed development were assessed for the year of opening (2021) and the design year (2036). A quantitative assessment was undertaken using a computer model to predict the changes in NO₂ and PM₁₀ concentrations that would occur due to emissions generated by the operation of the proposed development (road traffic). The assessment of operational effects considered impacts on existing receptors from road traffic emissions associated with the proposed development. Detailed dispersion computer models have been used to determine the likely NO₂ and PM₁₀ concentrations at existing residential receptor locations. Predicted pollutant concentration changes at existing receptors as a result of the proposed development were assessed using the Institute of Air Quality Managers (IAQM) significance criteria. The relevant air quality objectives for PM_{2.5}, PM₁₀ and NO₂ will not be significantly affected at existing receptors as a consequence of the proposed development. The national objectives and European limit values for PM_{2.5}, PM₁₀ and NO₂ for annual mean are highly unlikely to be exceeded in 2021 or thereafter as a consequence of the Proposed Scheme.

Similarly, the short term objective for PM₁₀ and NO₂ of 24 hour mean and 1 hour mean respectively are also within national objectives and European limit values. Improved emission criteria has been outlined within recent EU Directives which relate to vehicles manufactured in the past and in future years. An overall improvement to atmospheric pollutant concentrations through improved technologies and the utilisation of cleaner fuels means the levels of PM₁₀ and NO₂ are expected to continue to decrease. It was concluded that there are no significant local air quality impacts at either human exposure locations or ecological receptors.

3.7 CLIMATE AND GREENHOUSE GASES

This Chapter of the EIAR presents the assessment that considers the effects on climate and associated emissions of Greenhouse Gases (GHGs) due to the proposed development. The effects of regional air quality have been undertaken in accordance with the Design Manual for Roads & Bridges (DMRB) Advice Note 207/07, published by the Highways Agency (HA) (Highways Agency, 2007). The regional impact assessment calculates the change in carbon emissions. Carbon dioxide is considered the most important GHG and therefore is used as a key indicator for the purposes of assessing the impacts of projects on climate change. The chapter also references, The Institute of Environmental Management & Assessments (IEMA) Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emission and Evaluating their Significance, 2017. This IEMA document also endorses the use of the DMRB Regional Assessment for road schemes in terms of assessing GHG emissions.

The consideration of significance of the proposed developments impact on regional emissions was undertaken using professional judgement considering the change predicted and the sensitivity of the national (UK) total to change, with the outcome assessed as either Significant or Not Significant. In terms of regional air quality, both the 'Do-Minimum' and 'Do-Something' scenarios were assessed for the assumed year of Opening (2021) and Design Year (2035). The calculation of design year conditions is required as part of the Regional air quality DMRB 'Simple' assessment.

During the construction stage a range of mitigation measures are proposed to reduce the use of materials and the generation of waste which will in turn lead to a reduction in the embodied carbon impacts. These mitigation measures will be incorporated into the construction stage CEMP and Site Waste Management Plan.

The proposed development would change alter some travel times and improve the flow of traffic and safety of the general road environment, and emissions are forecasted to marginally increase (~4%). The proposed development would result in increases in the overall distance travelled when compared

to the existing road network, encourage steady-state driving conditions and improve road safety. The predicted changes are negligible in terms of GHGs and impact on regional climate and are not significant. No mitigation or monitoring is therefore required for the operational stage.

3.8 NOISE AND VIBRATION

This Chapter of the EIAR presents the assessment of the potential noise impacts associated with the proposed development. This chapter is focussed on determining the worst-case noise level increases at the nearest sensitive receptors as a result of the proposals, both during construction and during operation within a 300m study area.

Construction activities associated with developments of this type have the potential to result in significant noise impacts dependent upon the proximity of existing sensitive receptors and the need for significant earth moving and use of 'heavy' plant and machinery. The greatest impacts generally occur during the initial site establishment stage when the ground is being prepared/excavated and the main infrastructure is being put in place. Once this is complete, one would expect to experience a drop in noise emissions. The precise construction strategy to be adopted will be a matter for the contractor, but it is likely that construction noise levels experienced during the construction phase may exceed the relevant guideline noise threshold limits if mitigation measures are not in place. The predicted worst-case noise level has been calculated for a selection of the nearest noise sensitive properties to the proposed road improvement scheme.

A range of mitigation measures have been clearly defined within the assessment to reduce potential construction phase noise impacts, including the installation of a temporary noise barrier (approximately 2m height) placed between the construction activities and all properties in close proximity to the construction site (at least all properties within 100m of the proposed site). If properly installed, such a barrier in tandem with other on site mitigation measures will ensure that construction noise levels are below the relevant noise threshold limits.

Regarding the assessment of impacts from the operational phase the assessment has considered 454 of the nearest noise sensitive properties and noise levels at each of these locations have been modelled by selecting appropriate receptor locations within the noise model (i.e. the most exposed facade). Each property has been modelled at 1.5m for single-storey dwellings and 4m in the case of two-storey properties. These heights are indicative and assumed to be representative of a person on the ground floor and first floor of a typical dwelling.

The predicted operational noise impact at all the modelled noise sensitive receptors is not significant. In line with current best practice the guidance the predicted adverse impact at all modelled receptors except one is negligible, while there is a minor adverse noise impact at one property.

None of the receptors modelled satisfied the Noise Insulation Regulations (NI) 1995 circumstances under which a dwelling and other places used for residential purposes may qualify for an offer of noise insulation.

In the cumulative impact assessment it has been concluded that, given the very high traffic volumes along the existing road, none of the planning applications within the study area are likely to result in a cumulative noise impact in conjunction with the proposed road scheme.

It is recommended that monitoring be carried out during the construction phase, to ensure recommended noise levels are adhered to at the nearest sensitive receptors.

As there is no predicted noise impact during the operational phase of the proposed development, no monitoring is required.

3.9 TRAFFIC AND TRANSPORTATION

The traffic model has been developed based on the existing road network and the proposed development. The traffic assessment considers how right – turn movements onto or off the dual carriageway reassign when the scheme is in place at each respective public road junction with assumptions made on how vehicles will reassign. Right turns onto the A1 have been reassigned to either turn left onto the A1 and then U – Turn at the next suitable junction or use the minor road network to access the A1 downstream. Right turns off the A1 have been reassigned to either travel further down the A1 to U – Turn at the next suitable junction or leave the A1 earlier and access via the minor road network. Each junction location has been considered carefully.

It is assumed that demand is fixed between the Do – Minimum (without scheme) and Do – Something (with scheme) scenarios. All changes to flows between the two scenarios are due to local reassignment for right – turning vehicles that must divert with the scheme in place. Forecast traffic flows are required for various assessments in the Stage 3 process at both the scheme opening year (2021) and the design year which is fifteen years after opening (2036). In order to predict traffic growth, ideally it is necessary to provide an estimation of potential growth in housing, population, and employment from the present time to the forecast years. These factors are used to define future car ownership and usage and hence the potential growth in traffic between areas.

An average annual growth factor for 2005 to 2016 of 3.02% has been determined from the local Automated Traffic Count sites. For highway demand at the national level, WebTAG advises the value should be 2.5% therefore the local growth rate of 3.02% was used to produce 'Core' forecast flows at 2021 and 2036 starting from a base year of 2016. This includes elements of planned development that can reasonably be expected to be delivered by the forecast year. The 'Low Growth' scenario rate between the 2016 base year and 2021 opening year has been calculated as 10.45% over the five years and 21.63% for the 'High Growth' scenario.

Using the Low, Core and High growth rates three scenarios for both the 2021 opening year and 2036 design year were tested.

It is assumed that smaller developments listed in the Lisburn and Banbridge Area Plans will be accounted for within the local growth rates. Development flows have been added to forecast scenarios in addition to background growth. The proposed construction period for the scheme is assumed as approximately 30 months with activities undertaken during the daytime (08.00 to 19.00 Monday to Friday and 8.00 to 13.00 on Saturday).

The provision of a continuous central reserve barrier along the scheme extents will improve safety as errant vehicles will no longer be able to cross the central reserve towards oncoming traffic. This is predicted to have a moderate beneficial effect. Other benefits include a more consistent route design and more reliable journey times. Any increases in traffic due to this re-routing is anticipated to be well within the operating capacity of the local road network with the model showing that re-routing traffic will form less than 10% of the mainline flow at any point on the scheme which is considered to have a negligible effect. Results from a microsimulation model of proposals for a northbound merge slip to the A1 at Castlewellan Rd have predicted no adverse impacts to the operation of the existing junction at Castlewellan Road/Chinauley Park.

The developed models assign forecasts of travel demand to determine the effects of the proposed development compared to the Do-Minimum scenario based up a 2021 year of opening and a 2036 design year. These models have been used to inform the design of the scheme and used to undertake traffic-related operational, environmental, and economic assessments. The model has also been used to determine changes in traffic flows and patterns. These changes were then input into Cost Benefit Analysis software to identify the economic benefits of the proposed scheme compared to the Do – Minimum scenario.

Regarding mitigation during the construction stage a Traffic Management Plan will be developed by the contractor detailing a phased construction programme. Post-construction monitoring and evaluation of the development is important for demonstrating value for money and providing evidence for future investments and will include data from; permanent Traffic Count Sites; journey time surveys; and accident statistics.

3.10 CULTURAL HERITAGE

The general landscape (within approximately 1km of the proposed development) contains a low to moderate number of cultural heritage sites, including Sites and Monuments Record (SMR) sites; Industrial Heritage Record (IHR) sites; Listed Buildings; Scheduled Areas; Historic Parks, Gardens and Demesnes and Defence Heritage sites.

Regarding the assessment of impacts there are a small number of recorded cultural heritage sites located within close proximity to the proposed works associated with the scheme. The proposed development may pose slight direct or indirect impact to a small number of recorded cultural heritage sites. The indirect impacts during the construction phase will be of a visual nature, such as machinery and equipment, which will be temporary. The construction phase will involve ground reduction in many areas and this will include (as noted above) in close proximity to a small number of recorded archaeological sites. Ground reduction has the potential to impact on previously unrecorded elements of recorded sites (fosse/ditch associated with Ráths or enclosures) and on previously unrecorded archaeological finds, features or deposits that may exist sub-surface and be uncovered during topsoil stripping operations. The potential impact on previously unrecorded archaeology is unknown.

In terms of mitigation and monitoring for the proposed development all greenfield areas that will be subject to development/ ground reduction should be subject to an archaeological programme of monitored topsoil stripping (watching brief) under archaeological licence from the Department for Communities: Historic Environment Division (DfC;HED). The topsoil stripping should be undertaken using a mechanical excavator fitted with a toothless ditching bucket under the constant supervision of the licensee. Should archaeological remains be uncovered appropriate mitigation such as, preservation *in situ* (preferred option) or further archaeological work in the form of archaeological excavation and recording will be implemented. These works should take place post-planning, but at the outset of the construction works. Sufficient time and resources should be allowed for in the construction programme to deal with potential archaeology that may be uncovered. This archaeological programme should be implemented as far in advance of other construction related works as possible to allow sufficient time to fully excavate and record archaeological material that is uncovered but cannot be preserved *in situ*. All archaeological excavations will require a post-excavation phase of works to be undertaken off site. Prior to construction the boundaries of the proposed development areas should be clearly marked out and fenced off to create an exclusion zone in the vicinity of recorded archaeological monuments (for example at Gowdystown, Warringsford and Skeltons/Drumneath Road Junctions). No excavation, dumping of spoil, vehicular movements or any other associated site works should take place within the exclusion zones around these recorded archaeological sites.

3.11 POPULATION AND HEALTH

Human health can be affected negatively or positively by a number of environmental and socio-economic factors including: changes to air quality; changes to noise exposure; changes to traffic flows; and changes to income and employment opportunities.

The purpose of the population and health assessment is to draw from and build upon the associated EIAR chapters (air, Noise, traffic, pedestrian equestrians and community effects), and to further communicate what this means in terms of potential population and health effects on communities in proximity to the proposed development.

During the construction of the proposed development, mitigation relevant to the protection of health is present in the form of a Construction Environmental Management Plan which details the construction

methodology, site controls, procedures and site-specific actions that will be implemented to minimise impacts.

Potential air quality related population and health effects during construction are limited to nuisance from dust and are not considered to be significant. Noise generated during the construction phase would be during daytime hours only, therefore eliminating any risk of health effects associated with sleep disturbance and limiting potential health effects to annoyance from loss of amenity.

Potential population and health effects during operation of the proposed development are limited as the alignment of the A1 remains the same and there would be no significant increase in traffic flows. The main purpose of the proposed development is to upgrade infrastructure and improve safety. Overall, it is predicted that there would be a positive population and health effect based on the reduction in risk of accident and injury.

3.12 LAND USE

This Chapter of the EIAR assesses the potential impacts of the proposed development on land use resources. These resources include private property, land used by the community, development land and agricultural land, including the effect on agricultural land quality and farm holdings.

The effects on land use resources arise during the construction phase of the proposed development. There would be no physical impacts on areas of open space or sport and outdoor recreational facilities as a result of the proposed development. There would be no impacts on any parcels of land within the towns and villages alongside the A1 that have been identified in the Banbridge/Newry Area Plan 2015 as potential development areas.

One detached bungalow and garage building would need to be demolished at Gowdystown Road at proposed Junction 3. A second dwelling will require demolition at the proposed Milebush Road (North) junction. Out buildings within the Junction 2 and Junction 3 works areas and a derelict stone building and tin clad shed at Junction 5 will also require to be demolished. The effect of the loss of the two residential properties, together with the out buildings is assessed to be of Slight Adverse significance. The principal areas of agricultural land affected by the proposed development lie around the proposed new junctions, which would affect approximately 21.6ha of land permanently and approximately 2.5ha of land temporarily. The land is used mainly as permanent pasture. The new junctions would affect areas of land within individual land holdings, but access to individual parcels of land would be maintained and no substantive agricultural buildings would be affected. The quality of the agricultural land affected would include proportions of higher quality Grades 2 and 3a land, together with areas of lower quality Grades 3b, 4a, disturbed and restored agricultural land.

The works around existing junctions would also affect small areas of land, permanently affecting approximately 5.1ha of mainly agricultural land being used for permanent pasture. Access to individual fields would be maintained and no agricultural buildings would be affected. In terms of the quality of the agricultural land affected, the agricultural land classification of these areas would include proportions of higher quality Grades 2 and 3a land, together with areas of lower quality Grades 3b, 4a, disturbed and restored agricultural land.

In total therefore, during construction, the loss of land quality within the areas of land affected based on the loss of a proportion of higher quality Grades 2 and 3a land is assessed as Slight Adverse. The effect on farm holdings would be localised and would not render farming enterprises unworkable. The significance of effect on farm holdings during construction is therefore assessed as Slight Adverse. Regarding mitigation measures at construction stage the restoration of temporary areas of land required for construction to agricultural use will take place following recognised best practice measures. Further, measures to reduce the impact on farm holdings during the construction period shall include; maintaining water supplies; maintaining farm access; appropriate fencing of farm holdings; implementation of best practice to avoid spread of disease.

No mitigation or monitoring measures are required in relation land use following the completion of the restoration of land during the construction period.

3.13 PEDESTRIANS, CYCLISTS, EQUESTRIANS AND COMMUNITY EFFECTS

In assessing the impacts on Pedestrians, Cyclists, and Equestrians the chapter also considers:

- Journey length and local travel patterns; and
- Severance – Including relief from severance and newly created severance.

Impacts on accessibility/severance during construction will be short in duration, and of moderate localised impact. With traffic management mitigation measures the residual impact will be minor/moderate and of minor significance.

Given the very low numbers of pedestrians and cyclists affected, the construction stage impact will be negligible. During operation stage any existing pedestrian facilities will be retained and there will be no direct impact.

At proposed Compact Grade Separated Junctions (CGSJ), pedestrian facilities provided are a direct beneficial effect which is deemed to be significant beneficial. The central barrier proposed along the A1 will not materially change accessibility for pedestrians as the numbers executing this unsafe practice is extremely low. The impact on accessibility is therefore minor beneficial due to enhanced safety.

No cycling facilities are proposed and none exist currently. At left in/left out junctions, kerbed islands are set back to facilitate cyclists and reduce the risk of merging into vehicular traffic to avoid these barriers. The impact is deemed to be moderate beneficial.

Design proposals do not provide any equestrian facilities and none exist currently. The position in respect of equestrian users will not materially change and the impact is negligible.

Bus stops are viewed as the main pedestrian trip generators. All mainline bus stops will be replaced with bus stop facilities at the four proposed CGSJ resulting in a moderate beneficial impact. Community impact is slight/low due to low usage (average of 1-2 patrons per day) using the facilities.

No Community facility access will be closed. Upgraded and enhanced access arrangements provide a moderate beneficial impact.

Any severance due to closure of central reservations must be balanced against safety benefits. New CGSJs are located to ensure that in combination with the existing CGSJ there is on average 2.5kms or less between junctions. For pedestrians, cyclists and equestrians a re-route of more than 500m to community facilities would result in severe severance. In reality the impact is slight/low as facilities for these users in the Do-Minimum scenario are virtually non-existent and there is currently no safe way of crossing the carriageway. Therefore the impact is negligible. Removing the potential for right turning vehicles improves journey times and reliability which is a minor beneficial effect. Reduction in the potential for accidents set against notionally slight impacts on accessibility leads to a negligible impact on community severance.

Mitigation measures to minimise perceived adverse impacts include;

- Design measures ensuring private driveways are replaced on a like by like basis or through agreeable alternative solutions;
- The retention of access to all community facilities opening onto the A1;
- The provision of appropriately located grade separated junctions to improve safety and minimise impact;
- The provision of upgraded and appropriately located bus stop facilities.

- Retention of all existing pedestrian footways along the A1;
- Construction Environmental Management Plan to minimise construction impacts;
- Provision of alternative accesses to Community Facilities if required.

3.14 MATERIAL ASSETS

This Chapter of the EIAR considers and assesses the potential impacts on the material assets that are considered include all major utility infrastructure namely; electricity; gas; water; and telecommunications. In addition material assets are deemed to include Minerals (e.g. sand & gravel and rock etc.)

Detailed talks have been held with representatives from all utility companies and costs for diversions and provisional service layouts obtained. Details of existing services at each of the proposed junctions and on the mainline have also been obtained for consideration.

The local development plans have been reviewed to establish the potential effect on areas of mineral constraint.

All relevant scoping responses have been duly considered within this assessment.

Firmus Gas infrastructure currently runs from the Rathfriland Road Junction to Kilmacrew Road, with a spur serving old Manse Road in Banbridge. The construction of the new Castlewellaan Road On slip will require alterations of the existing gas main in the area. The provision of a merge lane at Kilmacrew Road will require the relocation of approx. 250m of gas main. Pre-mitigation the predicted magnitude of impact is predicted to be Moderate adverse.

Regards NIE, the construction of each of the junctions will require the relocation of poles and either the ducting, or raising/relocation of existing overhead lines. Waringsford Road is the most complex junction as it will require the relocation of 1 no substation which is currently adjacent to the entrance of Tullyraire Quarry. A further meeting in 2017 indicated that an overhead line would be impacted in junction one and that the road level in Junction 2 will impact an existing pole. This will also require the repositioning of the main switch room for the Quarry which is adjacent to the substation. Where existing NIE services cross the carriageway it would be preferable to convert these to underground services rather than raise or extend the overhead line span across the carriageway. Pre-mitigation the predicted magnitude of impact is predicted to be Major adverse.

Discussions have been held with Northern Ireland Water in relation to the impact to existing infrastructure as a result of the proposed road works. Work at the grade separated junctions will largely involve the laying of new mains parallel to the new roads and the installation of new infrastructure to ensure that the pipework and valves can be accessed easily and safely in the vicinity of the new junctions. The works associated with the side roads will require a combination of localised raising of manhole covers, lowering of existing pipework to maintain adequate cover or relocation of the existing main from the existing verge to the new verge due to the widening of the existing road corridor to accommodate diverge/merge lanes. Pre-mitigation the predicted magnitude of impact is predicted to be Major adverse.

BT currently maintains both underground and overhead infrastructure along the A1. At each of the grade separated junction locations, existing overhead lines will be buried and laid in the verge of the new road sections where required. The existing BT fibre optic services located in the existing verges will need to be protected for the duration of the works due to the high cost of relocating these services. This was successfully undertaken during the A1 Junctions Phase 1 scheme. Pre-mitigation the predicted magnitude of impact is predicted to be Major adverse. Pre-mitigation the predicted magnitude of impact is predicted to be no change.

Mitigation measures will include further during the detailed design stage. Methods such as specialist survey equipment and excavations in the grass verge areas will be used to verify and locate existing

services and offset potential effects. Where direct impact on services cannot be avoided agreements will be made with the service provider to relocate or lower the services.

The assessment of residual impacts has considered the following:

- With the implementation of the mitigation measures and also close liaison with Firmus Gas during construction stage all impacts will be temporary and the predicted significance of effect will be minor adverse.
- With the implementation of the mitigation measures and also close liaison with NIE during construction stage all impacts will be temporary and the predicted significance of effect will be minor adverse.
- With the implementation of the mitigation measures above and also close liaison with NIW during construction stage all impacts will be temporary and the predicted significance of effect will be minor adverse
- There is no direct impact on any Minerals. The predicted significance of effect will be no change.
- With the implementation of the mitigation measures above and also close liaison with BT during construction stage all impacts will be temporary and the predicted significance of effect will be minor adverse.

3.15 VEHICLE TRAVELLERS

With regards to existing views the gently undulating agricultural landscape and vegetation which mostly dominates the landscape to the east and west of the existing A1 corridor provide restricted long distance views resulting in a landscape of enclosed character. Long distance views are available where gaps in vegetation and elevated land allow for panoramic views of the wider agricultural/arable landscape and beyond to the Mourne Mountains in the south east and Belfast Hills in the northwest. At Banbridge, Dromore and Hillsborough built form increases immediately adjacent to the existing road corridor that prevents wider views and creates a sense of clutter.

Driver stress levels have been established for the existing road based on existing traffic flows and indicates that stress levels drivers along the existing route are anticipated as 'moderate' in 2018 for traffic flows.

In addition frustration or fear is caused on the A1 dual carriageway by a driver's difficulty to join the dual carriageway from side roads and/or crossing central reservations. Frustration and fear is also caused by a range of factors that include; the large number of gaps in the central reservation with slow moving vehicles pulling onto the dual carriageway; vehicles turning right onto the central reservation in fast lane; vehicles turning left; vehicles weaving to avoid slower moving vehicles turning left or right; vehicle overhang in the central reservation; multiple vehicles turning in the central reservation.

Following completion of the proposed development views from the road will predominantly be retained for vehicle travellers with new structures landscaped with a large or very large beneficial significant effect.

On completion of the proposed development driver stress will improve due to proposed development. It is anticipated that frustration, fear of potential accidents and uncertainty will greatly reduce as a result of the proposed development resulting in large or very large beneficial significant effect.

A number of measures will be implemented to minimise the impact on views from the road.

- Views from the road to be retained or enhanced where possible;
- Signage location sympathetic to rural and sensitive areas;
- Where possible, open parapets on bridges to maximise view from the road and to reduce visual impact;
- Where possible, areas of rock cuttings to avoid applied covering leaving rock as a natural feature;

- Hard features and planting at junctions to create gateways;
- Where appropriate on agricultural land, timber post and wire stock fencing will be used. With regards to disruption due to construction a traffic management plan for the construction stage will be developed prior to commencement of works and the following points can be made at this time;
- Road closures and diversions will be minimised and take place during off peak times to limit route uncertainty and thus driver stress;
- Although any temporary reduction in speed limit may increase driver stress, adequate signage will be provided at all times to encourage free flow of traffic.

3.16 INTERACTIONS

The EIA Directive and its transposing Regulations requires that in addition to assessing impacts on human beings, fauna, flora, soil, water, air, climate, landscape, material assets and cultural heritage, the interrelationship between these factors must be taken into account as part of the environmental impact assessment process.

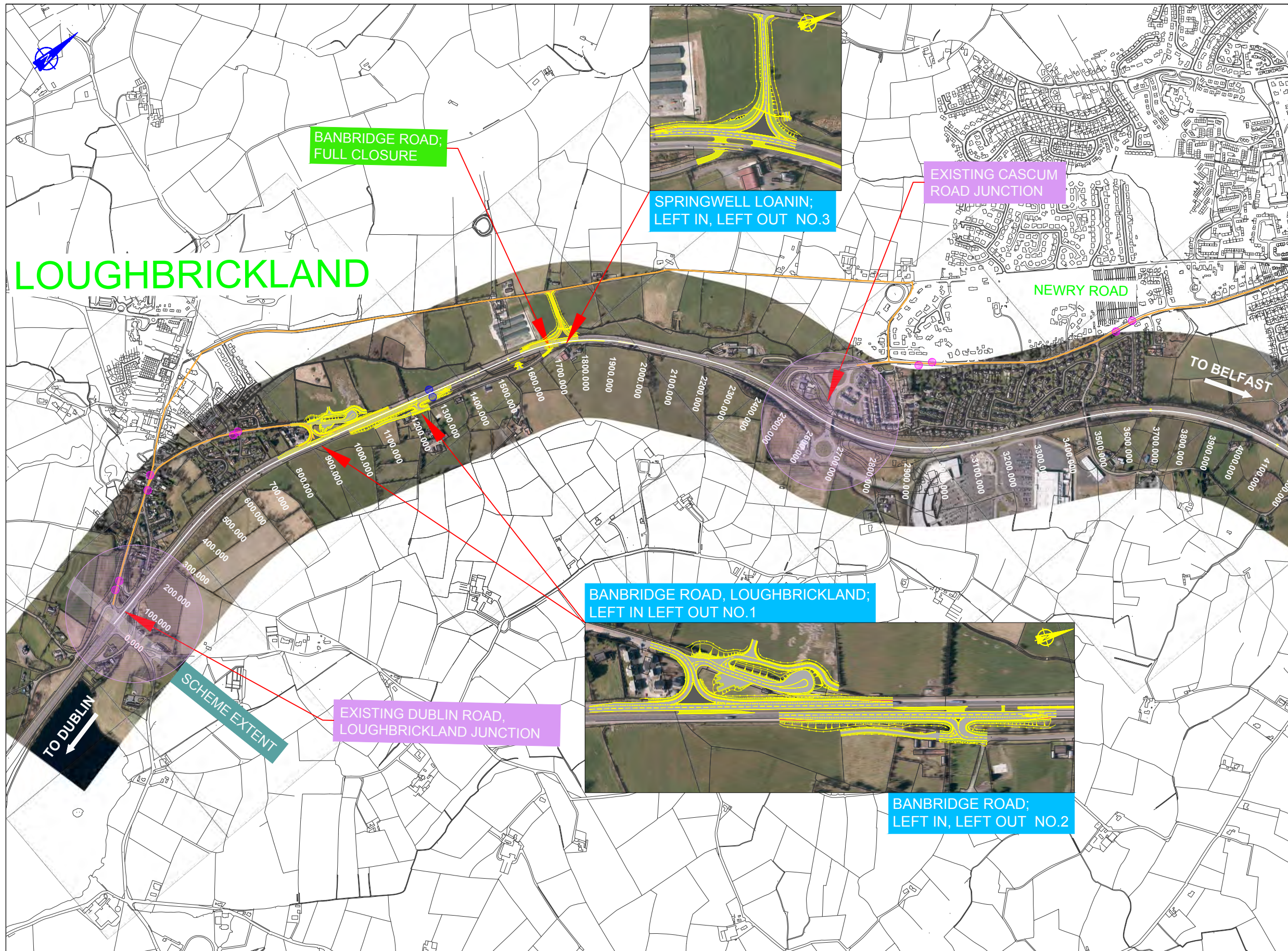
A summary of expected interactions is provided in Table 1.1 which uses a matrix to indicate the significant interactions that are likely to occur between the various environmental disciplines as a result of the proposed development. Where a cross exists in a box in the table, this indicates that a relationship exists between the two environmental considerations. The purpose of the table is to identify likely interaction between various disciplines in respect of both the construction and operational phases of the development, although the level of interaction will vary in each case.

Table 1.1: Inter-relationship Matrix – Potential Interaction between Environmental Disciplines

| | Landscape and Visual | Soils, Geology and Contaminated Land | Water Environment | Biodiversity | Air Quality | Climate | Noise and Vibration | Traffic and Transport | Cultural Heritage | Population and Health | Land use | Pedestrian, Cyclists, Equestrian & Community | Material Assets | Vehicle Travellers |
|--|----------------------|--------------------------------------|-------------------|--------------|-------------|---------|---------------------|-----------------------|-------------------|-----------------------|----------|--|-----------------|--------------------|
| Landscape and Visual | | | | X | | | X | X | X | | X | | X | X |
| Soils, Geology and Contaminated Land | X | | X | X | | | | | X | | | | | |
| Water Environment | | X | | X | X | | X | | | | | | | |
| Biodiversity | X | X | X | | X | | X | | | | | | | |
| Air Quality | | X | X | X | | X | | X | | X | | | | |
| Climate | | | | | X | | | X | | X | | X | | |
| Noise and Vibration | X | | X | X | | | | | | X | | X | | |
| Traffic and Transport | X | | | | X | X | | | | X | | | X | X |
| Cultural Heritage | X | X | | | | | | | | | | | | |
| Population and Health | | | | | X | X | X | X | | | | X | | X |
| Land use | X | | | | | | | | | | | | X | |
| Pedestrian, Cyclists, Equestrian & Community | | | | | | X | X | | | X | | | X | X |
| Material Assets | X | | | | | | | X | | X | X | | | |
| Vehicle Travellers | X | | | | | | | X | | X | | X | | |

APPENDIX I





- NOTES**
- Verifying Dimensions.
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
 - Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
 - Issue of Drawings.
Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipient's own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipient's drawing production, or setting out on site.
 - Datum: Irish Grid

PROPOSED JUNCTION UPGRADE

EXISTING GRADE SEPARATED JUNCTION

LEFT IN LEFT OUT JUNCTION

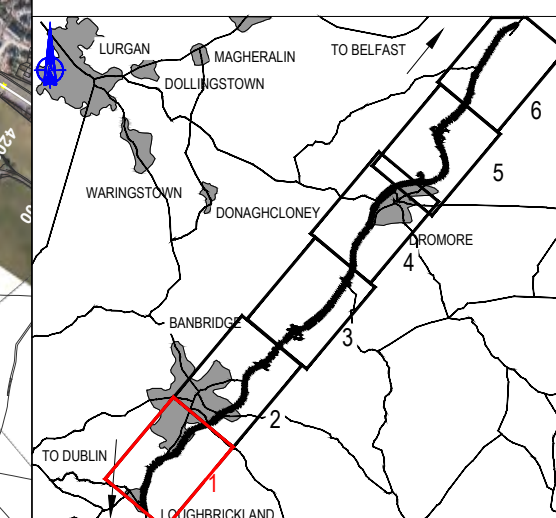
FULL JUNCTION CLOSURE

LOCAL ROAD NETWORK

BUS STOP - TO BE CLOSED (NEW BUS STOP FACILITIES TO BE PROVIDED AT 4 NO. NEW CGS. IS)

BUS STOP - TO BE RETAINED

18700.000 CHAINAGE NUMBER



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FIGURE 2.0.1

| | | | | | | | |
|---|--|-----------------------------|--|---------------------------------------|--|---------------------------------------|--|
| Title A1 Mainline General Arrangement Sheet 1 of 6 | | Drawing Status S0 | | Suitability For Information | | Project Ref No. IBH0488 | |
| Drawing Number 168014-RPSB-EGN-ML-DR-Z-100-00023 | | Rev P1.1 | | Scale 1:12500 1:5000 | | Designed PN | |
| TNI Ref 168014-RPSB-EGN-ML-DR-Z-100-00023 | | Originator EGN | | Volume ML | | Location DR | |
| Type Z | | Discipline DR | | Classification 100 | | Number 00023 | |
| Original Size A3 | | Date 18/05/18 | | Date 18/05/18 | | Date 14/02/19 | |
| Authorised CD | | Checked PN | | Drawn By JF | | Suitability For Information | |

Project

Client

An Roinn
Bonneagair

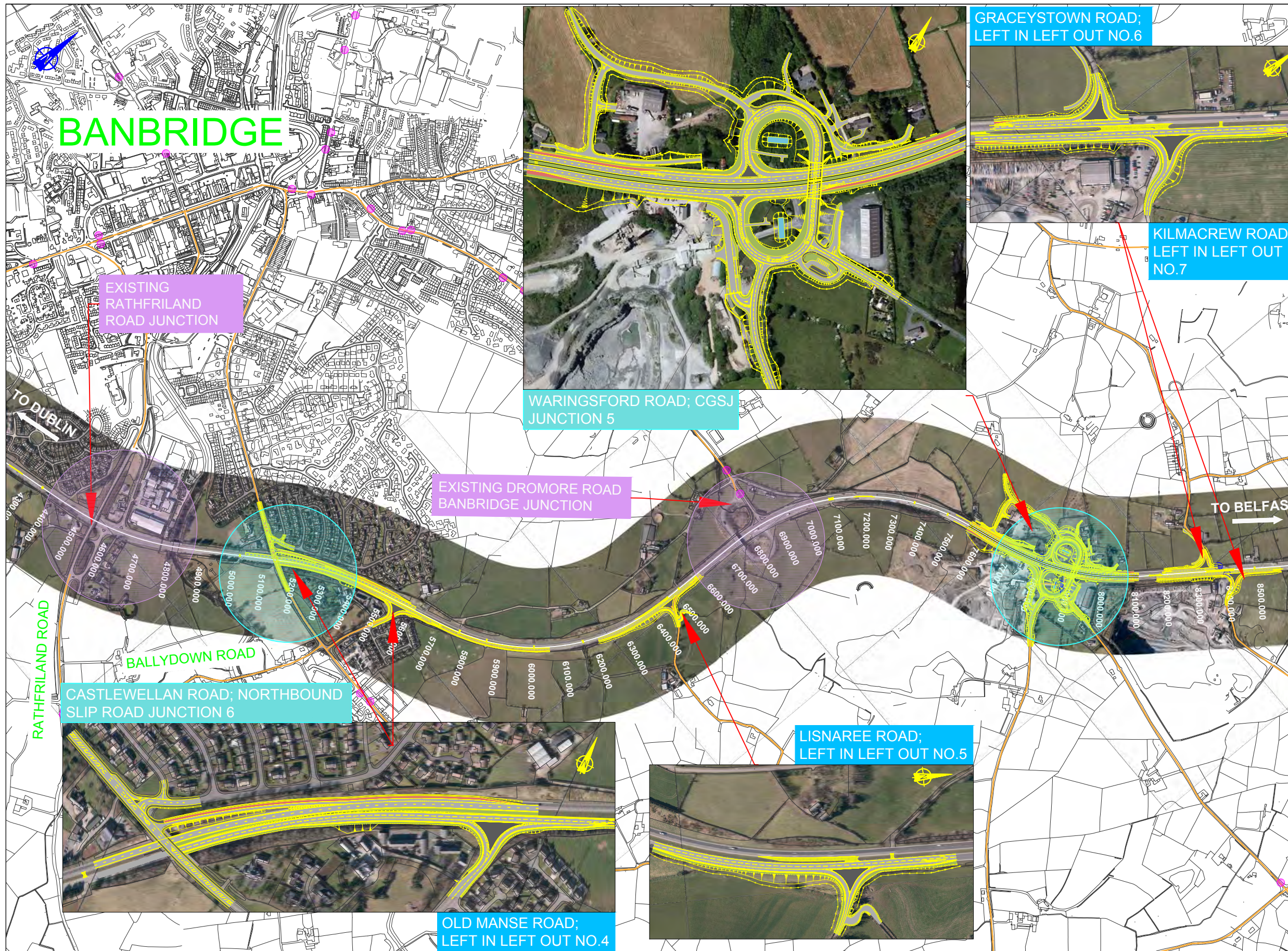
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| rev | amendments | drawn | date |
|-----|------------|-------|------|
| | | | |



NOTES

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- Datum: Irish Grid

- PROPOSED JUNCTION UPGRADE
- EXISTING GRADE SEPARATED JUNCTION
- LEFT IN LEFT OUT JUNCTION
- FULL JUNCTION CLOSURE
- LOCAL ROAD NETWORK
- BUS STOP - TO BE CLOSED (NEW BUS STOP FACILITIES TO BE PROVIDED AT 4 NO. NEW CGS.Js)
- BUS STOP - TO BE RETAINED

18700.000 CHAINAGE NUMBER

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FIGURE 2.0.2

| | | | |
|-----------------------------------|------------|---|----------|
| Title | | A1 Mainline General Arrangement Sheet 2 of 6 | |
| Drawing Number | Rev | P1.1 | |
| TNI Ref | Originator | Volume | Location |
| 168014-RPSB-EGN-ML-DR-Z-100-00024 | | | |

| | | | | |
|-------------------|-----------------|-----------------|----------|------------|
| Drawing Status | Suitability | Project Ref No. | | |
| S0 | For Information | IBH0488 | | |
| Scale | Designed | Drawn By | Checked | Authorised |
| 1:12500 1:5000 | PN | JF | PN | CD |
| Original Size | Date | Date | Date | Date |
| A3 | 18/05/18 | 18/05/18 | 18/05/18 | 14/02/19 |

Project

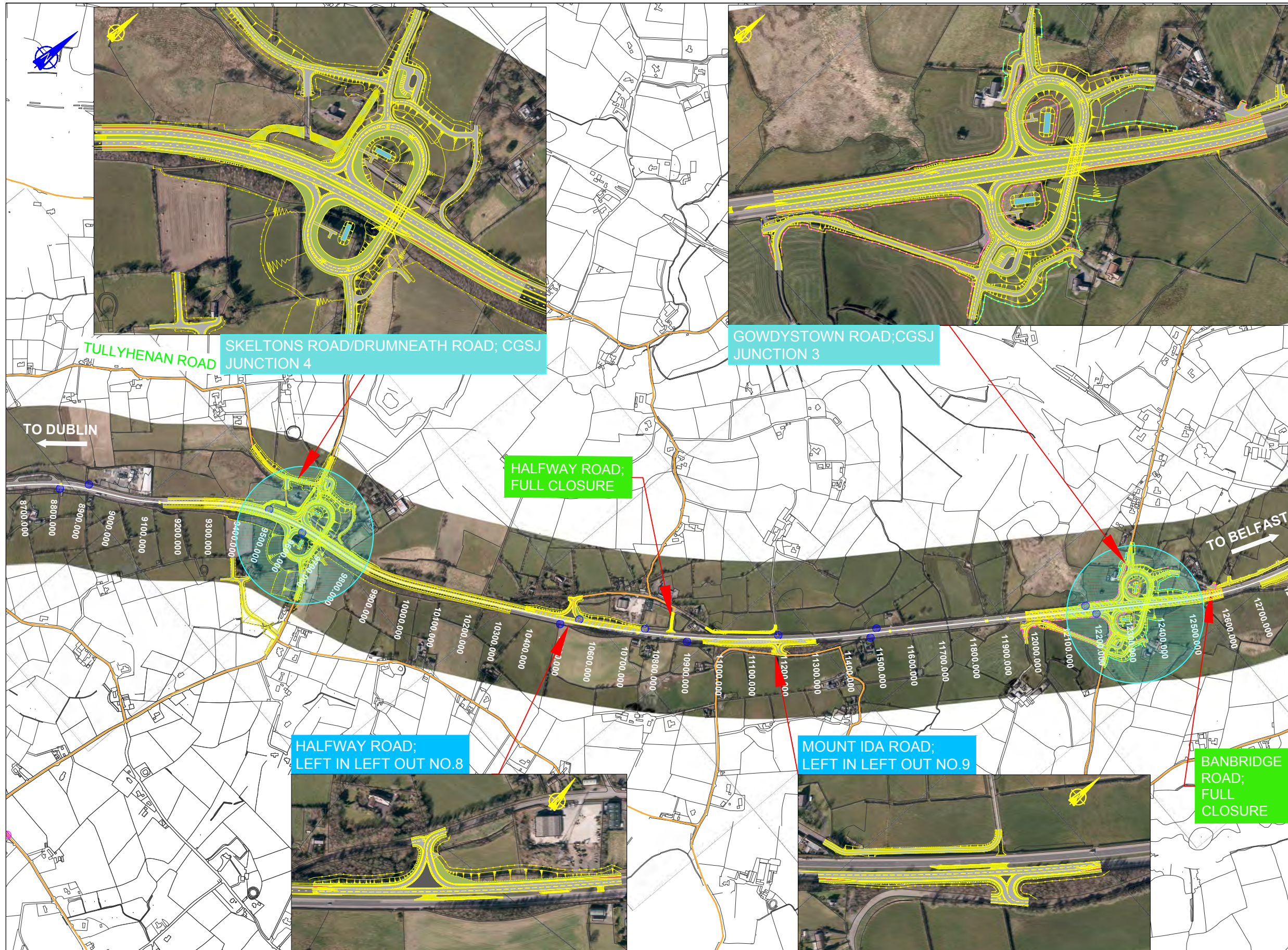
Client

An Roinn
Bonneagair
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BT12 6RZ

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F +44 (0) 28 90 668286
W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

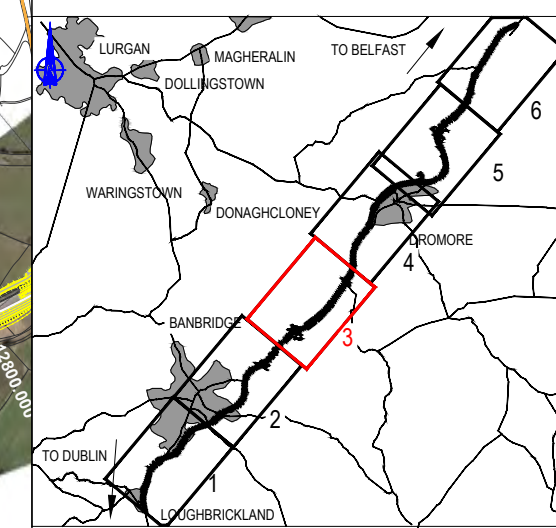
| | | | |
|-----|------------|-------|------|
| rev | amendments | drawn | date |
| | | | |



- NOTES**
- Verifying Dimensions.
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
 - Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
 - Issue of Drawings.
Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg, dxf etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipient's own risk. RPS will not accept any responsibility for any errors arising from the use of these files, either by human error by the recipient, listing of un-dimensioned measurements, compatibility issues with the recipient's software, and any errors arising when these files are used to aid the recipient's drawing production, or setting out on site.
 - Datum: Irish Grid

- PROPOSED JUNCTION UPGRADE
- EXISTING GRADE SEPARATED JUNCTION
- ▬ LEFT IN LEFT OUT JUNCTION
- ▬ FULL JUNCTION CLOSURE
- ▬ LOCAL ROAD NETWORK
- BUS STOP - TO BE CLOSED (NEW BUS STOP FACILITIES TO BE PROVIDED AT 4 NO. NEW CGS.Js)
- BUS STOP - TO BE RETAINED

18700.000 CHAINAGE NUMBER



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FIGURE 2.0.3

| | | | |
|-----------------------------------|------------|---|----------|
| Title | | A1 Mainline General Arrangement Sheet 3 of 6 | |
| Drawing Number | Rev | P1.1 | |
| TNI Ref | Originator | Volume | Location |
| 168014-RPSB-EGN-ML-DR-Z-100-00025 | | | |

| | | | | |
|-------------------|-----------------|-----------------|----------|------------|
| Drawing Status | Suitability | Project Ref No. | | |
| S0 | For Information | IBH0488 | | |
| Scale | Designed | Drawn By | Checked | Authorised |
| 1:12500 1:5000 | PN | JF | PN | CD |
| Original Size | Date | Date | Date | Date |
| A3 | 18/05/18 | 18/05/18 | 18/05/18 | 14/02/19 |

Project

Client

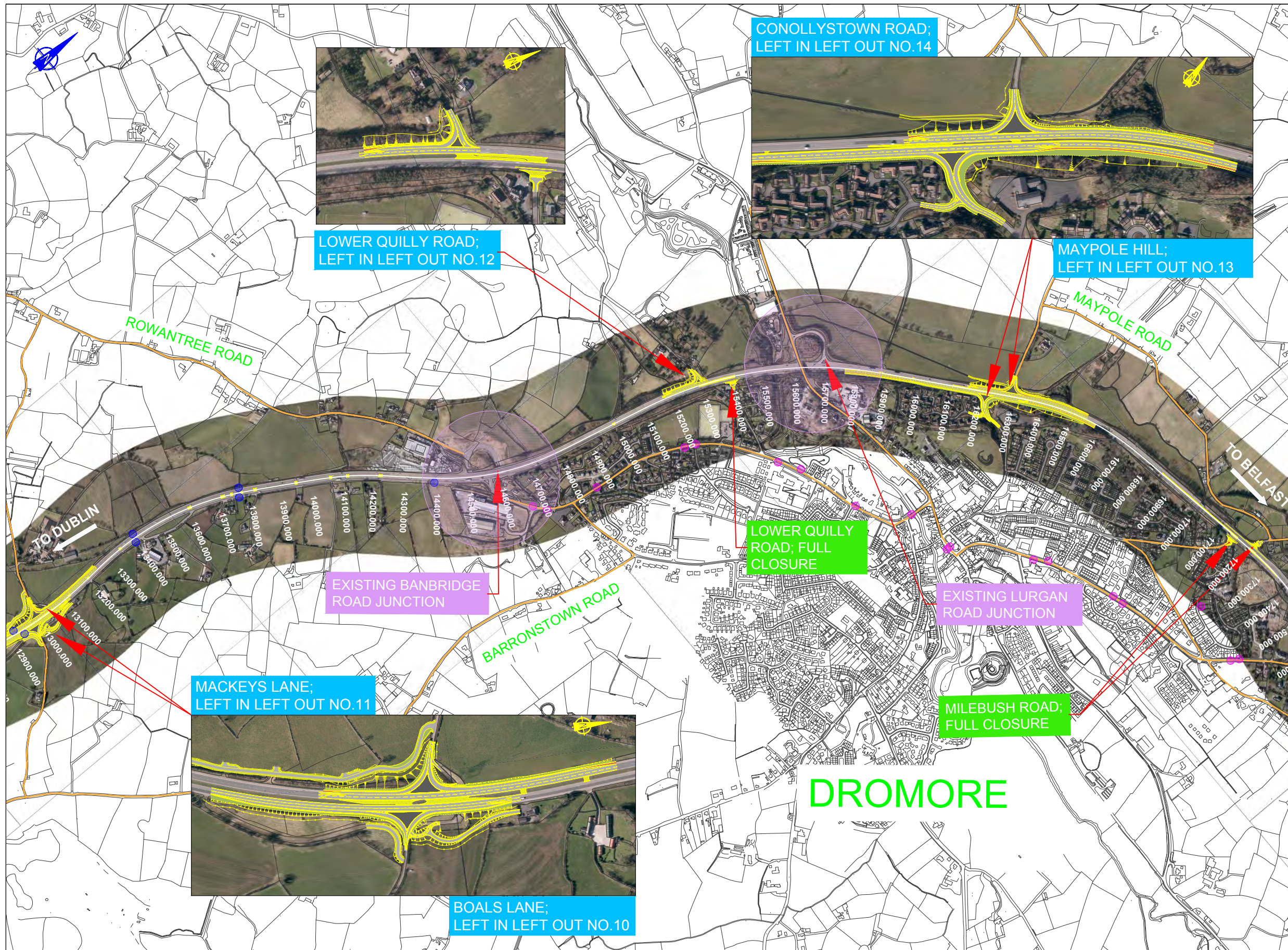
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W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

| | | | |
|-----|------------|-------|------|
| rev | amendments | drawn | date |
| | | | |



- ### NOTES
- Verifying Dimensions.
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
 - Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
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 - Datum: Irish Grid

PROPOSED JUNCTION UPGRADE

EXISTING GRADE SEPARATED JUNCTION

LEFT IN LEFT OUT JUNCTION

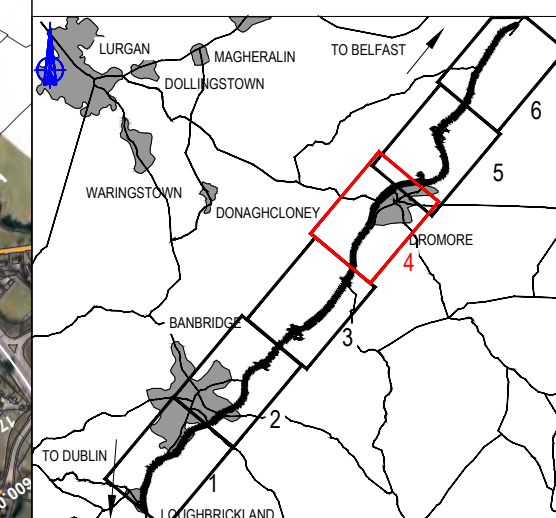
FULL JUNCTION CLOSURE

LOCAL ROAD NETWORK

BUS STOP - TO BE CLOSED (NEW BUS STOP FACILITIES TO BE PROVIDED AT 4 NO. NEW CGS.Js)

BUS STOP - TO BE RETAINED

18700.000 CHAINAGE NUMBER



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FIGURE 2.0.4

| | | | |
|-----------------------------------|------------|---|----------|
| Title | | A1 Mainline General Arrangement Sheet 4 of 6 | |
| Drawing Number | Rev | P1.1 | |
| TNI Ref | Originator | Volume | Location |
| 168014-RPSB-EGN-ML-DR-Z-100-00026 | | | |

| | | | | |
|-------------------|-----------------|-----------------|----------|------------|
| Drawing Status | Suitability | Project Ref No. | | |
| S0 | For Information | IBH0488 | | |
| Scale | Designed | Drawn By | Checked | Authorised |
| 1:12500 1:5000 | PN | JF | PN | CD |
| Original Size | Date | Date | Date | Date |
| A3 | 18/05/18 | 18/05/18 | 18/05/18 | 14/02/19 |

Project

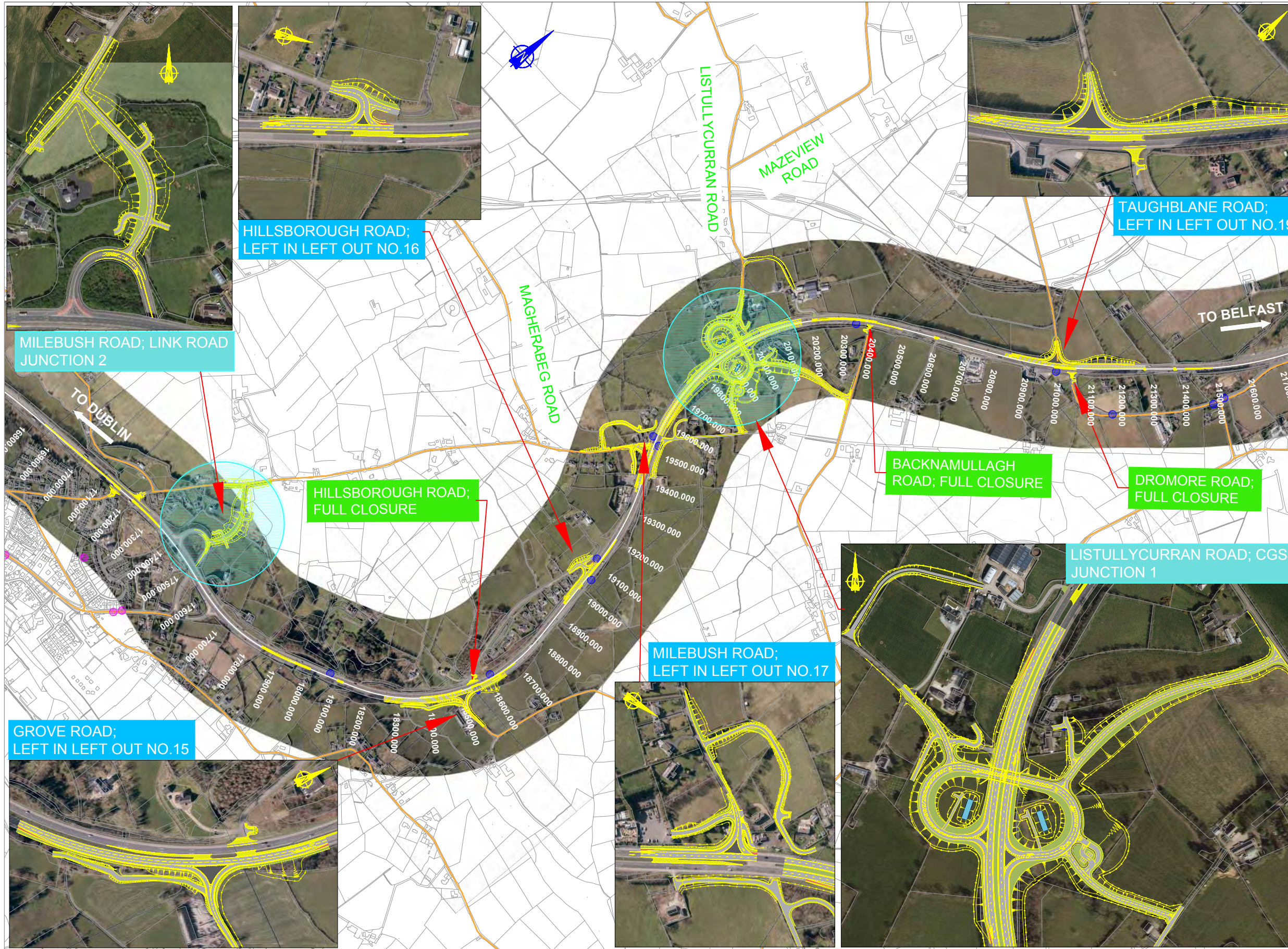
Client

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74 Boucher Road
Belfast
BT12 6RZ

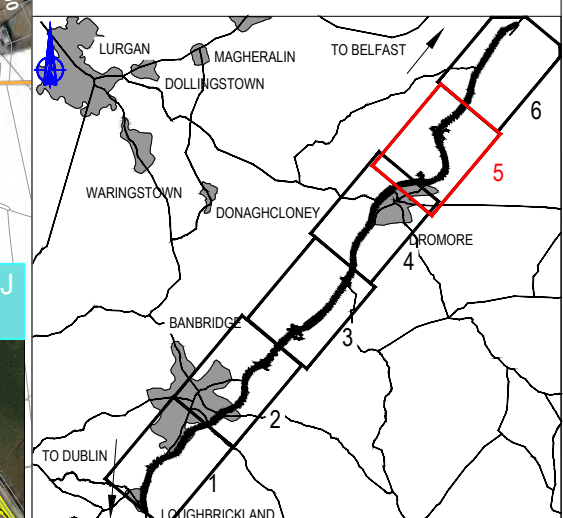
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W www.rpsgroup.com/ireland
E ireland@rpsgroup.com

| | | | |
|-----|------------|-------|------|
| rev | amendments | drawn | date |
|-----|------------|-------|------|



- ### NOTES
- Verifying Dimensions.
The contractor shall verify dimensions against such other drawings or site conditions as pertain to this part of the work.
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 - Datum: Irish Grid

- PROPOSED JUNCTION UPGRADE
 - EXISTING GRADE SEPARATED JUNCTION
 - LEFT IN LEFT OUT JUNCTION
 - FULL JUNCTION CLOSURE
 - LOCAL ROAD NETWORK
 - BUS STOP - TO BE CLOSED (NEW BUS STOP FACILITIES TO BE PROVIDED AT 4 NO. NEW CGSJs)
 - BUS STOP - TO BE RETAINED
- 18700.000 CHAINAGE NUMBER



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FIGURE 2.0.5

| | | | |
|-----------------------------------|------------|---|----------|
| Title | | A1 Mainline General Arrangement Sheet 5 of 6 | |
| Drawing Number | Rev | P1.1 | |
| TNI Ref | Originator | Volume | Location |
| 168014-RPSB-EGN-ML-DR-Z-100-00027 | | | |

| | | | | |
|------------------|-----------------|-----------------|----------|------------|
| Drawing Status | Suitability | Project Ref No. | | |
| S0 | For Information | IBH0488 | | |
| Scale | Designed | Drawn By | Checked | Authorised |
| 1:12500 & 1:5000 | PN | JF | PN | CD |
| Original Size | Date | Date | Date | Date |
| A3 | 18/05/18 | 18/05/18 | 18/05/18 | 14/02/19 |

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E ireland@rpsgroup.com

| | | | |
|-----|------------|-------|------|
| rev | amendments | drawn | date |
| | | | |



NOTES

- Verifying Dimensions.
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- Existing Services.
Any information concerning the location of existing services indicated on this drawing is intended for general guidance only. It shall be the responsibility of the contractor to determine and verify the exact horizontal and vertical alignment of all cables, pipes, etc. (both underground and overhead) before work commences.
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- Datum: Irish Grid

PROPOSED JUNCTION UPGRADE
EXISTING GRADE SEPARATED JUNCTION
LEFT IN LEFT OUT JUNCTION
FULL JUNCTION CLOSURE
LOCAL ROAD NETWORK
BUS STOP - TO BE CLOSED (NEW BUS STOP FACILITIES TO BE PROVIDED AT 4 NO. NEW CGSJs)
BUS STOP - TO BE RETAINED

18700.000 CHAINAGE NUMBER

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FIGURE 2.0.6

| | | | | | | | | | | | |
|---|-----------------|-----------------------------------|---------------------------------------|-----------------------------------|--------------------|--|-------------------------|-------------------------|-------------------------|-------|------|
| Title A1 Mainline General Arrangement Sheet 6 of 6 | | Drawing Status S0 | Suitability For Information | Project Ref No. IBH0488 | Project | Client An Roinn Bonneagair www.infrastructure-ai.gov.uk | RPS SWECO | | | | |
| Drawing Number 168014-RPSB-EGN-ML-DR-Z-100-00028 | Rev P1.1 | Scale 1:12500 1:5000 | Designed PN | Drawn By JF | | | | Checked PN | Authorised CD | | |
| TNI Ref Originator Volume Location Type Discipline Classification Number | | Original Size A3 | Date 18/05/18 | Date 18/05/18 | | | | Date 18/05/18 | Date 14/02/19 | | |
| | | | | | | | | | | | |
| | | | | | | Client Elmwood House 74 Boucher Road Belfast BT12 6RZ T +44 (0) 28 90 667914 F +44 (0) 28 90 668286 W www.rpsgroup.com/ireland E ireland@rpsgroup.com | | | | | |
| | | | | | | <table border="1"> <tr> <td>rev</td> <td>amendments</td> <td>drawn</td> <td>date</td> </tr> </table> | | rev | amendments | drawn | date |
| rev | amendments | drawn | date | | | | | | | | |