PART B – SUPPORTING ANALYSIS

6. PLANNING AND LAND USE ANALYSIS

6.1 Development Plan Policies and Objectives Overview

6.1.1 A key element of the Study Brief is the review of the existing Development Plans for the area, and the making of recommendations for future zoning objectives to maintain consistency with the SPG and the DTO Strategy.

6.1.2 It is stated at section 1.6.5 of the Greystones / Delgany Plan that the Development Policies will achieve the following:

- Provide a mix of land use zoning objectives to facilitate a balance between housing, employment and recreation consistent with reduced private motor car usage, and, consistent with protecting amenities, permit a mix of land uses within each zoning objective.
- Promote a reuse of derelict and under used urban land; prevent expansion into high amenity and rural areas; promote more compact urban forms, including where appropriate, increased net residential densities.
- Ensure the protection of natural habitats, ecological resources and quality landscapes; conserve existing urban areas, buildings and features of high environmental quality.
- Promote the use of public transport, cycling, walking and reduced private motor vehicle usage; provide adequate high quality sanitary services; promote the prevention, reduction, recycling and re-use of waste.
- Promote public participation.

6.1.3 The plan is zoning objective led, as opposed to policy led. These objectives are desirable and sustainable from a land use planning and sustainability viewpoint. However, this is an opportunity to review whether the policies did achieve the above, and whether the plan through its policies and objectives, is well equipped to achieve what may be considered as the key objectives. The key themes emerging from a planning analysis[1], which the IFP can address, are as follows:

- There is no clear link between the land use zoning objectives and the promotion of public transport, cycling, walking, and reduction in

1 It is noted that some issues highlighted may have been made without the benefit of some current strategic guidance, and that many of the comments do have the benefit of hindsight. However, a critical appraisal of planning weaknesses and strengths is fundamental in order to provide a useful input into the next development plan.

private motor vehicle usage, even though the plan highlights this as an outcome of policy;

- Rather, the only clear strategy for the plan is achieving a population target of 17,000. It would appear that development densities have been prescribed to meet this population target, rather than to be appropriate to transportation provision or potential. Therefore, in the consideration of a new target population of 22,000 the potential of this IFP to consider the issue in a new light closely aligning residential density with transportation is significant;
- The Development Plan is unusually prescriptive and detailed in its approach to residential density. However, this issue is not tied into transportation, but population targets. This is particularly evident under the 'Town Centre' zoning, where suburban, and not urban densities are encouraged in Greystones town centre;
- There is not a strong guide in the plan as to the consideration of the study area's urban hierarchy. While the plan recognises the location of neighbourhood and district centres, there is no strong sense that they are considered as different places from a typically suburban location. Perhaps the difficulty arises from the planning nomenclature traditionally used in such instances. For example the traditional village zoned as 'local centres' analogous with a couple of shops or services within a small 'main street' area. Residential zoned areas beside the villages are not considered to be part of the village, but a separate suburban area. Unfortunately, suburban neighbourhood centres do not typically have the qualities (particularly coherence) of villages, and therefore they should not be considered as one. Similarly, the opportunity was not utilised to promote Greystones an urban centre with a population of some 12,000 persons, with a DART station, but effectively as a suburban centre.
- The plan provides for employment development lands, to 'promote a greater degree of self-sufficiency', and 'reduce commuting' to the city centre. This is consistent with the SPG's policy that *further lands for industrial and other goods-based employment activities will be required in the Metropolitan Area and these should be located so as to spread the benefits of employment and to reduce the need to travel.*
- The socio-economic profile of the population of Greystones, is always going to give rise to commuting to a major centre such as Dublin, but the promotion of employment at a local level is desirable.
- It must be noted however, that the primary location of the zoned employment lands at Charlesland, are not designated in an optimum location regarding existing or proposed public transport but rather on improvements to the road infrastructure. Clearly, the improvement of the road infrastructure is a necessity, but there is a concern that the development of the area in this location will encourage an increase in private trips to Greystones;

- The plan promotes town centre expansion to the south, which is considered to be positive.
- The employment zoning objectives E1 and E2 encourage low site coverage, generous building lines and extensive perimeter landscaping. Loose development forms encourage car use, and in light of the evolution of strategic policy in the interim period, and in order to preserve the development extent of the town, it is opportune to now review this objective.
- The Marina Development (Action Plan Z2) provides an excellent opportunity to support the development of the town centre.
- An Bord Pleanála's decision to Grant Permission for the 'ZAPI' residential development at Charlesland, held that the low residential densities for greenfield development in the plan was inconsistent with national guidance, which was considered unsustainable within the Metropolitan area.

6.2 Development Issues

6.2.1 The variation to the 1999 Development Plan in 2001 (made having regard to the SPG) provided for an increase in the town's target population from 17,000 to 22,000. It is likely that the 17,000 target population will be achieved with currently permitted developments. Other important development issues are as follows:

- The location and form of the additional population will have a significant impact on the viability of a local transport route, and traffic congestion. It is imperative, therefore that the forthcoming Development Plan is structured to meet mobility targets, and be consistent with strategic guidance. The achievement of the population target should follow the implementation of good practice. In other words the target population should result from the strategy, not 'be' the strategy.
- The Draft Retail Strategy concludes that f*or Greystones and area to be a more self sufficient Town Centre within the County Retail Hierarchy .. there requires to be considerable enhancement in the quantum, quality and range of its retail offer. A number of sites within and around the town have been identified which could help address this issue.*
- The quality of village centres/shopping throughout the area is generally poor. Village Environments being overrun by heavy traffic, but equally are not being supported by appropriate land use. The loss of character of villages through generic suburban development is prevalent. This represents a lost opportunity, and a waste of land, partly through over specified road infrastructure.

6.3 Analysis of Relevant Plans and Studies

6.3.1 There is a considerable body of statutory guidance that provides clarification of the function and role of the settlement of Greystones / Delgany at a strategic level within the Greater Dublin Area. They include at regional level the National Spatial Strategy (NSS), Strategic Planning Guidelines for the Greater Dublin Area, the DTO Platform for Change (2000-2016) and the Wicklow County Development Plan 1999. At a local level the 1999 Greystones / Delgany Development Plan is the most important document.

6.3.2 The Strategic Planning Guidelines for the Greater Dublin Area (SPG) provides for the inclusion of Greystones within the defined 'Metropolitan Area'. Its role as an important node on the rail network, recently given added weight by the extension of the DART to Greystones, has particular significance and has given rise to its identification as an important centre.

6.3.3 In addition to the rail improvements, the upgrading of the N11 to dual carriageway at the Glen of the Downs and the programmed completion of the M50-South Eastern Motorway will place further pressures on the town - emphasising the need to seek an appropriate balance between the use of modes.

6.3.4 The 1999 Greystones / Delgany Development Plan's provides for sustained long-term growth. Between 1986 and 1996 the population increased by 18.6% from 8,455 and preliminary results from the 2002 Census shows that this population is now in the region of 11,871. Existing planning permissions are estimated to provide for a further increase up to 17,000 in the near future. The overall target population for the town is 22,000 by 2016. The following considers in detail pertinent policy for the Greystones IFP.

6.4 Strategic Planning Guidelines for the Greater Dublin Area (SPG)

6.4.1 The SPG cover the geographical area of the four Dublin counties, counties Kildare, Meath and Wicklow, (making up the greater Dublin Area). The purpose is to provide a coherent strategic planning framework for Development Plans and for the provision of major transportation, sanitary services, and other infrastructure, setting out a preferred direction for land use and transportation in the period up to 2011.

6.4.2 The SPG foresee the Greater Dublin Area will having a much improved transportation system in the future, with a better balance between public and private transport. A sustainable settlement strategy will offer choice in terms of residential and employment location and create a clearer demarcation between urban and rural areas.

6.4.3 A distinction is made between the existing built up area of Dublin (and its immediate environs) defined as the Metropolitan Area (in Co. Wicklow this consists of Bray and Greystones / Delgany), and the Hinterland Area with extensive areas of countryside and a range of towns of various sizes.

6.4.4 Separate development strategies are proposed for the Metropolitan and Hinterland Areas. In both cases the strategy strives for, and facilitates a better balance between public and private transport. This requires the consolidation of future growth into a limited number of locations. It is notable that Greystones is located at the southern most settlement within this area, and is to some extent therefore peripheral.

6.4.5 The principle issues in the Metropolitan Area are considered to relate to pressure arising from rapid and intensive development such as severe traffic congestion, compared to the issue in the Hinterland Area of addressing the overspill of development pressure from the built up areas of Dublin. The Strategy for the Metropolitan Area highlights[2]:

- Consolidation of Development within area
- Increase overall densities of development; and
- Thereby facilitate the provision of a considerably enhanced public transport system and facilitate and encourage a shift to public transport.

6.4.6 At the strategies core is the stipulation that future development in the Metropolitan Area will be located so as to maximise the potential of the public transportation system, where a more compact urban form increases the potential to reduce need to travel. It is stated that the additional population will be accommodated through (*inter alia*):

- The further development of the Bray-Greystones-Delgany area of north Wicklow [where Bray is viewed as a node for the area].
- Re-development of brownfield sites
- Infill development, where possible, within the existing built up area;

6.4.7 The Guidelines show projected populations and household sizes up to the year 2011 for every five-year period, and the review of 2000, which was confirmed by the review of 2001, forecasts further increases

2 SPGGDA, p.86

of population over the 1999 figures of 4.9% to 2006, and 6.9% to 2011. The projected population for Co. Wicklow in the Metropolitan Area (including the 2000 revisions) is 51,400 for 2006 and 55,600 for 2011. The projected population for Co. Wicklow in the Hinterland Area (including the 2000 revisions) is 80,800 to 2006 and 83,400 to 2011. The total population to 2011 for the county as a whole is thus 139,000 and this would rise to approximately 144,500 by 2016. The corresponding figure in section 1.4.1 of the Wicklow Development Plan is 128,000, deviating from Guidelines figure by some 16,500.

Employment

6.4.8 The question of *where will the people live,* as opposed to *where will the people work?* (in the parlance of the Town and County Planning Association), is generally given a great deal more attention in strategic planning, and the SPG tends to follow this course. Essentially, the strategy objectives are:

> *"Further lands for industrial and other goods-based employment activities will be required in the Metropolitan Area and these should be located so as to spread the benefits of employment and to reduce the need to travel. People-based employment activities should be located at appropriate existing and future public transport nodes, distributed throughout the Metropolitan Area".*

6.4.9 A vital issue to consider in the regional distribution of employment destinations is the radical changes that have occurred in the consideration of industrial and commercial zoning objectives, initially introduced in the first Variation of the Dun Laoghaire Rathdown Development Plan, 1998, and subsequently adopted in other Plans throughout the region.

6.4.10 Essentially, areas generally designated for low intensity employment; such as warehousing and distribution centres, have in effect being 'opened up' to allow for a higher intensity of usage; including primary office space. However, it is notable that in many cases the location, and infrastructure of many of these locations are not *located at appropriate existing and future public transport* and are not appropriate to accommodating high levels of peak hour trips. The basic point of applying a 'flexible' approach to the zoning of strategic industrial area, have the potential to conflict with regional objectives to locate people-based employment at appropriate existing and future public transport nodes.

Retail

6.4.11 The Retail Planning Strategy as applicable to Co. Wicklow and Greystones will be considered in greater detail below. However, in the context of SPG, it is pertinent to question the value of undertaking separate retail strategies, distinct from residential or commercial strategies for example. The objective of locating mixed-use development, which generates significant trip numbers at appropriate existing and future public transport nodes, is common to all uses. To segregate retail from the consideration of employment, transportation, is essentially counter-productive, and goes against any strategic goals to provide for integrated approach to decision making**.**

6.5 The National Spatial Strategy, 2002 (NSS)

6.5.1 The National Spatial Strategy (NSS) is considered after the SPG, due to the chronology of its publication. Section 3.3.1 of the NSS largely imports the SPGGDA's emphasis on *'Consolidating the Greater Dublin Area'*

6.5.2 Here, it is recognised that Dublin will continue to grow in population and output terms. It is stated as undesirable for the city to continue to spread physically into surrounding counties. The physical **consolidation** of Dublin, supported by effective land use policies for the urban area itself, is therefore highlighted as an essential requirement for a competitive Dublin, as well as a requirement for the public transport system to function effectively. Section 3.3.1 states that; *"In turn, investment in public transport will assist in promoting a more efficient and competitive Greater Dublin Area".*

6.5.3 Within the Metropolitan Area, the NSS places the responsibility on appropriate statutory bodies to "carry out a comprehensive and systematic audit of all vacant, derelict and underused land to establish its capacity to accommodate housing and other suitable uses. Such an audit should be focused in particular on areas in or close to public transport corridors and areas with under-utilised physical and social infrastructure (e.g. schools)".

6.5.4 It is also stated that local authorities should be pro-active in using their existing powers to facilitate the assembly of fragmented sites and to encourage the relocation to more suitable sites where there is inappropriate land use within city / district centres, and to encourage the effective use of the existing housing stock.

6.5.5 Given the pressure that this new statutory planning context places on a restricted area, the challenge of achieving intensification without compromising amenity becomes more acute. It is important therefore, that the NSS notes that the "preparation of urban design plans in renewal areas, to establish a framework for buildings and public space which can be readily understood by developers and existing communities".

6.6 Platform for Change, DTO (2000-2016)

6.6.1 The DTO strategy details a comprehensive integrated approach to the Greater Dublin Area to complement the SPG's objective to consolidate development. It is particularly pertinent to consider the Guidance on Complementary Land Use Policies that are forwarded to complement the DTO strategy.

6.6.2 At the local level it is stated that development should seek to maximise the use of walking and cycling as key transportation modes, which implies that land use patterns should encourage the following[3]:

- Neighbourhood centres should be located with good access to public transport
- Detailed layouts and design of developments which reflect the importance of walking and cycling as transportation modes by providing safe and direct access to local services (retailing, schools, employment and leisure) and public transport nodes;
- Increased density should be promoted close to public transport nodes;
- Mixed-use development should be encouraged.

6.6.3 The DTO recommend that public transport accessibility should be a primary determinant of location, development density and land use types, but that "Development patterns in the built up part of the Metropolitan Area have already been largely determined".

6.7 Residential Density Guidelines for Planning Authorities, 1999

6.7.1 In general, the guidelines note that Development Plans should give specific recognition to the importance of **achieving higher residential density in appropriate areas** such as 'brownfield' sites, sites in proximity to town centres or public transport corridors in the interest of providing a more sustainable residential pattern. It advises that Planning Authorities should also review their policies in relation to densities permitted in 'greenfield' developments.

3 Platform for change, p.66

6.7.2 It is stated that the most efficient use should be made of zoned and serviced lands by the avoidance of inefficient low-density development in order to prevent urban sprawl and promote efficiency in the use of energy, transport and natural resources. Efficiency in land usage is stated as being achieved by net residential densities in the general range of 35-50 dwellings per hectare and not less than 20/ha. Furthermore, it is stated that on lands proximate to existing or proposed public transport corridors, densities in excess of 50 dwellings per hectare should be permitted, subject to appropriate qualitative safeguards.

6.8 Wicklow County Development Plan, 1999

6.8.1 While local development objectives are provided for in the Greystones / Delgany Development Plan, 1999, It is pertinent to refer to the County Development Plan, which includes many policies and objectives, which are relevant to the study area. Greystones is identified on Map 1 of the County Development Plan as a 'Primary Growth Centre'. This strategic definition is analysed under the following sub-section 'Variation to Development Plan, 2001'.

Landscape Zones

6.8.2 Map 2B 'Landscape Zones' defines the town area as an 'Urban Area'. The southern extent of this zone is analogous with the extent of the Delgany / Greystones Development Plan area, as far south as the Three Trout Stream. Beyond this point the landscape is defined as rural.

6.8.3 Map 8 'Coastal Zone Strategy Cells- North' defines several coastal cells in or adjoining the study area (section 7.2 to 7.5 includes Bray Head, Rathdown, Greystones and Ballynerrin cells). The 'Control Objective' at *Rathdown* (Cliff Road below Bray Head in north to R761 in east to Grove Lane to the south) is 'To preserve the rural character of all lands in this area in order to maintain the greenbelt between the towns of Bray and Greystones'. The Policy for the *Greystones* coastal cell (Greystones Yacht Club – to driving range at South Beach, then widens to include all lands between the R762 and Three Trouts Stream as far inland as Killincarrig) states:

> *The Council will support the objectives of the Greystones / Delgany Development Plan and the development of a harbour at Greystones Harbour.*
> *Control Objectives:*
>
> *1) To seek to develop the town of Greystones as a based holiday and day visitor centre by promoting the development of the*

town's recreation function in association with the existing amenity area to the north at Bray Head…..

2) *The Council shall seek to improve public access to north and south beaches as a priority and shall support the development of Greystones harbour for sailing and other boating activities.*

6.8.4 The Ballynerrin coastal cell (South of the Three Trouts Steam at Greystones) provides for the following:

1) It shall be the policy of the Council to restrict development along the R761 between Delgany and Kilcoole in order to preserve the rural character of this area and to preserve the physical distinction that exists between the villages, as provided in the Greystones / Delgany Development Plan.
2) It shall be the policy of the Council to restrict any further expansion of Kilcoole to the east in order to consolidate existing development and to preserve the amenities of the coastal environment.

6.8.5 Map 44 of the County Plan 'Landscape and Commonage' illustrates the importance of the Kilruddy Estate as a 'buffer zone' between Bray and Greystones, as reinforced on Map 42 with the definition of Bray Head and Little Sugar Loaf as 'Areas to be considered for SAAO', and the zoning objective G1 *'To protect and enhance the open nature of lands between urban areas'.*

Roads

6.8.6 Map 31 'National & Strategic Road Improvements', indicates pertinent improvements at Kilmacanogue to Glen of the Downs on the N11. Barry's Bridge / Delgany Interchange, and Kilpedder Interchange are also notated.

6.8.7 Map 32 'Regional and Local Road Improvements' notates the following relevant 'Regional and County Road' improvements; Blacklion to Windgates, Blacklion Junction Bypass, Blacklion to Delgany, Delgany Bypass, Barry's Bridge to Killincarrig Improvement, Killincarrig Bypass, Drummin Distributor to Killincarrig, and Kilcoole to Ballyronan Roundabout Newtownmountkennedy.

6.8.8 Map 26 of the plan defines a significant employment zone (Zoning Objective 'E') at Kilpedder to the east of the N11 alignment, and just to the south Map 29(A) defines a Zoned Area to west of the N11 alignment under the title "Mountkennedy, Kilpedder Empoyment Uses – Option".

6.9 Variation to County Development Plan, 2001

Settlement Strategy

6.9.1 The 2001 (16 September)Variation to the County Development redefined Greystones/Delgany from Primary Growth Centre to '***Metropolitan Area Settlement'*** and took particular cognisance of the SPG making significant changes. In particular it is noted at section 6.3 that the strategy for the Metropolitan Area (i.e. Bray and Greystones / Delgany in the Co. Wicklow context) is to follow a development path that will: -

- Consolidate development within this area;
- Increase overall densities of development; and
- Thereby facilitate the provision of a considerably enhanced public transport system and facilitate and encourage a shift to public transport.

6.9.2 The rationale is explained as "intended to lead to a more compact urban form relative to the size of the population and reduce the overall demand for travel".

6.9.3 The Settlement Strategy states that the Council will encourage housing, industry and other development to locate in existing towns and villages that have the basic social, community and physical infrastructure or where these can be provided or expanded most economically or where there are specific zones for specific uses within the County (i.e. industrial zonings at interchanges on the N11). The Council will implement the strategy of the SPG by concentrating development into the Bray and Greystones / Delgany in the Metropolitan Area, the Primary Development Centre of Wicklow Town and the Secondary Development Centre of Arklow in the Hinterland Area.

6.9.4 It is stated that the Council will channel development towards the County's Metropolitan Area settlements to cater for the anticipated growth in the Metropolitan Area to circa 58,500 by 2016, and to the Hinterland Primary and Secondary Development Centres, and the primary and secondary Local Growth Centres to cater for the proposed growth in County population in the Hinterland Area to circa 86,000 persons by 2016.

6.9.5 Towns have been designated as high, medium or low growth settlements in order to give a strategic overview of projected growth. Development shall be controlled to ensure the overall population of the entire primary and secondary Local Growth Centres in Table 2.2 (which exclude Bray, Greystones, Wicklow Town and Arklow) shall not exceed 27,500. Greystones-Delgany is designated with a Medium Growth Rate of 50-100%, giving an Indicative 2016 *Maximum* Population of 22,000.

Development Policy (s.2.2.3)

6.9.6 It is the stated policy of the Council under this Variation to ensure that all of these settlements (inclusive of Greystones-Delgany) will, in so far as is practicable, be self sufficient, incorporating employment activities, sufficient retail services, and social and community facilities. Residential development will only be permitted if sufficient progress is being made in providing employment, retail, and social and community developments to ensure these settlements do not become primarily dormitory towns for the Metropolitan Area.

6.9.7 The September 2001 Variation does not provide for any change in density guidance for Greystones / Delgany (Appendix 1 – Residential Density Standards) and there remains a degree of inconsistency with national guidance. It states that "all proposals for new residential development on green field sites in other towns and large villages should ensure that there is a maximum gross density of …. 20 houses per hectare for non-terraced development. Terraced development should not exceed a gross density of …. 25 houses per hectare. These densities shall be regarded as a guide only and will not be appropriate in all circumstances. These densities relate to standard 125 sq.m. house (140 sq.m. including car port or garage).

6.9.8 The Plan Variation also states that "In certain circumstances, (such as brown field sites in urban areas, sites in proximity to town centres adjacent to public transport nodes and access nodes), the maximum density standard may be relaxed, at the discretion of the planning authority, in the interests of good urban design and the proper planning and sustainable infilling within urban areas".

6.9.9 Other amended objectives, which address more detailed layout design issues, which are relevant to refer, are included at 5.12 (adopted 25/6/01), as follows:

- Pedestrian links are encouraged within and between housing areas. Pedestrian links should feel safe to use, be well lit, overlooked by houses and have no acute bends in them. They should be short and at least 3.0 metres in width.
- Cycleways should be provided on the spine roads of housing developments in excess of 40 dwelling units. All roads should incorporate 1.5 m footpaths and 1.2 m grassed or planted verges. Traffic claming devices such as mini-roundabouts, speed tables, etc., should be provided for developments in excess of 40 houses and speed tables should be provided at the public road entrance to all housing developments.

6.10 Greystones / Delgany Development Plan Town and Environs

6.10.1 The general stated goal of the plan is to 'provide an excellent physical environment for Greystones-Delgany to maintain and improve the town as a place for living, for working and for recreation'4 and noted at section 6.2 above.

Residential Development

6.10.2 The Plan proposes to expand the town population depending on density assumptions, to provide for a potential capacity of approx. 17,000 persons (as noted above this has subsequently been raised to 22,000), stating that ' there is insufficient suitable land for this within the current town boundary'. It states that the only suitable land available is to the south of Greystones at Farrankelly and Charlesland. The town boundary was subsequently extended to include these areas, with expansion of Sewage Treatment Works facilitating this growth.

6.10.3 The main constraint facing the area is referred to as the inadequate road network for current flows and for the possible population increase.

6.10.4 A primary feature of the Plan is its prescriptive approach to density of the residential zoning objectives. This is illustrated on the development plan maps. The maximum density is 22.2/ha (R1 Zoning), and lowest is 2.5/ha (R8 Zoning). Even under the town centre zoning objective T1, residential density is still prescribed at no more than 22.2/ha. It is notable, that all zoning density objectives within the plan fall outside the standards recommended in Residential Density Guidelines. While this was reviewed in 2001 (see below) density standards remain relatively low. In this regard the Planning Inspector for the ZAPI Appeal was critical of the Planning Authority regarding the uneven application of the National Guidance, which recommends that net densities of between 35-40 should be encouraged generally on outer-suburban sites, and that "development at densities of less than 20 dwellings per hectare should generally be discouraged in the interests of land efficiency".

Transportation

6.10.5 In terms of transportation the main objectives are as follows:

4 Greystones/Delgany Development Plan 1999 p. 9

- To facilitate park and ride sites in keeping with the DTI Strategy.
- To provide cycleways in the R761
- Proposed / preserved pedestrian ways at the Three Trout's Stream Valley from Delgany to the coast along the R761.
- To provide priority for public transport in the context of the DTI Strategy and the Recommendations of the Greystones Transportation Study.

Specific Objectives

6.10.6 The Council will construct new roads and improve existing roads including appropriate traffic calming measures. The principle road objectives under the 1999 Plan are as follows:

Roads Objectives	**Implemented – Y/N**
Provide for the junction at the east end of an access free east-west distributor road from the R761 at Prettybush to the N11 at Drummin East	N
Improve road R761 from Prettybush northwards to Mill Road	N
Provide the eastern by-pass to Killincarrig from Mill Road northwards and improve the R761 northwards towards Blacklion	N
Improve road R761 from Blacklion northwards towards Windgates	Y
Improve road R762 from Delgany Primary School eastwards to its intersection with the R761	Y (partly)
Improve 300 metres of Mill Road east of its junction with the R761	N
Provide the Delgany (east) by-pass with a link to the R761 north of Killincarrig	(Delgany Wood Development Under Construction covers part of scheme
Improve the road from Delgany to Blacklion	N
Provide the Blacklion by-pass	N
Provide cycle-ways on the R762 from Delgany to Greystones, on the R761 from Prettybush towards Blacklion.	N (partly on Mill Road)
Provide traffic calming measures throughout the town	Y
Provide foothpath at Rathdown Road.	(Not Specific)
Other Works Objectives	
Facilitate 450 space capacity 'Park and Ride' off street parking for the DART	Y
Facilitate the provision of additional public car parking in the vicinity of the railway station.	Y
To facilitate the provision of park and ride/other off street parking at Greystones Town Centre.	Y

Table 6.1

Harbour/North Beach Action Area Plan -Action Area Plan Z2

6.10.7 The Greystones Harbour and North Beach Plan objective is to 'provide for an integrated and comprehensive harbour / marina / coastal erosion protection related development, including leisure, hotel, amenity, open space facilities and residential (200 dwelling houses max)'. The

development of the area comprises six areas these include: Harbour, community club and management facilities, Existing harbour side properties, Housing and commercial, Public Park and Heritage Park.

6.10.8 This element of the overall plan has not been implemented, however plans (with more residential units) have recently been approved by Wicklow County Council. A planning application is expected shortly.

Killincarrig and Charlesland - Action Area Plan Z1

6.10.9 The Killincarrig and Charlesland action area (approx. 53 hectares) was highlighted for development as the main extension for the town, to include:

- Up to 822 dwellings with 8.2 ha of open space, most of it along the stream to adjoin the existing public open space to the west.
- 15% of the area may avail of the 3:1 houses to apartments density.
- A minimum of at least 15% of the units will be social housing
- 12ha of public open space will be required for active recreation.
- Cycle and pedestrian ways to extend to the coast and Delgany, to link to the proposed primary school (C1) and other uses at Mill Road.
- Provide for the improvement of the R761 between Prettybush and Mill Road

6.10.10 Full Planning Permission was been Granted to ZAPI Properties Ltd. under PL 27.126750 for Residential (1,350 units) crèche, and community centre with dual carriageway. Permission has also been granted under PL 27.130415 to ZAPI Properties Ltd. for a mixed-use development comprising Light Industry, office, retail warehousing, local centre and petrol station on a site of some 85 acres.

Education

6.10.11 Within Greystones and Delgany there are four primary schools and one secondary school, and no third level establishments. Table 9.8.5 below lists schools in Greystones / Delgany and the vicinity. Schools in Bray have not been included although it is known that certain numbers of school children do travel there.

6.10.12 The Census of Population figures for 1996 showed that there are 1185 persons aged between and including 5 to 14 years of age within the Greystones DED. Within the Delgany DED there are 892 persons within the same age category. It should be assumed that all

persons within this category would be attending either primary or secondary school. The actual numbers of children attending school will be even greater than this figure, as there will be persons within the next category (15-19 years old) who will still be attending school, and because of the fact that population has increased since 1996 in Greystones and Delgany by 7% and 3.5%, respectively. There were primary and secondary school places in 2001 – 2002 for 1781 children.

Table 6.2

School	Address	Level	No. of Pupils
St David's	Greystones	Secondary	596
Greystones NS	Greystones	Primary	215
St. Brigid's Convent	Greystones	Primary	319
Scoil Naomh Caoimhghin	Greystones	Primary	440
Delgany NS	Delgany	Primary	211
Newtown Mt Kennedy Con	Newtown Mt Kennedy	Primary	120
Naomh Seosamh BNS	Newtown Mt Kennedy	Primary	174
St Anthony's Boys NS	Kilcoole	Primary	206

6.10.13 The Plan states that educational facilities are at capacity and that projected population figures will require the provision of additional educational space. The plan estimates that the following are required:

- A new primary school at Mill Road
- A new second level school in Killincarrig
- An extension of Delgany National School

6.10.14 The Department of Education and Science, Planning Unit have identified the following school projects:

Large-scale primary school projects recently completed and/or where some payments are still outstanding:
- Delgany N S - Refurb./extension
- Greystones Junior - Refurb./extension

Large scale primary school projects under construction or already authorised to proceed to construction:
- Scoil Naomh Caoimhghin, Greystones - Refurb./extension

Large scale secondary school projects under construction or already authorised to go to construction:
- Kilcoole CC - New School

Large scale primary school projects at advanced stages of architectural planning:
- Greystones N S - Refurb./extension - Stage 4/5 pre-tender documents requested

Large scale primary school projects that are at early stages of architectural planning (pre-planning permission):
- St Brigid S Convent, Greystones - Refurbishment/extension - Stage 3/detailed plans/costs queried

6.11 Wicklow Draft Retail Strategy

6.11.1 The Wicklow Draft Retail Strategy (November 2003), is still in draft from, and any extracts or comments must be considered only in this light.

6.11.2 Within the GDA Retail Hierarchy, Greystones is considered within the Level 3 Town and / or District Centre category. In terms of analysis it is noted at section 4.13/4.14 that Greystones and Environs, including Delgany, has the second largest population in the County (as at 1996) which is set to increase. It notes that the town has less retail floorspace than either Wicklow Town or Arklow and is predominantly a convenience centre, at some 71%. It states:

> *"Greystones has the emerging characteristics of a Town Centre as opposed to a District Centre, although this will require enhancement of the range and quality of its retail floorspace over the timescale of the County Retail Strategy. It is therefore appropriate to designate Greystones as a Metropolitan Area Level 3 Town Centre".*

6.11.3 It is noted at that given the size of the surrounding population, the range, quality and quantum of retail floorspace is limited with commercial leisure uses being a high component of town centre floorspace.

6.11.4 The Core Retail Area is stated as including Church Road from the park in the south to the northern end of the town centre zoning to the west of the railway line, but that this doesn't include the Tesco store on the R761 which is the main convenience store for the town.

6.11.5 Section 5.22 summarises retails statistics for the town as follows:

I. Greystones and Environs has 43% of the population of Bray (and Environs) and only 23% of the floorspace of Bray with convenience predominating at 71% of the total; and
II. It has a population 19% and 27% greater than Arklow and Wicklow and their Environs respectively but 76% and 77% of the floorspace of these two centres (with Delgany and Rathnew being included for both Greystones and Wicklow Town's totals); and
III. It has significantly less retail floorspace than main Level 4 Town Centres in the GDA Metropolitan Area that it seeks to compare with.

6.11.6 Having regard to the foregoing the Draft Retail Strategy concludes that local people are travelling out of the town for the majority

of their shopping needs which will be further facilitated by the proposed SAR link to the N11, and improvements to DART services. It states that *"For Greystones and area to be a more self sufficient Town Centre within the County Retail Hierarchy .. there requires to be considerable enhancement in the quantum, quality and range of its retail offer. A number of sites within and around the town have been identified which could help address this issue. These are:*

Behind Church Road	*Permitted Retail / Residential Development under construction*
Sewage Treatment Plan:	*Lands adjacent to Town Council Buildings, zoned for community uses in 1999 Plan. Forwared as suitable for convenience space.*
Park and Ride Car Park	*Under utilised and forwarded as appropriate for convenience*
Railway Station Car Park	*Identified by Council for retail/multi-storey car park*
	Limited in size and has poor access
	Option that would benefit from more detailed examination
Ballymore / IDA site	*A convenience supermarket has been permitted as part of the retail/community centr. This is likely to be occupied by Superquinn.*
Esso Station Site	*Blacklion – Lidl have been Refused permission for this site, on the grounds of inappropriate scale of development for a neighbourhood centre.*

7. TRANSPORTATION ANALYSIS

7.1 Transport Background

7.1.1 The Strategic Planning Guidelines for the Greater Dublin Area (SPG) have identified a number of transportation corridors within the region. They are intended to be the transportation backbone of the Metropolitan Area by connecting this to the proposed new Development Centres. These corridors were designated on the basis of being served by a road link of dual carriageway/motorway and a passenger rail link.

7.1.2 Greystones sits at the core on the southern transport corridor (See Figure 1.1) that runs from the Dublin city centre to Arklow. The southern corridor is served by the N11 national primary route and the M11 motorway, as well as the Dublin – Rosslare railway and the DART service.

7.1.3 The SPG states that a distinction can be made between the existing built up 'Metropolitan Area' of Dublin and its 'Hinterland Area' with extensive areas of countryside and a range of towns of various sizes. It also states that the principal issues in the Metropolitan Area relate to pressures arising from rapid and intensive development, such as severe traffic congestion, whilst an important issue in the Hinterland Area is the spill over of development pressures from the built up area of Dublin.

7.1.4 Although Greystones lies within what is termed the Metropolitan Area, its peripheral location almost on the boundary of Metropolis and Hinterland, means that it is subjected to the advantages and disadvantages of such a location. Greystones suffers from the traffic problems relating to its commutable distance to Dublin which could also be viewed as being an advantage for such commuters who have the benefits of living in semi – countryside.

7.1.5 Greystones however, in comparison to Wicklow Town which is designated a 'Primary Development Centre' under the SPGGDA, will not have to develop to a critical mass to become a self sustainable settlement. This has the consequence of Greystones continuing and reaffirming its role as a commuter town to Dublin. As a result, an analysis must be made of existing conditions for commuters on different transport modes (see Capacity Analysis section below). An aim of the Framework Plan will be to minimise commuting where possible, but with regards to Greystones, inevitable commuting should be encouraged onto sustainable transport modes.

7.1.6 The 1999 Development Plan proposed a set of comprenhensive transportation objectives for the area. When reviewing these, it is apparent that several of the transportation/ roads objectives have been achieved. However, the current Development Plan has been unable to achieve its objective of reducing private car usage as yet, indeed quite the contrary. This must be placed in the context of limited population growth in the area, rapid economic expansion and inadequate public transport provision.

7.1.7 Significant parking has been provided in the vicinity of the DART station, traffic-calming measures have been implemented throughout the town and several road improvement schemes have been undertaken. Construction is currently underway for the Southern Access Route (SAR) from Mill Road as far as Prettybush, in connection with the 'ZAPI' development.

7.1.8 Outstanding Roads proposals relate to the development of the SAR (from Prettybush to the N11 for which detailed design has been undertaken, and the Eastern By-Pass (of Killincarrig from the R761 at Prettybush through Golf Course lands to rejoin the R761 at Burnaby Heights). The Blacklion by-pass has not been implemented as yet, but proposals for a residential development in this vicinity will facilitate part of the road.

7.1.9 In terms of public transport, the efficiency and reliability of the DART service is crucial to the provision of an attractive alternative to the private car for commuting trips. The bus service must be regarded as quite good compared to similar areas on the Dublin periphery.

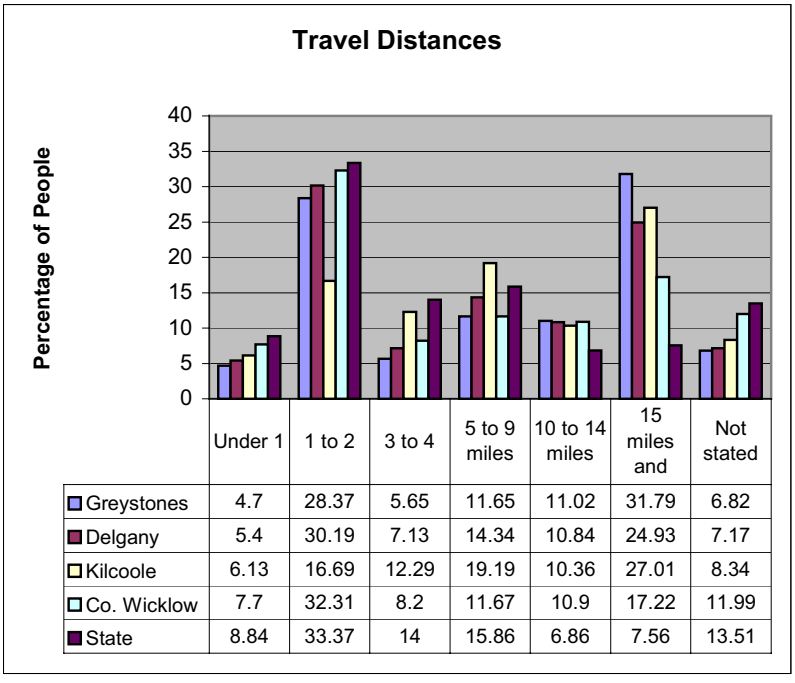
7.1.10 Road safety is a vital issue for all residents of Greystones/ Delgany. The public consultation exercise undertaken as part of the IFP process clearly illustrated that fears regarding pedestrian and cycle safety have encouraged a large mobility shift to the car, particularly for the school run. The implementation of infrastructure for the 'soft modes' (cycle/ pedestrian) has been insufficient and would appear consequent to road development in terms of priority.

7.1.11 The phasing of this infrastructure, and its potential benefit relative to road investment, must now be considered as an important tool for reducing congestion and car dependency. Development of the SAR should have a beneficial impact, by removing the majority of through-traffic from Delgany, and to a lesser extent Windgates. Finally, the co-ordination and improvement of public transport elements, pedestrian/ cycle and road infrastructure are vital considerations as part of this study.

7.2 Modal Split and Travel Distances

7.2.1 Of particular relevance to a land use and transportation study is how far children, students and workers travel to their place of education or employment and by what mode of transport. Such figures became available in 1998 from the Census of Population which took place in 1996.

7.2.2 Particular attention must be paid to the figures for the Greystones District Electoral Division (DED), as it contains most of the study area. Figure 7.2.1 below shows the travelling distances for school children over 5 years of age, students and workers and compares Greystones to Delgany and Kilcoole DED's, County Wicklow and the State from the 1996 Census. It is noticeable from the graph that Greystones has the least percentage of people travelling under 1 mile and from 3 to 9 miles to workplace/ educational institution. What is also noticeable is that Greystones has the highest percentage of people travelling over 10 miles to their place of education/ work. The reason for this is probably because high numbers of people commute to their place of work. If this is not the case however, Greystones must contain disproportionately high numbers of pupils/ students attending institutions out with the area.



	Under 1	1 to 2	3 to 4	5 to 9 miles	10 to 14 miles	15 miles and	Not stated
Greystones	4.7	28.37	5.65	11.65	11.02	31.79	6.82
Delgany	5.4	30.19	7.13	14.34	10.84	24.93	7.17
Kilcoole	6.13	16.69	12.29	19.19	10.36	27.01	8.34
Co. Wicklow	7.7	32.31	8.2	11.67	10.9	17.22	11.99
State	8.84	33.37	14	15.86	6.86	7.56	13.51

Figure 7.2.1 – Distances Travelled to Work/ Education

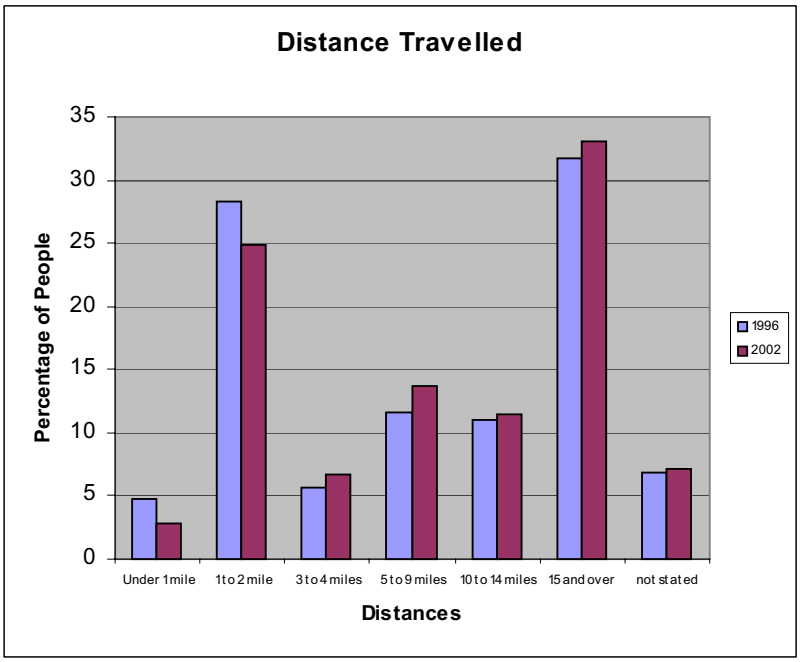


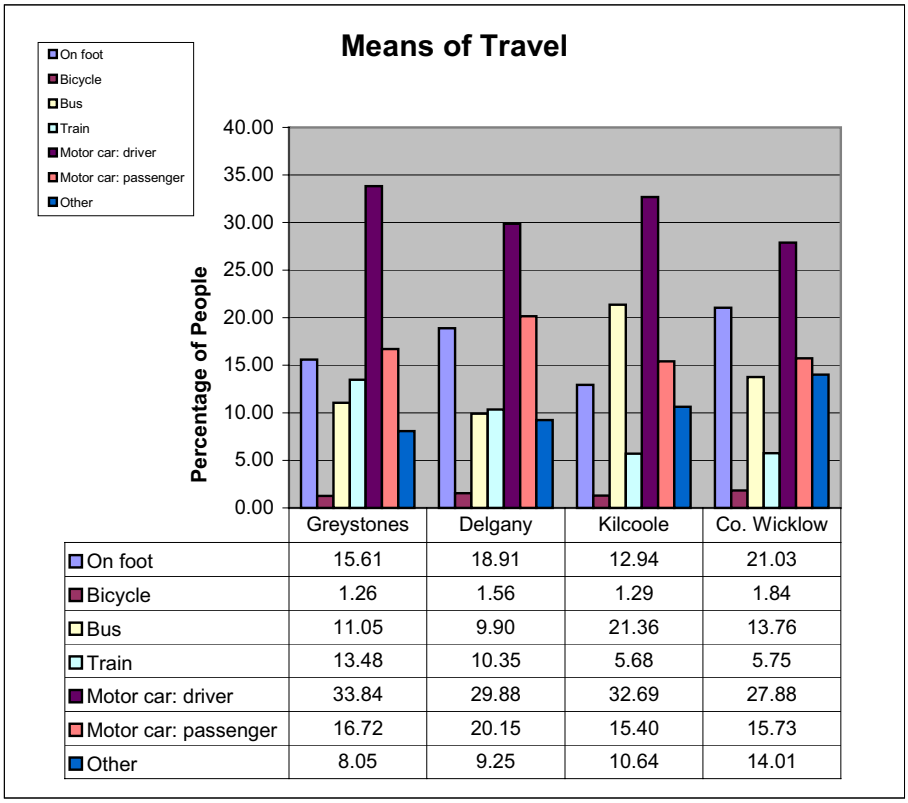
Figure 7.2.2 – Travel Distances 1996 and 2002

7.2.3 Figure 7.2.2 above compares 1996 and 2002 Census figures for distances travelled to work/ college/ school by residents of Greystones. Distances of between 1 and 2 miles and 15 miles and over are the most common categories that people fall within in both Census periods. These distance categories account for over half of all people travelling, although the percentage of people travelling 1 to 2 miles has fallen whilst distances of 15 miles and over has increased.

7.2.4 What is most concerning in terms of land use and transportation integration is that travel distances to work have generally increased. There has been a drop in the percentage of people travelling under two miles and an increase in the amount of people travelling over three miles. The 2002 Census figures have revealed that a third of all people now travel over 15 miles to work/ school/ college.

7.2.5 Figure 7.2.3 below shows comparisons of means of travel to work/ school/ college in Greystones, Delgany, Kilcoole, and County Wicklow from the 1996 Census. The dominant means of travel in all areas is of course the private motorcar. Just over half of people in Greystones are taken to their destination by private car, whether they are the driver or a passenger of the vehicle. In comparison, County Wicklow displays equivalent figures of just over 43%, around 7% less than Greystones. Although this 7% may seem miniscule, it does nevertheless place additional pressure on an already congested local road network and is likely to result in a rapid take up of new road space when constructed.

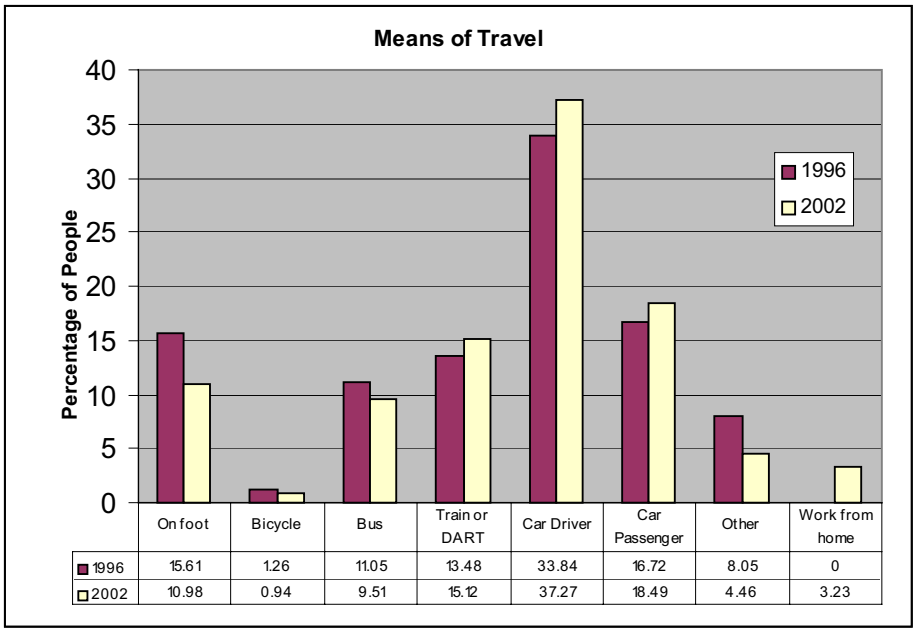
7.2.6 Some encouragement can be drawn from the graph below by looking at public transport figures. It proves that if infrastructure is in place in will be used. A total of 13.48% of people in Greystones use the train compared to 5.75% countywide and 1.52% at state level. These surveys were conducted before the introduction of the DART to Greystones. Kilcoole has a high level of bus users at 21.36%. This can be attributed to the Number 84 and 84X Dublin bus routes which service Kilcoole village with a route to Dublin city centre.



	Greystones	Delgany	Kilcoole	Co. Wicklow
On foot	15.61	18.91	12.94	21.03
Bicycle	1.26	1.56	1.29	1.84
Bus	11.05	9.90	21.36	13.76
Train	13.48	10.35	5.68	5.75
Motor car: driver	33.84	29.88	32.69	27.88
Motor car: passenger	16.72	20.15	15.40	15.73
Other	8.05	9.25	10.64	14.01

Figure 7.2.3 – Means of Travel to Work / Education

7.2.7 Figures for usage of non - mechanical modes of transport within the study area are below both the county and national rate. A total of 16.87% of people either walk or cycle to work/ education in Greystones compared to 22.87% at county level and 23.97% nationally. Again this may suggest high commuting levels, as the place of work may be unreachable on foot or by bicycle.



	On foot	Bicycle	Bus	Train or DART	Car Driver	Car Passenger	Other	Work from home
1996	15.61	1.26	11.05	13.48	33.84	16.72	8.05	0
2002	10.98	0.94	9.51	15.12	37.27	18.49	4.46	3.23

Figure 7.2.4 – Greystones 1996 and 2002

7.2.8 Figure 7.2.4 above compares the 1996 and 2002 Census figures for means of travel. The most favourable means of travel continues to be the private car. The percentage of people travelling in private car has risen from 50.56% in 1996 to 55.76% in 2002.

7.2.9 The percentage of people travelling 'on foot' to their place of work/ college/ school has decreased by 4.64% from 1996 to 2002. This is the greatest percentage change of all means.

7.2.10 Numbers of people cycling and taking the bus has also fallen but train user figures have increased. Considering that the DART has been extended to Greystones since the 1996 Census, the percentage increase of 1.64% is surprisingly small. This suggests that many people included in this category within the 1996 Census travelled to Bray DART station by another means. The Census does not include a category for multi-modal trips.

7.2.11 The 2002 Census has included a new category for people who mainly work from or at home. This may explain the reduction between 1996 and 2002 in the 'other' category.

7.2.12 The figures contained in the graphs below combine means of travel and distance travelled for each of the three DED's, the county and the State from the 1996 Census. The graphs give a good indication of what means of transport is used for what distances travelled. In general, each graph follows broadly the same pattern and the display of smaller

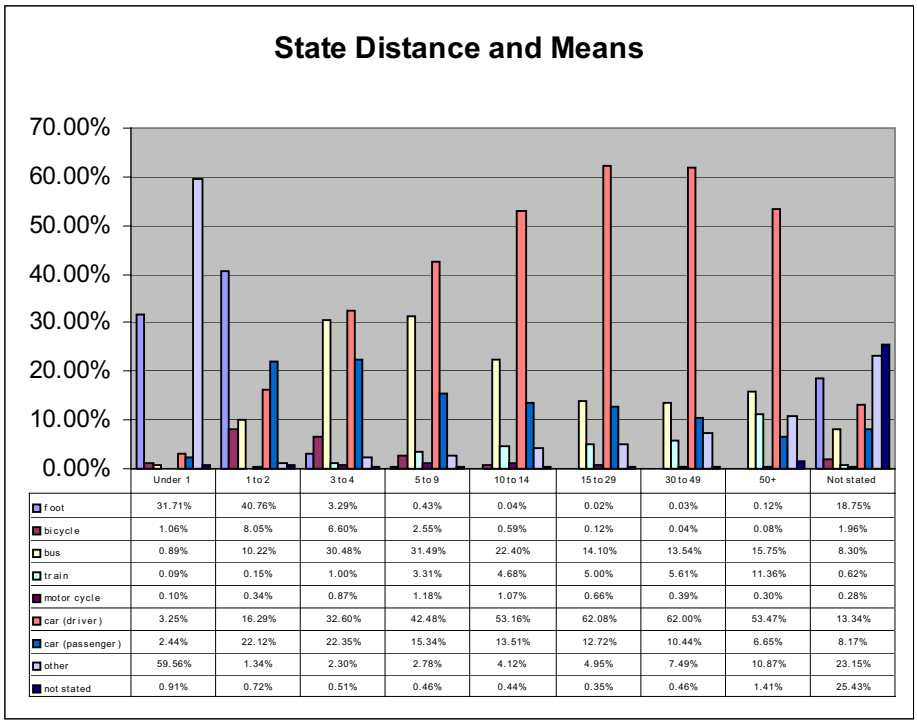
variations usually depends on the individual characteristics of the place or area.

7.2.13 The most evident pattern in all graphs is the growth of the orange column as distances increase. This is the car (driver) column and an examination of the State graph shows a steady increase in usage of that mode as distance increases, before an eventual tapering off at 50 miles and above. A similar pattern takes place at county level but the orange column does not reach the same heights as with State level, e.g. 56.27% of people travelling 15 to 29 miles do so by car at county level compared to 62.08% at state level. When comparing county and state figures to Greystones and Delgany, one of the most disappointing observations is the fact that such high numbers of people travelling under 1 mile do so by car: 11.96% and 10.26% in Greystones and Delgany compared to 3.25% and 3.98% at state and county level respectively. Another unsustainable observation is the massive amount (76.19%) of people who drive a car for distances of 30 to 49 miles to their place of work/ education.

7.2.14 An examination of all dark blue columns is also revealing with regards to over-use of the private car. This column assesses the distances that passengers in a car are driven to there place of work/ education. Comparatively higher numbers are driven 1 to 2 miles in Greystones and Delgany as opposed to the state and county, i.e. 31.32% and 31.65% against 22.12% and 22.14%. It is likely that a significant amount of car passengers are actually children being driven the short distance to school by their parents.

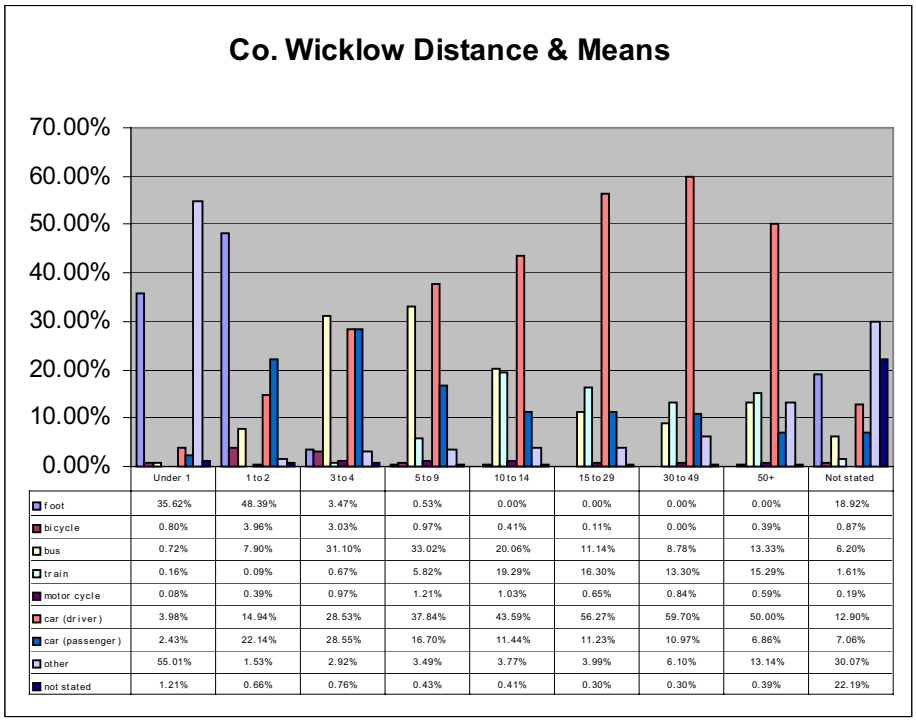
7.2.15 Other general observations include the fact that bus usage in Greystones and Delgany is below that of the State and County. The highest amount of people travelling by bus at State and County level occurs for distances of 3 to 4 miles and 5 to 9 miles. For the State 30.48% of people travelling 3 to 4 miles and 31.49% of people travelling 5 to 9 miles, do so by bus. At county level 31.1% of people travelling 3 to 4 miles and 33.02% of people travelling 5 to 9 miles do so by bus. The equivalent figures for Greystones are 29.88% and 23.17% and for Delgany are 13.11% and 31.19% respectively. In Kilcoole DED just under half of people travelling 3 to 4 miles do so by bus. Greystones is approximately between 3 and 4 miles to Kilcoole village.

7.2.16 Train usage increases with distance travelled. The highest percentage category is for 50 miles and over. However, it must be emphasised that these train figure do not include the extended DART service to Greystones. The DART network contains more stations and therefore shorter distances between stops, enabling shorter distanced train trips. The regional train service that operated through Greystones at the time of the 1996 Census would have had fewer stops towards Dublin.



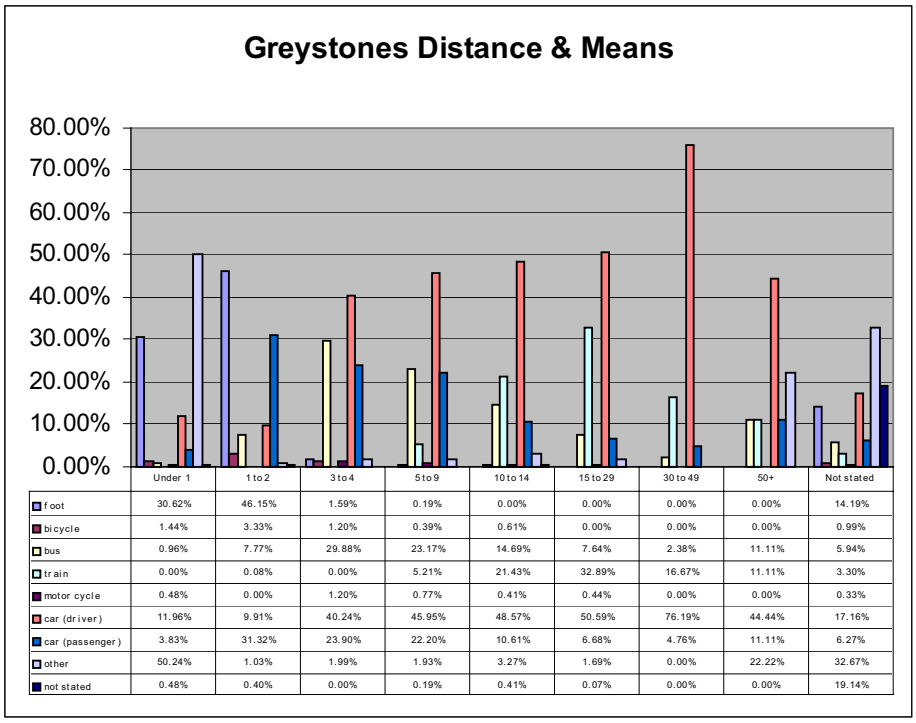
	Under 1	1 to 2	3 to 4	5 to 9	10 to 14	15 to 29	30 to 49	50+	Not stated
foot	31.71%	40.76%	3.29%	0.43%	0.04%	0.02%	0.03%	0.12%	18.75%
bicycle	1.06%	8.05%	6.60%	2.55%	0.59%	0.12%	0.04%	0.08%	1.96%
bus	0.89%	10.22%	30.48%	31.49%	22.40%	14.10%	13.54%	15.75%	8.30%
train	0.09%	0.15%	1.00%	3.31%	4.68%	5.00%	5.61%	11.36%	0.62%
motor cycle	0.10%	0.34%	0.87%	1.18%	1.07%	0.66%	0.39%	0.30%	0.28%
car (driver)	3.25%	16.29%	32.60%	42.48%	53.16%	62.08%	62.00%	53.47%	13.34%
car (passenger)	2.44%	22.12%	22.35%	15.34%	13.51%	12.72%	10.44%	6.65%	8.17%
other	59.56%	1.34%	2.30%	2.78%	4.12%	4.95%	7.49%	10.87%	23.15%
not stated	0.91%	0.72%	0.51%	0.46%	0.44%	0.35%	0.46%	1.41%	25.43%

Figure 7.2.5



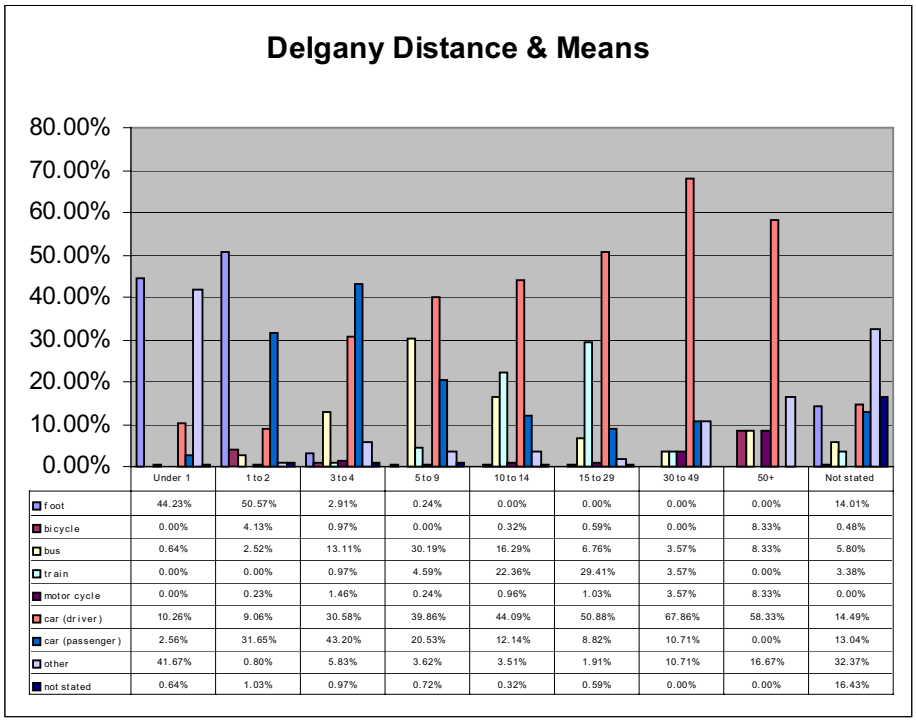
	Under 1	1 to 2	3 to 4	5 to 9	10 to 14	15 to 29	30 to 49	50+	Not stated
foot	35.62%	48.39%	3.47%	0.53%	0.00%	0.00%	0.00%	0.00%	18.92%
bicycle	0.80%	3.96%	3.03%	0.97%	0.41%	0.11%	0.00%	0.39%	0.87%
bus	0.72%	7.90%	31.10%	33.02%	20.06%	11.14%	8.78%	13.33%	6.20%
train	0.16%	0.09%	0.67%	5.82%	19.29%	16.30%	13.30%	15.29%	1.61%
motor cycle	0.08%	0.39%	0.97%	1.21%	1.03%	0.65%	0.84%	0.59%	0.19%
car (driver)	3.98%	14.94%	28.53%	37.84%	43.59%	56.27%	59.70%	50.00%	12.90%
car (passenger)	2.43%	22.14%	28.55%	16.70%	11.44%	11.23%	10.97%	6.86%	7.06%
other	55.01%	1.53%	2.92%	3.49%	3.77%	3.99%	6.10%	13.14%	30.07%
not stated	1.21%	0.66%	0.76%	0.43%	0.41%	0.30%	0.30%	0.39%	22.19%

Figure 7.2.6



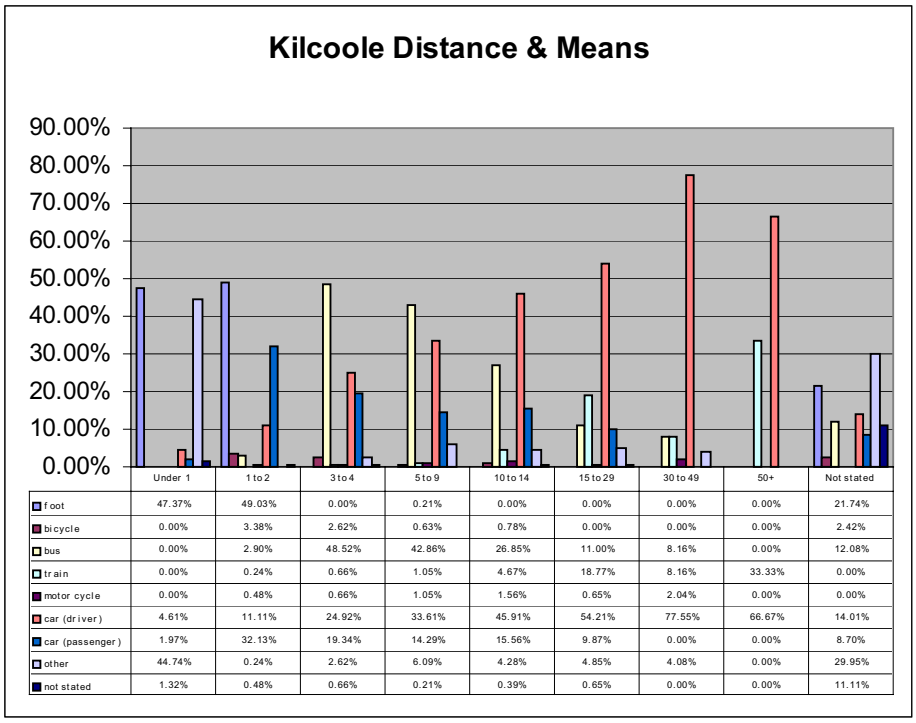
	Under 1	1 to 2	3 to 4	5 to 9	10 to 14	15 to 29	30 to 49	50+	Not stated
foot	30.62%	46.15%	1.59%	0.19%	0.00%	0.00%	0.00%	0.00%	14.19%
bicycle	1.44%	3.33%	1.20%	0.39%	0.61%	0.00%	0.00%	0.00%	0.99%
bus	0.96%	7.77%	29.88%	23.17%	14.69%	7.64%	2.38%	11.11%	5.94%
train	0.00%	0.08%	0.00%	5.21%	21.43%	32.89%	16.67%	11.11%	3.30%
motor cycle	0.48%	0.00%	1.20%	0.77%	0.41%	0.44%	0.00%	0.00%	0.33%
car (driver)	11.96%	9.91%	40.24%	45.95%	48.57%	50.59%	76.19%	44.44%	17.16%
car (passenger)	3.83%	31.32%	23.90%	22.20%	10.61%	6.68%	4.76%	11.11%	6.27%
other	50.24%	1.03%	1.99%	1.93%	3.27%	1.69%	0.00%	22.22%	32.67%
not stated	0.48%	0.40%	0.00%	0.19%	0.41%	0.07%	0.00%	0.00%	19.14%

Figure 7.2.7



	Under 1	1 to 2	3 to 4	5 to 9	10 to 14	15 to 29	30 to 49	50+	Not stated
foot	44.23%	50.57%	2.91%	0.24%	0.00%	0.00%	0.00%	0.00%	14.01%
bicycle	0.00%	4.13%	0.97%	0.00%	0.32%	0.59%	0.00%	8.33%	0.48%
bus	0.64%	2.52%	13.11%	30.19%	16.29%	6.76%	3.57%	8.33%	5.80%
train	0.00%	0.00%	0.97%	4.59%	22.36%	29.41%	3.57%	0.00%	3.38%
motor cycle	0.00%	0.23%	1.46%	0.24%	0.96%	1.03%	3.57%	8.33%	0.00%
car (driver)	10.26%	9.06%	30.58%	39.86%	44.09%	50.88%	67.86%	58.33%	14.49%
car (passenger)	2.56%	31.65%	43.20%	20.53%	12.14%	8.82%	10.71%	0.00%	13.04%
other	41.67%	0.80%	5.83%	3.62%	3.51%	1.91%	10.71%	16.67%	32.37%
not stated	0.64%	1.03%	0.97%	0.72%	0.32%	0.59%	0.00%	0.00%	16.43%

Figure 7.2.8



	Under 1	1 to 2	3 to 4	5 to 9	10 to 14	15 to 29	30 to 49	50+	Not stated
foot	47.37%	49.03%	0.00%	0.21%	0.00%	0.00%	0.00%	0.00%	21.74%
bicycle	0.00%	3.38%	2.62%	0.63%	0.78%	0.00%	0.00%	0.00%	2.42%
bus	0.00%	2.90%	48.52%	42.86%	26.85%	11.00%	8.16%	0.00%	12.08%
train	0.00%	0.24%	0.66%	1.05%	4.67%	18.77%	8.16%	33.33%	0.00%
motor cycle	0.00%	0.48%	0.66%	1.05%	1.56%	0.65%	2.04%	0.00%	0.00%
car (driver)	4.61%	11.11%	24.92%	33.61%	45.91%	54.21%	77.55%	66.67%	14.01%
car (passenger)	1.97%	32.13%	19.34%	14.29%	15.56%	9.87%	0.00%	0.00%	8.70%
other	44.74%	0.24%	2.62%	6.09%	4.28%	4.85%	4.08%	0.00%	29.95%
not stated	1.32%	0.48%	0.66%	0.21%	0.39%	0.65%	0.00%	0.00%	11.11%

Figure 7.2.9

7.3 Railway. Iarnród Éireann.

7.3.1 Greystones is located on the southern railway corridor between Dublin and Rosslare.

7.3.2 At present, there are 5 Arrow/ Intercity services from Dublin which continue beyond Greystones to Wicklow, Arklow and Rosslare Europort. In the opposite direction services commence from Bray to Dublin at 05:40 concluding at 23:20 hours, and from Greystones at 06:34 and 23:09 hours. The latter Arrow service is specifically aimed at the commuter market, with an arrival at Connolly at 0845, and departure at 1725. Nevertheless, such service does not make rail an attractive proposition for travel between Dublin, Greystones and Arklow. In addition, the line between Dublin and Arklow is also used by a limited number of freight trains each day.

7.3.3 Since late 2003, the 06:55 Arklow – Dublin and 17:25 Dublin – Arklow services operates as Arrow trains. This has increased the capacity of each service by about 200 passengers, and also reduces journey times because of increased speeds.

7.3.4 Greystones is also the final stop of the DART suburban service linking Malahide/ Howth, Dublin, Bray and Greystones.

7.3.5 The current weekday DART service provides around 85 services per day in each direction between Bray and Dublin, of which only 24 reach Greystones ($^1/_3$). The service to/ from Greystones is somewhat irregular, averaging one train per hour, except during the morning peak period when it is twice per hour. The public consultation exercise clearly illustrated that people in Greystones are extremely frustrated by the unreliable nature of the service.

7.3.6 Park and Ride is also possible at the Greystones DART station but it is made unattractive by the car park's distance from the platform.

7.3.7 Travel time between Greystones and Bray is around 9 minutes by DART and 8 minutes on the intercity service. Between Bray and Dublin the DART takes around 44 minutes and the intercity takes 36 minutes. All the diesel trains operate on the same track as the DART trains and cannot overtake them, even though the latter calls at every station. Consequently average speeds are low (20 mph between Connolly and Bray compared with 35 mph between Bray and Arklow).

7.3.8 Between Greystones and Bray and due to a length of single track there is a limitation on services, 9 minutes being required to traverse it, limiting passing opportunities. The main constraint in the current operation is the limitation of track capacity. The track is single between

Bray and Arklow, with passing places only at Greystones, Wicklow and Rathdrum. This obviously reduces the frequency of service, which can be operated.

7.3.9 The 4.8 mile section between Bray and Greystones is a particular problem because of the presence of the DART service. Occupancy of this section is over 66% of the maximum possible at several times of the day, and these are not confined to the peak periods. To enable more frequent services to operate to and from Greystones it would be very desirable to provide at least an additional passing loop between Bray and Greystones, and preferably double track.

7.3.10 There is, however, a major physical problem, since the railway here operates along a very narrow path cut through difficult topography potentially involving several tunnels. Only a detailed feasibility study could determine the exact cost of such works and whether that investment presents good value for money to the Exchequer relative to other infrastructure.

7.3.11 In the interim, there is an opportunity to double the track for some 1.5 miles northwards from Greystones. This would reduce the length of single track from 4.75 to 3.25 miles, which can be traversed in about 6 minutes instead of the current 9 from Bray to Greystones. Route capacity would thus be increased by 50%.

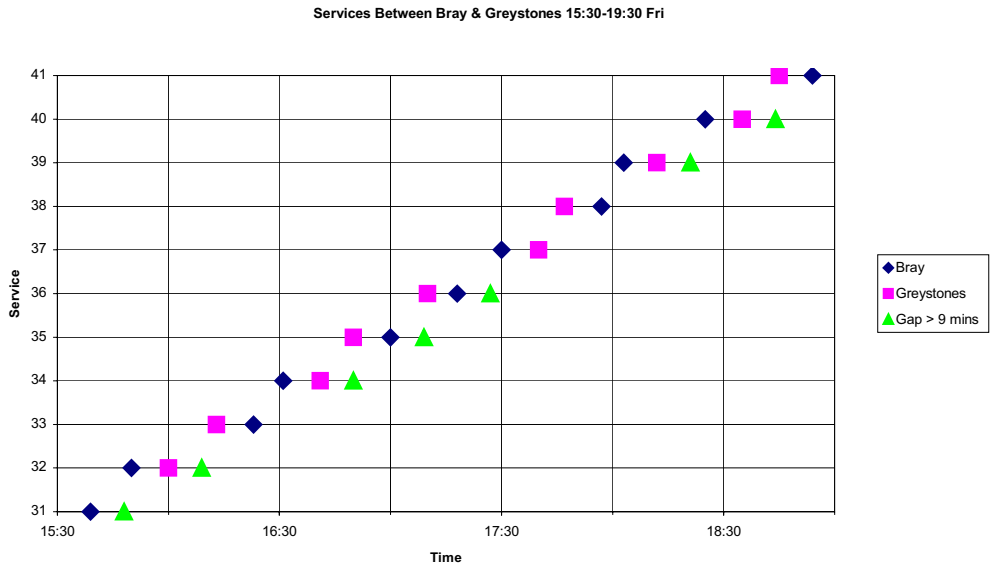


Figure 7.3.1

7.3.12 Furthermore, Figures 7.3.1 above and 7.3.2 below show that there are spare slots between Bray and Greystones at peak hour (based on a

survey carried out on Friday 14th February 2003). In the AM peak period there are 11 services operational, both north and south bound; which are shown in Figure 13 (diamonds and squares). An additional symbol (a green triangle) indicates where there is sufficient spare capacity (i.e. greater than 9 minutes) for an additional service to be provided in the opposite direction. This opportunity is seen to occur 6 times (55%). In the PM peak there are also 11 services between Bray and Greystones, during which there is possible spare capacity for another 7 services (64%) to be introduced.

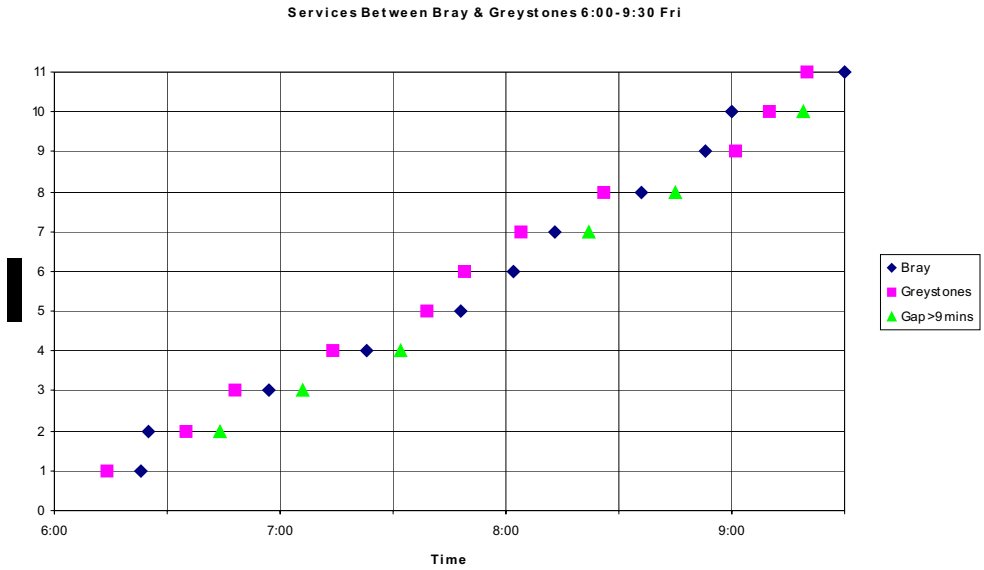


Figure 7.3.2

7.3.13 Finally, the single-track sections between Greystones and Wicklow, Wicklow and Rathdrum, and Rathdrum and Arklow are considerably longer at around 10 miles each, imposing an effective minimum headway of 40 minutes between trains in the same direction. This assumes the alternate passage of trains in opposite directions, and also perfect timekeeping. Such long sections are to be avoided if at all possible, both to improve reliability and to enable higher speeds to be operated: it is no good being able to operate faster between stations if this merely results in having to wait longer at the next passing place for a train in the opposite direction.

7.3.14 Iarnród Éireann have some short – medium term proposals for this route, following the introduction of new Arrow-type diesel multiple units. These are:

a) From 2004 introduce an additional, earlier Arrow commuter service from Wicklow to Dublin, approximately 30 minutes

earlier than the 0655 from Arklow. This would be complemented by a later commuter departure from Dublin to Wicklow at around 1800 hours. The capacity of these trains will be similar to those in (a) above.

c) With the opening of a new maintenance depot at Drogheda for Arrow cars, these peak period services are likely to operate through between Drogheda and Wicklow / Arklow This will avoid using unnecessary paths in central Dublin.

d) Use of Arrow trains during the off-peak period to provide a regular service between Wicklow and Bray.

7.4 Bus Éireann Services

7.4.1 Bus Éireann does not directly service Greystones but there are a number of routes that pass nearby (see Figure 7.4.1 below). The number 133 bus service between Dublin, Bray, Wicklow, Avoca and Arklow stops at both Kilpedder and Kilmacanoge, and at three other stops in between. Both Kilpedder and Kilmacanoge are approximately 6 km from Greystones town centre.

7.4.2 There are 2 daily (Mon – Sat) services from Dublin to Arklow taking approximately 140 minutes, and 13 services from Dublin as far as Wicklow Town taking about 90 minutes. These services are timetabled to reach Kilmacanoge in 45 minutes. There are 7 services operating on a Sunday, two of which go all way to Arklow.

7.4.3 The return service from Arklow to Dublin is also operated twice daily (Mon-Sat), but has 18 services from Wickow and a further 2 from Newtownmountkennedy (NTMK) to Dublin. The Sunday services operate at a similar regularity to the opposing direction. The first Sunday services leave Dublin at 08:30 and Wicklow at 09:45; the only service from Arklow is at 07:30. The last service from Dublin is at 14:00 as far as Arklow and 22:30 as far as Wicklow. From Wicklow the last service for Dublin leaves at 20:20.

7.4.4 On a weekday the service for Arklow leaves Dublin Busaras at 09:00 and 17:30 hours, and the last service for Wicklow leaves at 22:30. The first morning service from Wicklow to Dublin is at 07:00 and from Arklow at 08:00. The other Arklow service is at 13:00 and the final Wicklow service departs at 20:50 hours.

7.4.5 The number 2 expressway year round coach service between Dublin, Arklow, Gorey, Wexford and Rosslare passes Greystones via the

N11 but the nearest actual bus stops are at Loughlinstown to the north and Ashford to the south, some 13 and 18 km from Greystones respectively. The first morning services leave Busaras and Rosslare at 07:30 and 05:30 and the final services depart at 20:30 and 20:15 respectively.

7.4.6 Likewise, the number 5 expressway coach between Dublin, Tullow / Gorey, Enniscorthy, New Ross and Waterford, passes on the N11. The nearest stops on this service to Greystones are at Bray and Ashford. Bray town centre is approximately 8 km from Greystones town centre. The first morning services depart Dublin and Waterford at 08:30 and 07:00 and the last services leave at 18:00 and 17:15 respectively.

7.4.7 Fares from Dublin to Bray, Kilpedder, Wicklow and Arklow are priced €2.35, €2.95, €5.80 and €9.00 respectively.

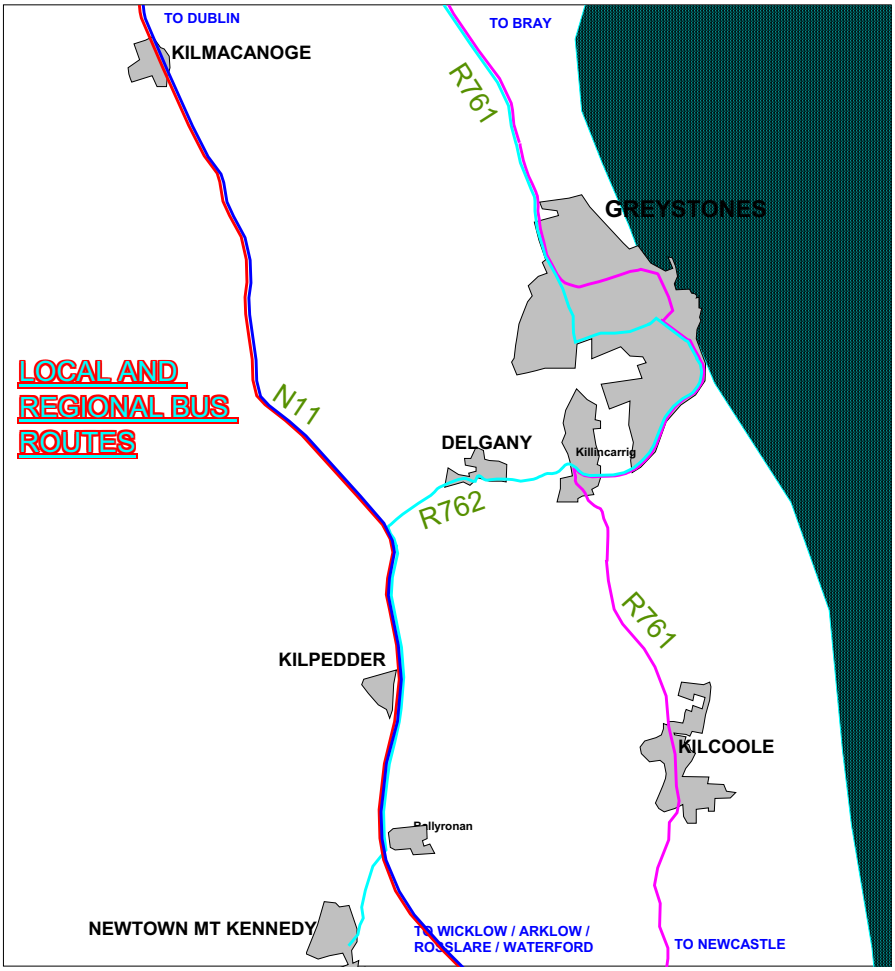


Figure 7.4.1

7.5 Dublin Bus Service

7.5.1 Greystones, despite being in County Wicklow is still within Dublin Bus coverage and is serviced by three routes, which are illustrated in Figure 7.4.1 above.

ROUTE 84

7.5.2 Service 84, operating from Donnybrook Depot, provides journeys between Dublin Eden Quay and Newcastle, which includes stops at Bray and Greystones DART Stations, and Kilcoole. There are 12 daily (Mon-Fri) services from Eden Quay to Newcastle; 5 daily services from Eden Quay as far as Kilcoole; 3 daily services from Bray DART Station to Kilcoole; and 1 daily service from Bray DART Station to Newcastle. In the opposite direction there are 14 daily services the whole way from Newcastle to Eden Quay; 6 services from Kilcoole to Eden Quay; 2 services from Kilcoole to Bray; and 1 service from Newcastle to Bray. In total there are 15 outbound (from Dublin) services on a Saturday and 19 inbound. On Sunday there are 13 outbound and 15 inbound. According to the timetable a bus takes 60 to 75 minutes between Eden Quay and Bray DART Station; 10 to 20 minutes between Bray and Greystones; 10 to 15 minutes between Greystones and Kilcoole; and 5 to 10 minutes between Kilcoole and Newcastle.

7.5.3 The first service from Bray to Kilcoole leaves at 05:45 and from Eden Quay to Newcastle at 06:45. The final service from Eden Quay to Kilcoole departs at 23:00. This timetable is somewhat irregular, with generally around one bus per hour as far as Kilcoole but with gaps of up to 2.5 hours to Newcastle.

7.5.4 The weekday Peak Vehicle Requirement (PVR) has been calculated from the timetable to be six vehicles (ignoring one vehicle required for a journey during school term-time). However, of these only three are required for the off-peak service (until around 15:00). It is not known whether the remaining vehicles are then spare, or whether they operate on other services during the off-peak.

ROUTE 84X

7.5.5 The Route 84X “XPRESSO” service is designed to cut through the rush hour gridlock, resulting in a faster, cross-city service in the rush hour both in the morning and the evening. The service is intended to provide quicker and more consistent journey times; more direct routes; and fewer stops. The 84X does not access Bray town centre but instead follows the route of the Bray Southern Cross Route and then onto the M11 / N11, resuming the same route as the 84 onto the Stillorgan QBC.

7.5.6 The service operates Monday to Friday from Kilcoole to Eden Quay at 07:30 and 10:15 hours; from Blacklion to Eden Quay at 07:30 hours; and from Southern Cross (Riddlesford) to Eden Quay at 07:45 hours. In the opposite direction the 84X departs Eden Quay at 09:00, 16:45 and 17:50 hours. Dublin Bus do not list on their timetable the duration of this service.

ROUTE 184

7.5.7 Route 184, also operated by Dublin Bus from Donnybrook depot provides a link between NTMK, Kilpedder, Greystones and Bray. There are 15 daily (Mon-Fri) services from Bray DART Station to NTMK. In addition, there are also 15 services from Bray as far as Kilpedder and a further 11 separate services from Bray to Greystones. One early morning service goes from Greystones to Kilpedder.

7.5.8 In the opposite direction, there are 16 services operating from NTMK to Bray Station; 15 services from Kilpedder to Bray; 10 services from Greystones to Bray; and a single early morning service from NTMK to Greystones. The service resumes at 07:10 from Bray Station and finish at 23:45. In the opposite direction the service resumes at 06:50 from Kilpedder and concludes at 23:05 from Greystones to Bray.

7.5.9 On a Saturday there is a total of 41 outbound services (from Bray) and 43 inbound. On Sunday there are 12 outbound and 12 inbound services.

7.5.10 Like route 84, it also provides a rather irregular service, with two buses per hour at least as far as Kilpedder. Late mornings it provides a similar level of service from NTMK, but for most of the day only one bus per hour gets this far. On Sundays it runs between Kilpedder and Bray only.

7.5.11 The weekday PVR has been calculated from timetables to be 4 vehicles, with the possible exception for around half an hour between 13:00 and 14:00 when 5 vehicles appear to be in service.

Service Description	Service No.	No. of Services	Bus Capacity	Passenger Capacity
Total services - Bray DART - Greystones	84, 184	21+ 41= 62	94 + 71	**4885**
Total AM* peak services - Bray DART to Greystones	84, 184	4+6=10	94 + 71	802
Total PM* peak services - Bray DART to Greystones	84, 184	5+10=15	94 + 71	1180
Total services - Greystones to Bray DART	84, 184	12+41=53	94 + 71	**4039**
Total AM peak services - Greystones to Bray DART	84, 184	2+7+9	94 + 71	685
Total PM peak services - Greystones to Bray DART	84,184	3+10=13	94 + 71	992
Total services – Bray S. X - Greystones	84, 84X	0+3=3	94	**282**
Total AM peak services – Bray S. X to Greystones	84, 84X	0+1=1	94	94
Total PM peak services – Bray S. X to Greystones	84, 84X	0+2=2	94	188
Total services - Greystones to Bray S. X	84, 84X	11+2=13	94	**1222**
Total AM peak services - Greystones to Bray S. X	84, 84X	4+1=5	94	470
Total PM peak services - Greystones to Bray S. X	84, 84X	3+0=3	94	282
Total services - Dublin to Greystones	84, 84X	17+3=20	94	**1880**
Total AM peak services - Dublin to Greystones	84, 84X	3+1=4	94	376
Total PM peak services - Dublin to Greystones	84, 84X	5+2=7	94	658
Total services - Greystones to Dublin	84, 84X	20+2=22	94	**2068**
Total AM peak services - Greystones to Dublin	84, 84X	5+1=6	94	564
Total PM peak services - Greystones to Dublin	84, 84X	5+0=5	94	470
Total services - Kilcoole to Greystones	84, 84X	23+2=25	94	**2350**
Total AM peak services - Kilcoole to Greystones	84, 84X	5+1=6	94	564
Total PM peak services - Kilcoole to Greystones	84, 84X	6+0+6	94	564
Total services - Greystones to Kilcoole	84, 84X	21+3=24	94	**2256**
Total AM peak services - Greystones to Kilcoole	84, 84X	4+1=5	94	470
Total PM peak services - Greystones to Kilcoole	84, 84X	5+2+7	94	658
Total services - Newcastle to Greystones	84	15	94	**1410**
Total AM peak services - Newcastle to Greystones	84	3	94	282
Total PM peak services - Newcastle to Greystones	84	3	94	282
Total services - Greystones to Newcastle	84	13	94	**1222**
Total AM peak services - Greystones to Newcastle	84	3	94	282
Total PM peak services - Greystones to Newcastle	84	4	94	376
Total services - Kilpedder to Greystones	184	32	71	**2272**
Total AM peak services - Kilpedder to Greystones	184	8	71	568
Total PM peak services - Kilpedder to Greystones	184	7	71	497
Total services - Greystones to Kilpedder	184	32	71	**2272**
Total AM peak services - Greystones to Kilpedder	184	5	71	355
Total PM peak services - Greystones to Kilpedder	184	6	71	426
Total services - NTMK to Greystones	184	17	71	**1207**
Total AM peak services - NTMK to Greystones	184	4	71	284
Total PM peak services - NTMK to Greystones	184	5	71	355
Total services - Greystones to NTMK	184	15	71	**1065**
Total AM peak services - Greystones to NTMK	184	2	71	142
Total PM peak services - Greystones to NTMK	184	4	71	284

Table 7.5.11

* AM peak = 06:00 to 09:30 hours. PM peak = 15.30 to 19.30

7.6 Road Capacity and Traffic Management

7.6.1 Wicklow County Council retained CBP in co-operation with Greystones Town Commissioners, in early 1996 to undertake a traffic

study of Greystones. The object of the project was to identify traffic management measures to overcome existing and further traffic problems, so as to retain the essential quality of Greystones as an attractive, separate, thriving community yet recognising the inevitable repercussions of increasing population and car ownership. The study's aim was to improve conditions for pedestrians and reduce the impact of road traffic, while at the same time encouraging the usage of quality public transport.

7.6.2 Various surveys were conducted such as roadside interview surveys, traffic counts, accident analysis, parking surveys, journey time surveys and public transport surveys. Analysis was also conducted on traffic circulation patterns in existing residential areas, as well as consideration of levels of walking and cycling. Observations were carried out on local journeys, particularly school access, heavy goods vehicle movement, and the resultant road safety implications.

7.6.3 From this analysis problem points on the road network were identified, namely:

- Redford and Rathdown Park
- Chapel Road
- Rathdown Road Triangle Junction
- Killancarrig Crossroads
- Rathdown Road / Church Road Staggered Crossroads
- Trafalgar Road / La Touche Place Junction
- Pedestrian Crossing at Victoria Road
- Church Road / La Touche Place
- Delgany – N11 Road

7.6.4 The study also carried out a detailed analysis of a number of possibilities for new road construction. A number of traffic management measures have since been completed such as the erection of town gateways, traffic calming measures, and the installation of numerous cycleways.

ROAD CAPACITY

7.6.5 Table 7.6.1 below shows road capacity estimates used during the preparation of the DTO transport strategy, A Platform for Change. Figure 1.1 above shows that Greystones is accessed by road from three directions. These roads are the R761 from the north, the R761 from the south and the R762 from the west. The R761 from the north carries traffic between Greystones and Bray, and to the south it operates as an

alternative parallel route to the N11, accessing Kilcoole and Newcastle villages. The R762 between Greystones and the N11 is used by traffic travelling further distances to Dublin and to the south.

Road Type	**Lanes**	**Vehicle Capacity / Lane**	**Vehicles**	**Average Vehicle Occupancy**	**Person Flows**
Major Road with Signals	1	1000	1000	1.42	1420
	2	1000	2000	1.42	2840
Motorway Type Road	1	2000	2000	1.42	2840
	2	2000	4000	1.42	5680
	3	2000	6000	1.42	8520

Table 7.6.1 (Notes: assume 60% green time at signals and all flows assume no congestion

7.6.6 Assuming these regional roads are "major roads with signals" with "one lane" from Table 7.6.1 above, the person flow to or from Greystones is 4260 persons per hour. This is a very crude assumption because there is considerable congestion at peak times on the R761 between Greystones and Bray and on the R762, due to motorist accessing or exiting the N11. It is also debatable to consider these regional roads as "major roads with signals" with an hourly flow capacity of 1000 vehicles. A more realistic picture of traffic flow is contained in Table 7.6.2 below, which is taken from the 1997 Greystones Traffic Study. If capacity were to allow, present day traffic flow figures would have increased substantially from these figures but it is unlikely that they will have.

	12 hour traffic flow		**0730 – 0930 traffic flow**		**RIS sample**	**Sample rate (%)**
	Out	**In**	**Out**	**In**		
R761 Windgates	5540	5182	1564	590	270	17
R761 Kilcoole	1957	1944	234	444	131	56
R762 Delgany Rd.	2716	2769	706	424	181	26

Table 7.6.2

8. LOCAL PUBLIC TRANSPORT STUDY

8.1 Background

8.1.1 As part of the Framework Plan, the provision of a local public transport system will be considered. The main objective of this local public transport route is to accommodate local trips in the Greystones/Delgany area serving all-day uses and act as a feeder of the proposed upgraded train services. Different options will be compared in terms of route choice, frequency, timescale and feasibility.

8.1.2 In principle, the service would aim to:

- Give good accessibility to residential areas;
- Operate via main shopping street in the town centre, retail, employment, key health, leisure and educational facilities;
- Serve Greystones DART Station;
- Connect with regional Bus Éireann routes to provide connections with the interurban services described above; and complement the existing or altered Dublin Bus services.

8.1.3 A fixed local bus route is recommended that is frequent and reliable as part of a "system". The road network within Greystones presents a good opportunity to sustain a fixed route.

8.2 Local Public Transport Route Options.

8.2.1 Seven local public transport routes have been analysed and compared. The objective is to maximise the catchment of the route and, at the same time, minimise or even eliminate any need for subsidy to run it in the medium-short term.

8.2.2 A basic gravity model has been created to identify and distribute the travel demand along the proposed local public transport routes. In addition and based on the results of this model, a feasibility study has been carried out to find the optimal route.

8.2.3 A commercial speed of 20 Km/h has been applied for all routes. All of the routes will take between just under 15 minutes and just under

half an hour to complete. All routes will commence in the morning time to coincide with the departure of the first DART services and commuter trains from the north and south, which by the time of the bus route's conception, should be operating earlier than at present.

8.2.4 The seven routes part of the study are described as follows:

ROUTE A

8.2.5 This is a stand-alone orbital route that will require a service to operate clockwise and another to operate anti-clockwise around the town. The clockwise route will commence at the DART station and make its way south and southwest along Mill Road to the Zapi site. This section of the route and the reverse route will provide the shuttle service as required in the condition for the Zapi planning permission.

8.2.6 After leaving the Zapi site the route will continue along the SAR and take a right turn north to serve Killincarrig, past Greystones Golf Course and onto Church Road. The route will then take a left turn west into Applewood Drive, through Applewood Heights and onto the proposed new road link northeast to Rathdown Road, where it will take a right turn south before taking a left turn west into Rathdown Park. The service will meander through Rathdown Park where a demand responsive element will operate until the service joins New Road and then Victoria Road. A bus only link will be required to connect the serve through Rathdown Park. The route will then service the harbour area via Beech Road, Trafalgar Road and La Touche Place before rejoining Church Road and terminating back at the DART station. The anticlockwise service will operate on an identical route.

8.2.7 The total length of this service is 9.655km, which will take 25.7 minutes. Two buses will therefore be capable of providing four (two clockwise and two anticlockwise) per hour.

8.2.8 The routes has a good catchment and connects the DART service with Zapi development. However, it does not serve Delgany and the circular nature of the service results in some sections being attractive in

either direction and some for sections only attractive in one direction. In addition, roundabouts on SAR might delay Service.

ROUTE B

8.2.9 This route is also a stand alone orbital route requiring a clockwise and anticlockwise service. It follows the same route as Route A until Killincarrig where it take a left turn west onto Delgany. Upon reaching Delgany the service takes a right turn north past Thorndale and onto a proposed new road link through Kindlestown. The route then joins Chapel Road before rejoining the path of Route A at the new link road after Applewood Heights.

8.2.10 This service has a total length of 10.233kms and can be completed in 27.3 minutes. As with the service above, two buses can provide four (two clockwise and two anticlockwise) services per hour.

8.2.11 This route serves Delgany and most of the Schools. However, it serves low density development to the west of the town and does not serve Tesco. In addition, roundabouts on SAR might delay Service.

ROUTE C

8.2.12 This route is identical to Route A except for the section that operates on the SAR. Instead of turning onto the SAR from Mill Road, the route will turn off earlier just opposite St Vincent's Road onto a new link before rejoining the SAR at the third roundabout. The service continues to the Zapi site but instead of bypassing it, the service penetrates the site and exits via a new bus only link to the west of the Zapi site before rejoining the path of Route A to the north of Glenbrook Park.

This route avoids roundabouts on the SAR and penetrates Zapi development. However, it requires the construction of a new route between Mill Road and the SAR and a new bus only link to the west of Zapi.

ROUTE D

8.2.13 This route is also the same as Route A and Route C apart from its southern section. At the first roundabout between Mill Road and the SAR the service continues straight on along Mill Road. It rejoins the other routes after taking a right turn north at Killincarraig.

8.2.14 This route has a total length of 7.436 km and will take 19.8 minutes. Because it takes under 20 minutes to complete a circuit, it may be attractive to run one bus in one direction three times per hour. Otherwise there would be a provision of six services per hour in either direction.

8.2.15 This route cann provide up to six services per hour with only two buses. However, it doesn't serve Zapi and about 50% of the route is presently serviced by Dublin Bus, albeit infrequently.

ROUTE E

8.2.16 After leaving the DART station this service passes through the Burnaby via Kilincarrick Road and St Vincent's Road before joining Mill Road and following the path of Route D until Tesco. At Tesco the route take a left turn west into Lower Grattan Park, Riverdell Grove and north onto Chapel Road. The route then takes a right turn east into Applewood Heights, a left turn north onto Church Road and a right turn east onto Rathdown Road before rejoining the path of Route D at the junction of Rathdown Road, Victoria Road and New Road.

8.2.17 This route has a total length of 7.582kms and circuit time of 20.2 minutes. With a few minor short cuts this service could also operate at intervals of up to six buses per hour.

8.2.18 This route provides direct link from Killincarraig and DART and serves Appleby Heights. However, it does not serve Zapi nor Delgany.

ROUTE F

8.2.19 This route is the only one which is linear in nature. It will commence within the Zapi site and continue along the path of Route C via a newly constructed link between the SAR and Mill Road. It then passes the DART station along Church Road and into Rathdown Park at New Road. It continues through the aforementioned path through Rathdown Park, back onto Rathdown Road and then takes a right turn east into Redford Park onto a newly constructed turning circle at Redford Court. It then follows the same route back to Zapi.

8.2.20 The total length of a single journey from Zapi to the Redford Court turning Circle is 5.537kms, which takes 14.8 minutes. This route can therefore provide two services in either direction per hour using only one bus.

8.2.21 Both directions are easily serviced by one bus. This route serves Zapi and the utilisation of proposed new and improved road infrastructure – bus priority measures could be put in place during construction. However, it doesn't serve the west of the study area.

ROUTE G

8.2.22 This route follows the same path as Route E until it reaches Kilincarraig where instead it continues straight on to Delgany. At Delgany the route takes a right turn north and

continues until it makes a right turn east into Beechwood Park onto Riverdell Grove and Lower Grattan Park. The route then makes a left turn north onto Church Road before rejoining Route E at the junction of Applewood Drive and Church Road. This route has a total length of 7.498kms and takes a time of 20 minutes.

8.2.23 This route serves Delgany and most of the schools. However, it services large areas of low density housing to the west (lower patronage).

8.3 Connectivity Matrix and Forecast Demand

8.3.1 An integrated spreadsheet analysis has been used to compare different Local Bus Routes (LBR). The system is linked to a land use database that reflects not only uses and locations but also density and degree of development over time. The distribution of trips is based on a gravity model.

8.3.2 Seven basic routes and two additional combined routes have been initially identified. Each of these routes have particular catchment areas and also a specific connectivity matrix.

8.3.3 Bus stops were strategically located in positions throughout each route which were convenient in terms of potential trip origins and destinations e.g. near to the DART, schools, shops, leisure destinations, community facilities and high density residential areas. A 400 metres circular catchment was drawn around each bus stop and these catchments were joined together to provide a 400m bus route corridor along the route.

8.3.4 Greystones has already been divided into 58 zones as part of the PARAMICs modelling exercise. The same zones were used for this land use and transportation analysis. These were layered on top of each bus route corridor along with the land use zonings per the Greystones Development Plan. The connectivity matrix shows the areas that can be connected for each of the routes.

8.3.5 The areas of all existing residential, community and education, open space, employment and town centre zonings within each of the model zones were then calculated and translated into potential users by using the adequate parameters. When the existing population was calculated using the above method a figure of around 15,000 was attained, some 4,000 more than what was contained in the 2002 Census figures. Therefore a factor of 0.7 was applied to the figures initially obtained to bring the calculated population down to more realistic levels.

An spreadsheet was then complied to show the 58 model zones with the total existing population (users) per use per model zone.

8.3.6 The next stage was to estimate the increases in each of the above zonings up to 2016 as per the Do Concentrate scenario. Each of these increases were then allotted into whichever model zone they fell within to produce an expanded spreadsheet showing all existing and proposed population, employees, leisure pursuits, pupils, shopping areas and those engaged in community activities.

8.3.7 When the potential population was added to the existing population a figure of around 25,000 was derived at, some 3,000 more than the target population for 2016. Therefore a higher factor of 0.9 was applied to this population to bring it down to target levels. This figure takes cognisance of the fact that infill development will have occurred along with all other additional development on undeveloped and un-serviced zoned land.

8.3.8 Finally, by combining the catchment area for each route with the PARAMICs model zones, the connectivity matrix and the land use database, a particular imprint for each route can be obtained.

8.4 Mobility Parameters

8.4.1 It has been assumed that the majority of trips made by local transport will have an origin at home. In addition the return trip for these trips will have a destination at home. We are not considering therefore combined trips such as home-work-shop-home or home-school-work-school-home. This type of pattern usually corresponds to car-users and would be more difficult to assign to local public transport users.

8.4.2 The basic mobility parameters used for this exercise are based on the Mobility Survey Data provided by DTO. These are as follows:

Daily Person Trip Rate	Home Base Work	Home Base School	Home Base Shopping	Other
2.05	57%	29%	9%	5%

A 8-12% modal transfer to local public transport has been initially assigned. This is based on the assumption that 10.6% of the population already uses public bus as a mean of transport. This figure could be considered to some extent conservative. However, over time and

depending on the quality of the service and its coordination to the DART service this figure could therefore increase.

8.5 Internal / External Trip Calibration

8.5.1 Internal trips are those that remain within the Greystones area, and external trips originate in the Greystones area with destinations outwith it, or where Greystones is the destination of a trip originating outside it. For the purpose of this analysis, trips through Model Zones 37, 38, 39 and 40 are assumed to be external.

8.5.2 Trips passing through Zone 37 are going or coming from the direction of the N11 north are therefore are most likely to be to/ from Dublin and trips through Zone 38 are to/ from Bray. A smaller percentage of trips originate or are destined for either Zone 39 (N11 south), or Zone 40 (R761 south) with the most likely destination/ origin being Wicklow Town.

8.5.3 Different assumptions have been made in order to establish the relationship between internal and external trips depending on trip purpose. Those for trips generated internally are as follows:

Table 8.5.1
Destination of trips generated within the area (2002)

To	Home Based Work	Home Based School	Home Based Shopping	Other
Inbound	12%	70%	65%	70%
Outbound	88%	30%	35%	30%

8.5.4 Home Based work and School figures are based on Travel Distances for work/ school trips data from 2002 Census (See 7.2). This assumption covered 86% of the trips based on the Mobility Survey Data provided by DTO (see 8.4). “Home-based shopping” and “Other” are estimated based on existing shopping and leisure facilities within the area.

Table 8.5.2
Destination of trips generated within the area (2016)

To	Home Based Work	Home Based School	Home Based Shopping	Other
Inbound	18%	70%	65%	70%
Outbound	82%	30%	35%	30%

8.5.5 Table 8.5.1 above shows estimations for trip origins and destinations for the year 2016 depending on trip type, i.e work, school or shopping based. Work based trips are based on the fact there are currently 380 jobs in Greystones, and in the year 2016 there will be an additional 2,648. The figure of 380 was calculated from the Census figures on employment and distances travelled. It is taken for granted that the percentage of those who travel less than four miles to their work place are obviously working in Greystones. This percentage of the working population therefore equated to 380 people.

8.5.6 The figure of 2,648 was calculated by applying a density of 40 workers per hectare to zoned employment land, located around IDA and ZAPI. An assumption is made that one third of these workers live in the Greystones area and therefore with a total working population in the year 2016 of 6,800, 18% of the town's working population live in the area.

8.5.7 The Census was also used to calulate the percentage of children going to school externally and internally. The total number of school places was obtained along with the total number of persons aged between 5 and 18 years of age. It was discoved that the number of those aged between 5 and 18 exceeded the number of places resulting in 30% of children having to attend school outside the area.

8.5.8 With regard to shopping based trips an assumtion was made that 65% of all trips stay within the area. This is due to the fact that there is adequate convenience retail provision within the town to prevent the need for externally based trips. It is assumed that convenience shopping carried out by Greystones residents in external areas such as Cornels Court or Bray would be part of a multi-purpose trip, e.g. on the way home from work. A large proportion of comparison shopping trips would take place outside the area but would not be as great in number as convenience trips. They would therefore account for much of the other 35%.

8.5.9 Based on peak hour traffic counts around the study area and on the location of main employment and education centres, outbound trips could be assigned to the following model zones.

Table 8.5.3
Destination of external trips generated within the study area

Towards	Home Based Work	Home Based School	Home Based Shopping	Other
37/ N11 N	60%	20%	50%	25%
38/ Bray	20%	30%	35%	30%
39/ N11 S	15%	20%	10%	35%
40/ R761	5%	30%	5%	10%

8.5.10 Similar assumptions have to be made in relation to external trips with the destination as Greystones. Those for trips generated externally are as follows:

Table 8.5.4
Origin of trips attracted within the area

	Home Based Work	Home Based School	Home Based Shopping	Other
Internal	95%	95%	90%	60%
External	5%	5%	10%	40%

8.5.11 This distribution has been made assuming that the majority of the local jobs are filled by locals. Based on the capacity of the schools in Greystones, we assume that 5% of schooles places are occupied by students coming from surrounding areas.

8.5.12 Based on peak hour traffic counts around the study area and on the location of main population centres, inbound trips could be assigned to the following model zones.

Table 8.5.5
Origin of external trips attracted within the study area

	Home Based Work	Home Based School	Home Based Shopping	Other
37/ N11 N	60	20	50	25
38/ Bray	20	30	35	30
39/ N11 S	15	20	10	35
40/ R761	5	30	5	10

8.6 Analysis and Comparison

8.6.1 An estimation of the total number of daily trips attracted by each of the routes for years 2002, 2006 and 2016, taking into account all the parameters indicated above are shown as follows.

Table 8.6.1

ROUTES	A	B	C	D	E	F	E+ F	G	F+ G
Route Length (km)	9.655	10.233	8.951	7.436	7.582	5.537	13.119	7.498	13.035
Loop time(minutes)	25.7	27.3	23.9	19.8	20.2	14.8		20	
Daily trips (2002)	1694	1728	1662	1238	1176	904	1946	1235	2032
	687	689	684			347	1265		1321
Daily trips (2006)	2244	2316	2276	1424	1329	1360	2598	1379	2680
	725	730	727			379	1689		1721
Daily trips (2016)	2746	2750	2761	1551	1539	2146	3912	1543	3946
	805	807	813			434	1833		1836

8.6.2 After this initial assessment, consideration has to be given to service frequency, peak hour capacity and overall cost analysis in order to be able to correctly compare these routes.

8.6.3 Three basic frequencies have been taken into account. These are 15, 20 and 30 minutes. Routes A, B, C and F could be served with 15 and 30 minutes frequencies. However, Routes D, E and G can only accommodate 20-minute frequencies. Higher Frequencies than every 15 minutes have not been considered in this study. Based on these principles the vehicle requirements for each route are as follows:

Table 8.6.2

ROUTES	A	B	C	D	E	F	E & F	G	F & G
Adjusted Loop time	30	30	30	20	20	15	20&15	20	15&20
15 minutes	4	4	4			2	2		2
20 minutes				2	2		2	2	2
30 minytes	2	2	2			1	1		1

8.6.4 The bus type chosen is 71-seater single-decker. In order to financially compare Routes A to F & G, the following assumptions have been made:

- The cost of each bus is estimated at approximately €150,000.
- The return period for the investment is assumed to be 15 years with an interest rate of 7.5%.
- It is assumed that the service will run from Monday to Thursday from 07:00 to 22:00, Friday from 07:00 to midnight, Saturday from 09:00 to midnight and Sunday from 09:00 to 22:00.

- Three drivers are needed to operate each bus during the year.
- It is assumed an average salary of €35,000 per driver.
- Indirect costs are assumed to be around 10% while running costs covering petrol and maintenance are €0.40 per kilometre.
- The insurance premium for each bus is around €20,000 per year.

8.6.5 With all these figures, and taking into account the passenger numbers for 2002, 2006 and 2016, a cost analysis has been done for all routes, for 15, 20 and 30 minute frequencies and for 3 different starting years (2004,2006 and 2008). The results are shown in the Tables 8.6.2 and 8.6.3 below.

Table 8.6.3

ROUTE	Service Frequen-cy (min)	Starting Year	Total No Trips	No trips per person per year	Added Net Return (2016)	Return (%)	Total Subsidy(€) needed by 2016	Recovery period (years)
A	15	2004	9,786,970	42.12	-€ 385,946.40	-3.79%	-€ 574,182	22
		2006	8,564,320	41.65	-€ 43,532.40	-0.51%	-€ 231,768	12
		2008	7,183,660	40.96	€ 140,871.60	2.00%	-€ 47,364	4
	30	2004	2,951,051	12.70	-€ 2,135,407.50	-41.98%	-€ 2,135,408	<>
		2006	2,524,665	12.28	-€ 1,779,261.00	-41.34%	-€ 1,779,261	<>
		2008	2,087,219	11.90	-€ 1,434,175.20	-40.73%	-€ 1,434,175	<>
B	15	2004	9,911,299	42.66	-€ 369,818.40	-3.60%	-€ 513,756	24
		2006	8,653,999	42.08	-€ 45,408.00	-0.52%	-€ 189,346	13
		2008	7,231,459	41.23	€ 113,762.40	1.60%	-€ 30,175	4
	30	2004	2,965,026	12.76	-€ 2,175,532.80	-42.32%	-€ 2,175,533	<>
		2006	2,536,215	12.33	-€ 1,813,488.60	-41.69%	-€ 1,813,489	<>
		2008	2,095,837	11.95	-€ 1,463,011.20	-41.11%	-€ 1,463,011	<>
C	15	2004	9,869,634	42.48	-€ 171,493.20	-1.71%	-€ 476,322	16
		2006	8,642,184	42.03	€ 145,845.60	1.72%	-€ 158,983	8
		2008	7,239,984	41.28	€ 288,434.40	4.15%	-€ 16,394	1
	30	2004	2,967,788	12.77	-€ 2,052,776.10	-40.89%	-€ 2,052,776	<>
		2006	2,541,066	12.36	-€ 1,707,103.20	-40.18%	-€ 1,707,103	<>
		2008	2,102,112	11.99	-€ 1,373,662.80	-39.52%	-€ 1,373,663	<>
D	20	2004	5,789,853	24.92	€ 563,088.60	10.77%	-€ 2,909	1
		2006	4,977,603	24.21	€ 554,956.20	12.55%	NO	0
		2008	4,107,753	23.42	€ 489,223.80	13.52%	NO	0

8.6.6 Routes A, B and C have similar results. Despite the fact that they are the most obvious routes, their distance results in the requirement for more buses in order to have an appropriate frequency. A Thirty-minute frequency would make these routes financially unfeasible. This is due to peak hour limitations and their limited attractiveness. However, Route C with a 15 minute frequency starting on 2006 seems to be slightly more

attractive than the other options for Routes A, B and C. This would need a subsidy of circa €200.000 to obtain a limited 1.3% return by 2016. The number of trips covered per person per year would be around 42.

8.6.7 Route D would be as profitable as the preferred Route C but would require a subsidy of approximately €32,000. However the total number of trips covered per person per year would be reduced to 23.4. This is the reason why two combinations of a linear route plus a short circular one have been studied. The first variation is Routes E+F and the second is F+G.

Table 8.6.4

ROUTE	Service Frequen-cy (min)	Starting Year	Total No Trips	No trips per person per year	Added Net Return (2016)	Return (%)	Total Subsidy(€) needed by 2016	Recovery period (years)
E	20	2004	5,637,967	24.27	€ 390,704.40	7.45%	-€ 49,232	5
		2006	5,784,900	28.13	€ 435,000.60	8.13%	-€ 4,936	1
		2008	4,061,527	23.16	€ 428,806.80	11.80%	NO	0
F	15	2004	6,498,300	27.97	€ 1,279,023.60	24.51%	-€ 89,566	4
		2006	5,784,900	28.13	€ 1,368,589.20	30.99%	NO	0
		2008	4,945,320	28.20	€ 1,331,974.80	36.86%	NO	0
	30	2004	1,562,481	6.73	-€ 788,025.60	-33.53%	-€ 788,026	<>
		2006	1,342,143	6.53	-€ 646,747.20	-32.52%	-€ 646,747	<>
		2008	1,112,972	6.35	-€ 514,301.40	-31.61%	-€ 514,301	<>
E+ F	20&15	2004	12,153,600	52.31	€ 1,687,060.80	16.12%	-€ 223,855	6
		2006	10,741,500	52.24	€ 1,885,197.60	21.29%	-€ 25,718	2
		2008	9,143,280	52.14	€ 1,897,214.40	26.18%	€ 53,122	0
	20&30	2004	7,899,840	34.00	-€ 475,324.20	-5.68%	-€ 812,077	17
		2006	6,981,975	33.95	-€ 104,702.40	-1.48%	-€ 441,455	12
		2008	5,943,132	33.89	€ 144,941.40	2.50%	-€ 191,812	7
G	20	2004	5,723,935	24.64	€ 488,466.00	9.33%	-€ 10,778	2
		2006	4,929,235	23.97	€ 499,222.80	11.27%	NO	0
		2008	4,086,745	23.30	€ 462,189.60	12.75%	NO	0
F+ G	15&20	2004	12,395,100	53.35	€ 1,940,354.40	18.56%	-€ 146,434	5
		2006	10,932,900	53.17	€ 2,086,576.80	23.59%	-€ 211	1
		2008	9,286,920	52.95	€ 2,049,019.20	28.31%	NO	0
	30&20	2004	8,056,815	34.68	-€ 306,555.60	-3.67%	-€ 693,053	16
		2006	7,106,385	34.56	€ 29,686.80	0.42%	-€ 356,811	10
		2008	6,036,498	34.42	€ 246,472.20	4.26%	-€ 140,026	6

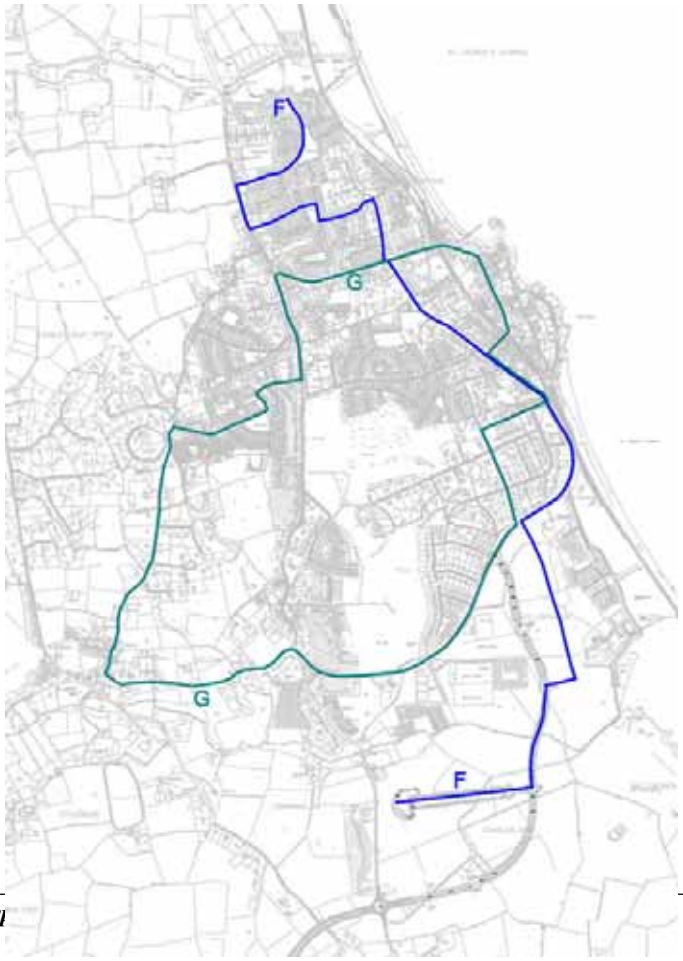
8.6.8 Route F is a short linear route that runs North-South as shown in Appendix 17 f. Its coverage extends from high-density residential areas at the northern extremes to the town's employment, town centre and educational facilities. The short length of this route necessitates the use of only two buses to cover a 15 minutes frequency. Another circular route then complements this route by covering areas not serviced by the linear one. Alternatives for the circular route are whether to cover

Delgany (Route G) or run along the R-761 (Route E). Both routes are similar in length and therefore it is possible to serve these areas with only two buses at a frequency of 20 minutes in both a clockwise and anticlockwise direction.

8.6.9 Route F by itself is potentially extremely attractive. This route just does not need any sort of subsidy if implemented in 2006. The profitability of the route by 2016 is quite high (36%). However, it just provides 29 trips per person per year in comparison to 42 provided by route C.

8.6.10 Adding either Route E or G to Route F would increase the catchment of the local public transport service. If frequencies of 15 minutes are considered for route F and 20 minutes for the other two, a combination of F & G seems to be more attractive than E & F. If these routes are implemented by 2006 the level of subsidy needed is just €65,000 to obtain a rather attractive 20.8% return by 2016 and providing 52 trips per person per year.

8.6.11 Therefore, as a result of this analysis Routes F + G are recommended. The commencement service would be 2006. The fact that the recovery period of this combination is just three years could question the need for a subsidy at all.



8.7 Sensitivity Analysis Against Ticket Fare

8.7.1 A sensitivity analysis has been carried out against ticket fare. In an initial analysis the amount of €1.00 was assumed as a base rate. Different rates varying from €0.60 to €1.00 have been utilised. Results show that fares below €0.80 make the service economically unviable. In addition, a reduction of €0.20 in ticket fares results in an increase of subsidy from no subsidy to approximately €510.000.

8.7.2 Although an additional subsidy of €510,000 is required in this instance, it would result in a more attractive public transport service because of the reduced fare and particularly the perceived psychological difference between €0.80 and €1.00.

Table 8.7.1

ROUTE	Service Frequen-cy (min)	Fare	Total No Trips	No trips per person per year	Added Net Return (2016)	Return (%)	Total Subsidy(€) needed by 2016	Recovery period (years)
F+ G 2006	15&20	€ 0.60			-€ 2,286,583.20	-17.30%	-€ 2,286,583	<>
		€ 0.70			-€ 1,193,293.20	-9.84%	-€ 1,217,742	60
		€ 0.80	10,932,900	53.17	-€ 100,003.20	-0.91%	-€ 510,307	12
		€ 0.90			€ 993,286.80	9.99%	-€ 139,288	5
		€ 1.00			€ 2,086,576.80	23.59%	NO	0

8.8 Sensitivity Analysis Against Modal Share

8.8.1 The initial assessment has been made assuming a modal share of 8.6%. Two other potential modal shares have been tested. These are 5.7% and 11.5%. The results are as follows:

Table 8.8.1

ROUTE	Modal Share	Total No Trips	No trips per person per year	Added Net Return (2016)	Return (%)	Total Subsidy(€) needed by 2016	Recovery period (years)
F+ G 2006 15&20	5.7%	7,253,400	35.27	-€ 1,592,923.20	-18.01%	-€ 1,592,923	<>
	8.6%	10,932,900	53.17	€ 2,086,576.80	23.59%	NO	0
	11.5%	14,173,790	68.93	€ 5,327,467.20	60.22%	NO	0

8.8.2 It seems realistic to assume 11.5% of modal share instead of 8.6% if the DART service is improved and integration between DART and LPT effectively achieved. In this case, there is room to reduce the proposed fare from €1.00 to €0.80. This case is studied as follows.

8.9 Combined Sensitivity Analysis Against Both Ticket Fare And Modal Share

8.9.1 Finally, an assessment has been made taking into account a 20% potential modal share (which results in an 11.5% real modal share) and a suggested ticket fare of €0.80.

8.9.2 This combination results in an extremely profitable route, where no subsidy is needed and a provision of 69 trips per person per year is catered for. A final return of 21% deems this to be the preferred service.

Table 8.9.2

ROUTE	Modal Share	Total No Trips	No trips per person per year	Added Net Return (2016)	Return (%)	Total Subsidy(€) needed by 2016	Recovery period (years)
F+G	11.5%	14,173,790	69	€ 2,492,709.12	21.34%	NO	0

9. TRAFFIC MODELLING CONTEXT

9.1 The Traffic Model

9.1.1 The following section amplifies section 3.5 of the text *'Testing the Transport Implications of Spatial Scenarios.'* It introduces the concept behind a traffic model, and describes the process involved in the building of the base 2001 model, and the validation process undertaken. It also presents the future year 2016 model test results.

What is a Traffic Model?

9.1.2 A traffic model can be defined as a simple representation of a part of the real world. The purpose of a traffic model is two fold:-

- To provide a better understanding of how the traffic system works; and
- To predict traffic consequences of planned changes to land-use and transport.

9.1.3 The traffic model has two distinct elements, the supply and traffic demand. While the supply refers to the road infrastructure, the demand refers to the number of trips travelling between each area or zone. The demand for transport is derived; people do not usually travel for the sake of it, and they do it to satisfy a need (e.g. work, shop). It is also spatial in nature i.e. the distribution of activities over spaces creates the demand for transport.

9.1.4 Once both supply and demand have been considered they are brought together using a process known as assignment, where each trip is allocated a route through the network.

Previous Modelling Studies in Greystones

9.1.5 CBP have previously prepared two traffic models for Greystones. The first, a SATURN model created in 1996 as part of Greystones Traffic Study, then in 2001 a micro-simulation model using the Paramics modelling suite. A revised 2001 demand matrix was created as part of the Paramics model for the Greystones IFP. This trip matrix forms the base for the framework plan.

9.2 Base 2001 Highway Network

The Paramics Suite

9.2.1 Paramics is one of a new breed of micro-simulation traffic modelling packages where the interaction between individual vehicles and the surrounding network is modelled in real time and presented graphically.

Highway Network

9.2.2 Ordnance Survey mapping of the study area was obtained from Wicklow County Council and used as an overlay for the PARAMICS model. This mapping was last updated in 1995, but was the most up-to-date information available and satisfactorily represented the current highway network. The scale of the imported mapping was checked by comparing the road widths with the original Ordnance Survey data and was found to be correct. Link and junction geometric data from the 1996 SATURN model provided supplementary information.

9.2.3 Links and junctions in the 1996 SATURN model were replicated in PARAMICS over the mapping template. Similarly the original SATURN zoning system was replicated in PARAMICS with zone connections appropriately placed. Where, in SATURN, the zone connectors had been connected directly to a main link, in PARAMICS local roads were used to attach the zones in their approximate locations.

Junction Types

9.2.4 Junction types and priorities were taken from the SATURN model and these were checked by on-site inspection. Two key changes to the highway network had occurred in the six years between the two models, these were the implementation of:

- Double mini-roundabouts at the junction of the R761 and the R762 replacing the existing priority junctions;
- A set of signals at the junction of the R761 and Rathdown Rd replacing the existing priority junction.

9.2.5 Two pedestrian crossings on the R761 and Church Road were modelled in PARAMICS. Signal timings for the R761 crossing were taken from the SATURN model; the crossing on Church Road is

relatively new and on-site observations were used to obtain signal timings.

Link Speeds

9.2.6 Link speeds were set to highway speed limits except where traffic calming or road widths forced a reduction in speed. These roads were:

- Church Road, through the town centre;
- La Touche Place, between Church Road and railway Bridge;
- Church Lane;
- Applewood Heights.

9.2.7 All of these roads were assigned a speed of 15 mph, with the exception of Applewood Heights which was assumed to have a 20mph limit.

Zoning

9.2.8 Within the study area it will be desirable to represent the movements of all people, or vehicles. This is clearly impractical, representing each vehicle movement from its start point (*origin*) to its finish point (*destination*) in detail would bring with it considerable costs. As an alternative it is standard modelling practice to divide the study area into discrete areas in order to group origin and destination so as to make it intelligible and easy to analyse, but so as to avoid any unnecessary loss of detail or precision. The zone layout for the traffic model is shown in Appendix 14.

9.3 Demand Matrix, Matrix estimation and the base matrix

9.3.1 A revised 2001 demand matrix was created as part of the Paramics model for Greystones. This trip matrix forms the base for the framework plan. A detailed explanation of the process involved in creating this matrix is detailed below.

Matrix manipulation

9.3.2 The original RSI matrices were required to be factored to 2001 flows. As the traffic growth factors were significantly different at each RSI site each RSI matrix was factored separately and combined to produce a base 2001 matrix.

9.3.3 Each of the 6 RSI matrices (3 sites x 2 directions) was assigned to an updated SATURN network to check O-D routings; this gave an indication of how much traffic from each matrix would pass through each site. Flows at each site were then compared to the relevant counts and the matrices factored accordingly.

9.3.4 Each matrix was added to create a composite trip matrix; double counted trips were removed from the matrix by giving priority to observed inbound records. The summed matrix was then assigned to the base network and compared against actual flows. Assigned and actual flows were slightly different since the six matrices affected one another. This was especially so at Barry's Bridge and Windgates, where there was some disparity between the recorded origin destination movements at each site. Adjustments were therefore made to the matrix factors and the process was repeated until suitable flows were obtained which satisfactorily matched observed movements at each cordon site.

9.3.5 A summary of the model flows and growth factors applied is shown in Tables 9.3.1.

Table 9.3.1a : Model flows at RSI locations resulting from assignment of individual matrices

	Windgates		**Barry's Bridge**		**Kilcoole**	
Assigned RSI Matrix	**In**	**out**	**in**	**out**	**in**	**out**
Barry's Bridge in	52	0	177	0	0	12
Barry's Bridge out	3	85	0	288	85	0
Kilcoole in	2	0	6	0	43	4
Kilcoole out	20	2	14	9	9	49
Windgates in	258	0	24	0	0	22
Windgates out	0	756	20	93	118	0
Total	**335**	**843**	**241**	**390**	**255**	**87**
Target	394.40	1338.60	533.30	392.00	451.30	183.20

Table 9.3.1b : Indicative result of assigning factored matrices

		Windgates		Barry's Bridge		Kilcoole	
Factored RSI Matrix	**Factor**	**In**	**out**	**in**	**out**	**in**	**out**
Barry's Bridge in	2.35	122.2	0	415.95	0	0	28.2
Barry's Bridge out	0.75	2.25	63.75	0	216	63.75	0
Kilcoole in	4	8	0	24	0	172	16
Kilcoole out	2.4	48	4.8	33.6	21.6	21.6	117.6
Windgates in	0.85	219.3	0	20.4	0	0	18.7
Windgates out	1.68	0	1270.08	33.6	156.24	198.24	0
Total		**399.75**	**1338.63**	**527.55**	**393.84**	**455.59**	**180.5**
Target		394.40	1338.60	533.30	392.00	451.30	183.20
%age Difference		1.36%	0.00%	-1.08%	0.47%	0.95%	-1.47%

Table 9.3.1c : Actual result of assigning factored matrices

	Windgates		Barry's Bridge		Kilcoole	
	In	**out**	**in**	**out**	**in**	**out**
Final flows	409	1362	535	374	468	179
%age Difference	3.70%	1.75%	0.32%	-4.59%	3.70%	-2.29%

Matrix estimation

9.3.6 While the above base matrix provided the basis for the trip patterns of all movements crossing the external cordon some changes to trip patterns had occurred between 1996 and 2001 as a result of land use changes and local developments. In particular, the extension of the DART to Greystones and the provision of a park and ride car park at the station have encouraged increased commuting trips to the town centre. Furthermore, trips wholly within the cordon were not observed by the RSI sites and had yet to be estimated.

9.3.7 To determine the change in trip patterns and non-observed trips internal to the cordon, the SATURN matrix estimation suite SATME2 was used.

9.3.8 Matrix estimation is a process within SATURN which is used to derive a best fit matrix from traffic count data. The procedure involves firstly "seeding" unobserved cells and then assessing each counted link in turn and factoring all of the O-D trips that use that link by the ratio between the assigned and observed flows. This effect of this process should be to match the assigned and observed flows at each location.

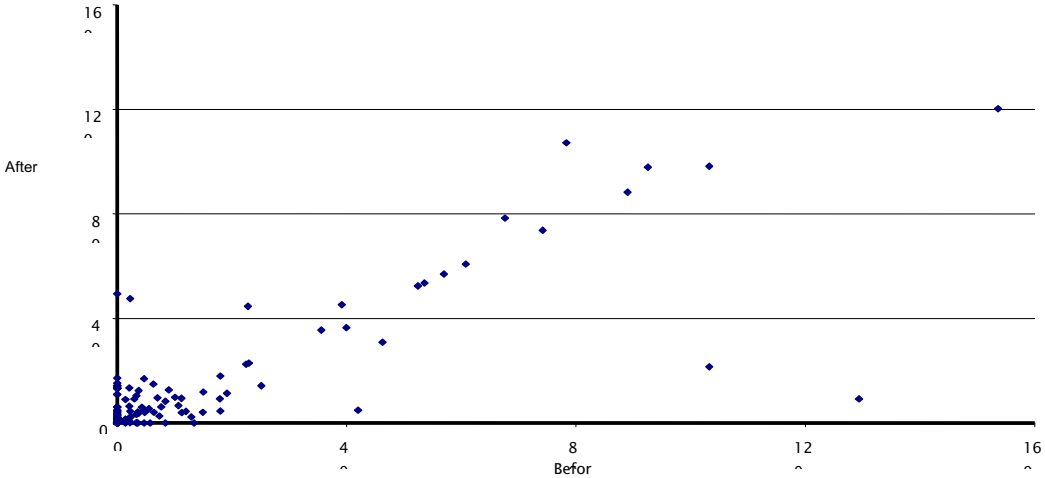
9.3.9 Two complications make this procedure iterative. Firstly, some O-D trips may pass through more than one count location and the factors at each location will usually be different. The result of this will be that factor "A" may be applied to the first count to give a good correlation

between observed and modelled flows, reducing the observed to modelled correspondence at a second count location. Factor "B" is then applied to the second count location, changing the flow at the previous site, once again reducing the correspondence achieved. The SATURN matrix estimation suite undertakes a number of iterations to correct for this so that the best overall trip matrix can be found. The second complication is that the resulting change in the trip matrix will make changes to the assignment hard to predict. This is because even trips that have not have been altered will encounter changed costs along the route and so the route choice may change. Therefore to produce a matrix that matches the observed flows, an iterative loop of assignment-estimation-assignment is required.

9.3.10 To decide how many times the process should be estimated, nine iterations were carried out for each peak. Link flows for each iteration were then compared with the counts to decide which the closest fit was. In this case, it was decided that the 7th iteration was the best.

9.3.11 Comparisons of the external to internal trip patterns before and after matrix estimation are shown in Figure 9.3.2. External to external trips were "frozen" during the matrix estimation process and remained unchanged.

Figure 9.3.2 - Analysis of matrix estimation changes



9.4 Model Validation

Introduction

9.4.1 As all count information had been utilised to create the base matrix, no independent counts were available for validation. Accordingly, validation has been based on three key features:

- GEH summary statistics;
- Land use data;
- Queue lengths.

9.4.2 Comparison of observed / modelled flows in PARAMICS

9.4.3 GEH (a form of chi squared) summary statistics have been used in the calibration of the PARAMICS model. These are useful when comparing two different values of flow in a link, V_1, the observed flow, and V_2, the assigned flow. It is defined by:

$$GEH = \sqrt{\frac{(V_2 - V_1)^2}{0.5(V_1 + V_2)}}$$

9.4.4 The GEH statistic is recommended because of the difficulties in using "absolute difference" and "relative difference" measures to cope with a wide range of flows. An absolute difference of 100 pcu/h may be considered a large difference if the flows are in the order of 100 pcu/h, but not as important if flows were 2000 pcu/h. Equally, a 10% error in 100 pcu/h would not be important, whereas a 10% error in 1000 pcu/h might be.

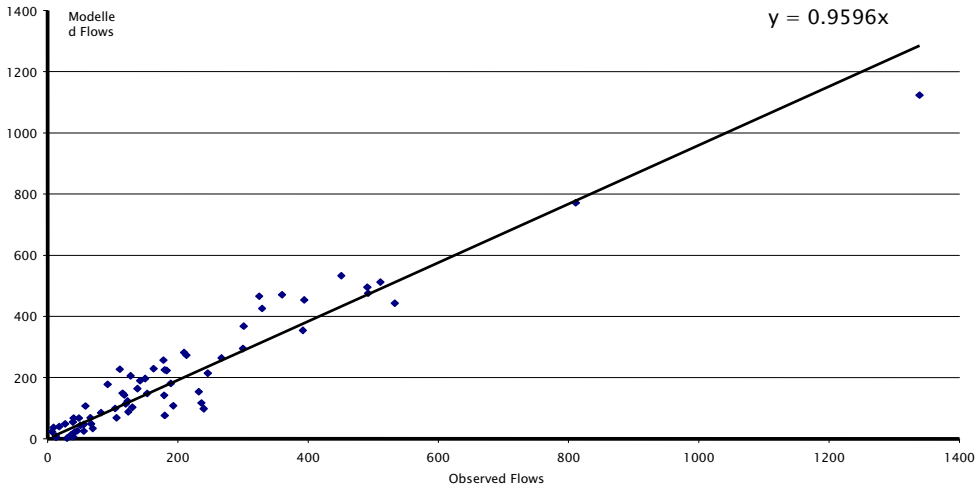
9.4.5 As a general rule in comparing assigned volumes with observed volumes, a GEH value of less than 5 would indicate an acceptable fit, while links with a GEH greater than 10 would require closer attention.

9.4.6 Table 9.4.1 provides a summary of the GEH statistics for the PARAMICS model. Figure 9.4.1 shows the observed/modelled relationship graphically.

Table 9.4.1 - Summary GEH statistics

Junction	GEH
1	2.584
2	3.397
4	3.408
6	2.622
7	2.822
9	6.462
11	6.141
12	2.033
13	5.624
14	4.818
All	4.364

Figure 9.4.1 - PARAMICS correlation



9.4.7 In terms of GEH statistics, 75% of all counts have a GEH value of less than 5 and all but one of the counts has a value less than 10. Seven out of ten junctions meet the criteria for an acceptable fit and the remaining three fall just outside the threshold. The maximum GEH for individual counts and junctions are 10.92 and 6.46 respectively, the overall GEH is 4.36.

Validation against land use data

9.4.8 As matrix estimation has adjusted the number of trips to and from each internal zone, a check has been made that no zone produces unreasonable trip rates. To do this the approximate number of dwellings

or gross floor area in each zone catchments has been compared with the final number of trips. The results are shown in Table 9.4.2

Table 9.4.2 - Land use comparison

Zone	Approx. Number of Dwellings	Additional Uses	No of Trips (2-way)	Trip Rates
1	30	Town Centre	147.5	4.92
2	70	Town Centre	253.91	3.63
3	90	Town Centre	286.14	3.18
4	60	Town Centre	226.48	3.77
5	320		253.15	0.79
6	90		172.64	1.92
7	40	School	178.19	4.45
8	240		209.97	0.87
9	190		159.93	0.84
10	80		180.35	2.25
11	80		180.58	2.26
12	230		85.35	0.37
13	0	Shopping Centre	189.92	-
14	290		161.23	0.56
15	90		136.51	1.52
16	10	School	80.19	8.02
17	130		127.25	0.98
18	110		138.32	1.26
19	110		91.37	0.83
20	50		100.66	2.01
21?	50	Dart	112.6	2.25
22?	100	Dart	124.56	1.25
23	60	Dart	145.11	2.42
24	0	Marina	48.09	-
25	250		190.2	0.76
26	30		48.09	1.60
27?	40		174.31	4.36
28	50		184.92	3.70
29	50		75.12	1.50
30	40		91.12	2.28
31	90		243.56	2.71
32	70		200.63	2.87
33	40		48.47	1.21
34	100		166.27	1.66
35	120		238.56	1.99

9.4.9 Modelled trip rates generally correspond satisfactorily to the expected trip rates for each zone. Zone 1 and parts of 3 and 4 form the Greystones town centre where most shops and businesses are located; consequently, trip rates to and from these zones are high. Similarly, the high trips rates to and from Zones 7 and 16 are as a result of trips to and from the schools located in these zones. High trip rates to Zones 21, 22 and 23 are associated with the Dart station; Zone 13 contains a large superstore.

Queue lengths

9.4.10 Within the model, the major factor in route choice between the N11 and R761 is the congestion on the R761 between Greystones and Bray. The length of traffic queue modelled within PARAMICS on the R761, south of the Bray Southern Cross Route, was noted to be similar to on-site observations during the AM peak. No other significant queues were noted within the model area although localised congestion frequently occurs in the town centre.

Validation Summary

9.4.11 Validation of the PARAMICS model has been based on three key features:

- GEH summary statistics
- Land use data; and
- Queue lengths.

9.4.12 A comparison of observed and modelled flows indicates a good correlation. 75% of all counts have a GEH value of less than 5, all but one count has a value less than 10 and the overall GEH is 4.36.

9.4.13 Trip rates have been compared against land use data and show a satisfactory correlation. Where queuing occurs on the network, modelled lengths satisfactorily match observed queue lengths.

9.4.14 Consequently, it is considered that given the information available, the base year matrices satisfactorily reproduce existing observed traffic patterns within Greystones.

9.5 Future year matrices

Background growth

9.5.1 The Greystones Development Plan (1999) (the Plan) clearly states the potential growth of Greystones for the future (17,000 persons). This data is used to estimate the likely future traffic demands for years 2006 and 2016. Irrespective of the growth as stated in the Plan it is likely that both car ownership and an increase in the desire to travel for existing residence will increase traffic demand. Thus, a nominal growth factor of

1% per annum (agreed with Wicklow County Council) was applied to base year traffic flows to account for this increase.

9.5.2 The next stage was the estimation of the likely generation and distribution of future development related traffic.

Future Development

9.5.3 The first stage in estimating future traffic demand was to look at premises currently in the process of being built or which had been granted planning permission. The second stage was to look at the Plan itself and determine the likely areas and proportion of land that is likely to be developed by 2006 and 2016. This was done for both residential and employment related developments.

9.5.4 With the future land take identified, the next step was to determine the likely trip generation and distributions associated with these developments. Trip generation is determined using an average trip rate from similar existing developments which is obtained from a database know as TRICS, (a standard transport industry tool for estimating trip rates). Table 9.5.1 indicates the trips rates applied for all development types.

Table 9.5.1 – Trip Rate by Development Type

Trip rates per sqm development			**factor per**
	In	**out**	
college / uni	0.0205	0.0046	sqm
driving range	0.0002	0.0000	sqm
food superstore	0.0312	0.0205	sqm
golf, private 18 hole	0.0000	0.0000	sqm
holiday accommodation	0.0002	0.0002	sqm
hotel	0.0030	0.0028	sqm
industrial units	0.0039	0.0010	sqm
office development	0.0225	0.0031	sqm
petrol filling station	0.0416	0.0410	sqm
petrol filling station with retail	0.0279	0.0277	sqm
pub/restaurant	0.0000	0.0000	sqm
shopping centre- local shops	0.0332	0.0266	sqm
sports centre	0.0012	0.0010	sqm
warehousing	0.0002	0.0001	sqm
housing development	0.2250	0.6750	dwelling
Marinas	0.0200	0.0100	berth
private flats	0.0500	0.2700	dwelling

9.5.5 For housing, it was assumed that an overall trip rate of 0.9 was applicable (for both inbound and outbound trips). 75% of trips were assumed to be outbound; all remaining trips were assumed to be travelling in the opposite direction.

9.5.6 The distribution, origins and destinations, of the newly generated traffic was derived using either the distribution of existing trips to that particularzonefrom the zonewith or to the nearest zone to the development in the case where an existingmodelled zone did notcurrently exist.

9.5.7 The next stage was to create a matrix of these origins and destinations constrained to the new trip end totals. The method used to do this is known as the Furness method, which is an iterative process applying both origin and destination specific growth factors to the corresponding rows and columns in the trip matrix.

N11 Growth

9.5.8 Flows on the N11 are essentially out with the study area but will play an important role in the way in which people travel to and from Greystones to Dublin. The Dublin Transportation (DTO) model was used to ascertain the likely future flows (2006, 2016) and represented in the Paramics model.

Additional Population

9.5.9 The Plan, and above matrix building process, caters for a population of around 17,000 in the study area (2016). The next stage was to apply the additional growth of 5,000 populations as highlighted in the variation plan 2001. Three alternative scenarios were developed for the distribution of this additional population:-

- ***Do-Normal;*** *the likely uptake of land if development is to occur at the density specified in the recent development plan variation i.e. 30 house per hectare,*

- ***Do-Spread;*** *the likely uptake of land if development was to continue at current densities, i.e. about 10 houses per hectare, and*

- ***Do-Concentrate;*** *the amount of land required if densities were in accordance with the strategic Planning Guidelines fro the*

Greater Dublin Area, i.e. about 35 to 50 houses per hectare near to public transport corridors.

9.5.10 Appendix C shows the distribution of these graphically and the development included. The equivalent method as detailed in Section 3.2 has been applied to calculate the number of trips generated and their corresponding distribution.

Summary of Future Growth

9.5.11 The existing population of Greystones and Delgany is in the region of 11,800 (2002) persons and is expected to reach around 22,000 by 2016. Naturally with increased population comes an increased demand for travel.

9.5.12 The effect of this in terms of traffic will be an annual increase between 2001 (the base year) and 2006 of ***9.4%***. The three proposed scenarios produce the following annual increase in traffic:-

- Do-Normal, 6.5%;
- Do-Spread, 6.4%; and
- Do-Concentrate, 6.13%.

9.5.13 Although the differences appear small, if the trends are applied between the years 2006 and 2016, the results suggest that the do-concentrate scenario would result in 3.2% less cars on the road network compared to the do normal scenario, before the potential for public transport is investigated.

Note: the above growth also includes the area of Kilcoole and its surrounds but excludes the effects of growth on the N11.

Future Highway options

9.5.14 Several new highway infrastructure schemes are likely to be in place by 2016. These have been included in the model and are as follows:-

- Dualling of the N11 for its entire length;
- The closure of the median at the southern part of the N11/ R762 junction;
- The construction of the Southern Access Route (SAR), between the N11 and the R761 and the R761 and the R762,
- The construction of the Killincarrig Bypass, which realigns the R761 to the east of Killincarrig, incorporating a roundabout where it joins the R762;

- A new road running from the current alignment of the R761 just north of the Killincarrig, southwest to the new road as described above;
- Realignment of Chapel Road at the school to take a more direct route; and
- A new road running from the junction of Chapel Road and Applewood Heights, north to the first junction of the R761 south of the cemetery.

9.6 Model Run Observations

9.6.1 As might be expected, with the potential growth assumed for Greystones/ Delgany there are a number of potential problems on the highway network where vehicles experience delay. At this stage of the modelling process it is not within the study brief to find engineering solutions to alleviate these queues but rather to highlight the potential problems as it is the overall aim of this study to draw a balance between facilitating the private car where appropriate, and promoting alternative means of transport.

9.6.2 Generally the three development scenarios generate the same problems, although with differing levels of severity. Observations from the model clearly show that extensive queuing occurs on the proposed section of road running from the junction of Chapel Road and Applewood Heights, north to the first junction of the R761 south of the Cemetery. The junction would benefit from a set of signals which if linked to the existing signals at Chapel Road/ R761 and Rathdown Road/ Church Road would minimise delay to traffic on the R761. The Southern Access Road is heavily trafficked both sides of the R761.

9.6.3 Eastbound traffic approaching the roundabout with the R761 experiences delays as a result of the circulating traffic on the roundabout itself. Queues also form southbound from the R761 at this junction. East of the roundabout, on the GSAR traffic is very heavy but constantly moving. The junction with the GSAR and the N11 runs smoothly with no undue delay to traffic. As a result of a previous study, undertaken by CBP, it was found that a set of signals on the northbound slip would be required to ensure traffic does not block back further than the length of the slip thus causing delay on the N11 carriageway.

9.6.4 The Do-Spread scenario creates an additional challenge in terms of junction delay. A large proportion of additional housing is designated along the existing unclassified road running south from the Wicklow arms on the R761 to the R761 South of Prettybush. Essentially single lane its entire length this road would require substantial upgrading as would the junctions with the R761 and R762.

9.7 Taking the Model a Stage Further

Introduction

9.7.1 The growth highlighted above accounts for private vehicles only and assumes existing travel behaviour, e.g. person's choice of mode to undertake their journey, remains the same as those in 2001. Naturally this assumption, over a 14 year period (2016) is somewhat unrealistic and therefore the model should reflect the potential shift from private to public transport trips which would occur if there was greater coverage to/ from Greystones/ Delgany.

9.7.2 Demand transfer to local public transport services and improved rail links both to the north and south was assessed out-with the model, with the effect of these changes in terms network performance and traffic demand on the network assessed using thewith the Paramicsmodel software model.

Transport Strategy

9.7.3 The socio-economic profile of Greystones and Delgany is such that it is expected to experience an unprecedented growth in population between 2002 and 2016 of over 10,000 persons from the current 11,800 to 22,000. The consequences of such high growth will be increased pressures on the highway infrastructure throughout the study area unless the necessary public transportation infrastructure is in place thus providing a viable alternative to the car.

9.7.4 Greystones will always give rise to commuting to a major centre such as Dublin. But measures can be implemented to give a viable alternative to the private car to use alternative more sustainable modes of transport.

9.7.5 Like any urban area the development of a reliable efficient transportation infrastructure is fundamental in its future development. The current Plan places provision of infrastructure for the private vehicle as priority with little, if no incentive for people to use alternative modes. The lack of critical mass in the study area, as a result of minor increases in population noted over the past Census periods (1996 population of 11,236 – 2002 with population of 11,871) does not lead to creation of a self sustaining public transport system but with projected increases of

10,000 persons we are getting closer to the critical mass necessary to do so.

Public Transport

9.7.6 The DTO "A Platform for Change" document stresses "Framework Plans for Development Centres will be developed, to ensure that land use and transportation objectives are sufficiently integrated. Within these frameworks, Local Transport Plans should focus on the improvement of bus-based accessibility to local services, minimise car use for local trips and ensure interconnection with strategic public transport Networks…."

9.7.7 The DTO is responsible for updating and updating the Dublin Transportation Model that covers the counties Dublin, Kildare, Meath and Wicklow. The model has recently been updated to reflect conditions in 2001.

9.7.8 The function of the model is two fold. On the one hand it serves as a strategic multi-modal model to enable the DTO to carry out its ongoing transportation planning function. On the other, it is intended that the model will provide the basis to assess the impact of major planned developments and as a tool undertake more detailed assessment of major infrastructure schemes.

9.7.9 Whilst the DTO model covers the Framework Plan Study Area the detail in terms of local trips around Greystones or trips to and from Bray- Greystones Wicklow – Greystones has not been incorporated. The DTO model was therefore used to estimate the future travel demand between Dublin and Greystones for the year 2016. The results are as follows:-

2016 Demand from Greystones towards Dublin
- Car Trips towards Dublin; ***665 car trips***
- Public Transport Trips towards Dublin; ***2,827 person trips***

2016 Demand toward Greystones from Dublin
- Car Trips towards Greystones; ***460 car trips***
- Public Transport Trips towards Greystones; ***833 person trips***

9.7.10 The total number of person trips for the year 2016 (assuming the DTO average occupancy of a car to be 1.35 for car trips) amounts to just over 3,700 trips to Dublin from Greystones. Public transport trips account for almost 76% of the total. It is interesting to compare this to 2001 patronage which is detailed below, which suggests that car travel

between Dublin and Greystones will reduce by 20% between 2001 and 2016 :-

2001 Demand from Greystones towards Dublin
- Car Trips towards Dublin; ***823 car trips***
- Public Transport Trips towards Dublin; ***939 person trips***

2001 Demand toward Greystones from Dublin
- Car Trips towards Greystones; ***582 car trips***
- Public Transport Trips towards Greystones; **198** ***person trips***

Note: *the DTO pointed out that their model would not pick up a lot of the local trips around the Greystones area*

9.8 Final test results

9.8.1 A final future year 2016 test was undertaken based on the preferred combination of development and transport initiatives. They include:

- The do-concentrate development scenario (described in Section 9.5.9)
- The highway schemes listed in Section 9.5.13
- The public transport services described in Section 8

9.8.2 A comparion was made between this scenario, and the comparable scenario without the inclusion of public transport measures, in relation to network wide performance. For discussion purposes the former is referred to as "do –concentrate base" and the later "do-concentrate PT".

9.8.3 The summation of all vehicle travel time, in vehicle hours, and the total distance travelled by all vehicles, in vehicle kms, are shown for both options in Table 9.8.1. The figures show that the implementation of the public transport measures as suggested would result in a reduction of some 300 vehicles on the network during the AM peak hour, which equates to a 3% reduction. If it is assumed that the "do-normal" and "do-spread" development scenarios would provide an even more modest shift from car to public transport, it could be argued that the "do-concentrate" scenario, together with the public transport initiatives, would reduce car travel by up to 6.2% compared to the alternative development strategies (see section 9.6.13).

9.8.4 Comparison of the total time spent travelling on the highway network, also shown in Table 9.8.1, suggests that the public transport initiatives will result in a 6% reduction in the total time spent travelling on the network.

Table 9.8.1 Network statistics, 2016, by scenario

	do-concentrate base	Do-concentrate PT	Difference	% Diff
Network time	121.8	114.9	-6.9	-6%
Network distance	7179	7015	-164	-2%
Vehicles on network	11976	11667	-309	-3%

9.8.5 Figure 9.8.1 shows the location and magnitude of AM peak hour queues forecast by the traffic model for the year 2016 do-concentrate PT scenario. The figure suggests that queueing is not forecast to be excessive network wide given the significant increase in population assumed when determining future year traffic forecasts. The junctions between the R761 and the Greystone Southern Access Route (GSAR), and the R761 and the re-aligned Chapel Road are forecast to have occasional peak hour queues of up to 20 vehicles, whilst 5 additional junctions are forecast to have queues of up to 10 vehicles:

9.8.6 The location and arm of the AM peak hour queue forecasts are:

Up to 20 vehicles

1 GSAR/R761 – GSAR eastbound arm

Up to 15 vehicles

2 GSAR/R761 – R761 northbound arm
3 R761/New Chapel Road – Chapel Road arm
4 R761/New Chapel Road – local residential access arm

Up to 10 vehicles

5 R761/New Chapel Road – R761 southbound arm
6 Church Road/Church Lane – Church Lane arm
7 Church Road/Belleview Road – Belleview Road arm
8 GSAR/R761 – GSAR westbound arm
9 La Touche Place/Touche Close – Touche Close arm

Up to 5 vehicles

Various as shown in Figure 9.8.1

9.8.7 The forecast PM peak hour flows are shown for the 2016 "do-concentrate PT" scenarios in Figure 9.8.2, while the traffic volumes

observed crossing the study cordon in 2001 are compared to the forecast traffic volumes for 2016 in Table 9.8.2.

9.8.8 In terms of changes forecast between 2001 and 2016, the new N11 and the Greystones Southern Access Road (GSAR) will maintain traffic volumes to/from the north on the R761 at 2001 levels (just a 2% increase) despite the considerable growth in travel demand forecast in Greystones. The new east west link between the N11 and Greystones provided by the GSAR is forecast to relieve the R762 of 84% of the traffic volumes observed in 2001 while volumes on the R761 from the south are forecast to increase by 25%, largely due to the high concentration of future development forecast in Kilcoole.

Table 9.8.2 Comparison of observed 2001 and forecast 2016 flows, AM peak hour, pcu's

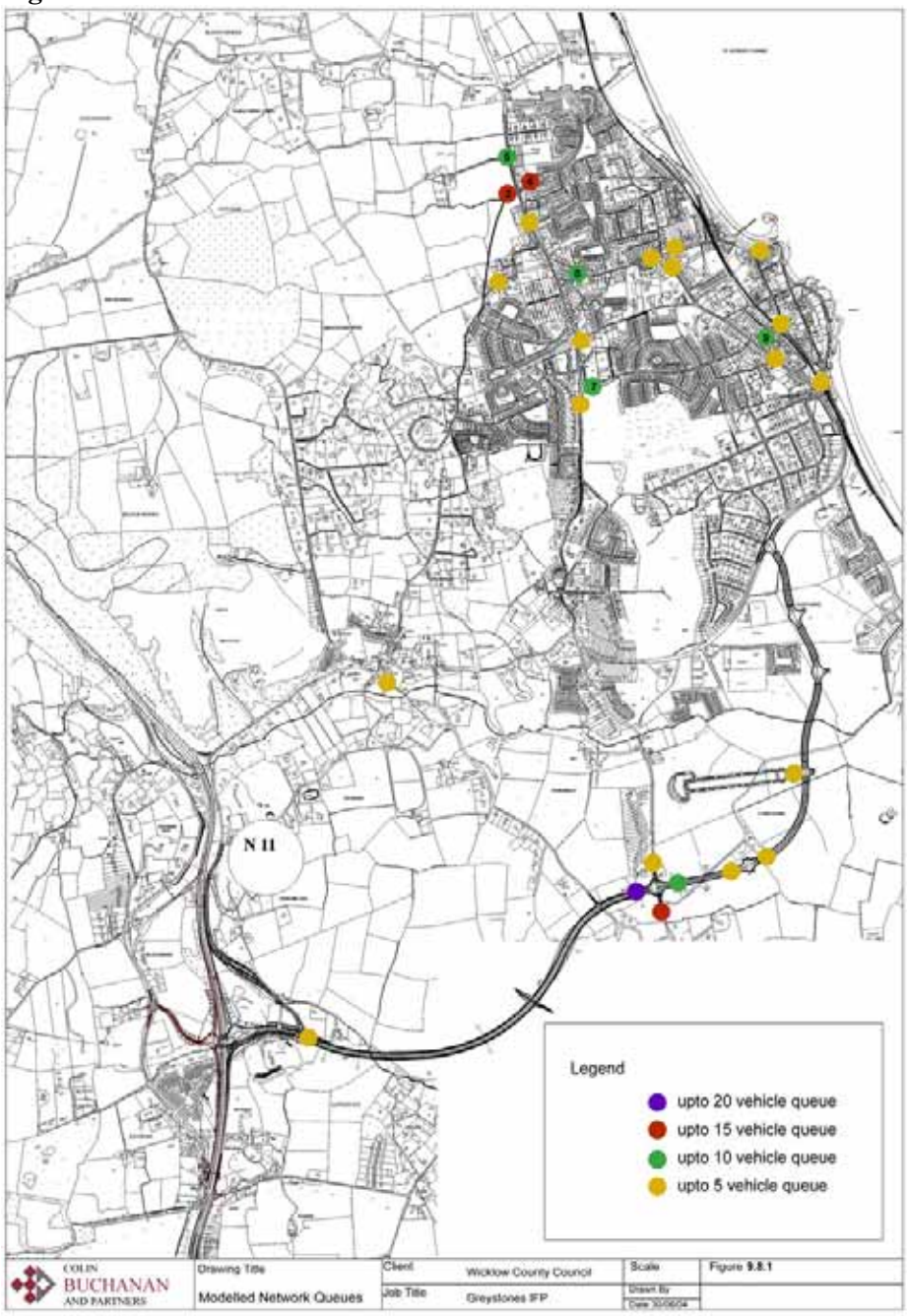
Location	AM peak 2-way flow		% diff
	2001 observed	2016 modelled	
R761 north	1732	1744	2%
R761 south	634	795	25%
R762 west	925	394	-84%

9.8.9 As would be expected, the GSAR is forecast to be the most heavily traffic road in the study area with an AM peak hour 2-way flow of almost 3,500 pcu's forecast for the eastern section.

9.8.10 The forecasts suggest that a re-aligned R761 through the site of the existing golf course would attract less than 350 trips during the AM peak hour with an equivalent daily traffic flow (assuming a factor of 12) of around 4,000. Although the resulting traffic relief on the existing R761 would be welcome it is unlikely that this scheme would be justifiable on purely economic grounds.

9.8.11 Output plots showing AM peak hour flows for all modelled links are included in Fig. 9.8.2

Fig. 9.8.1


N 11
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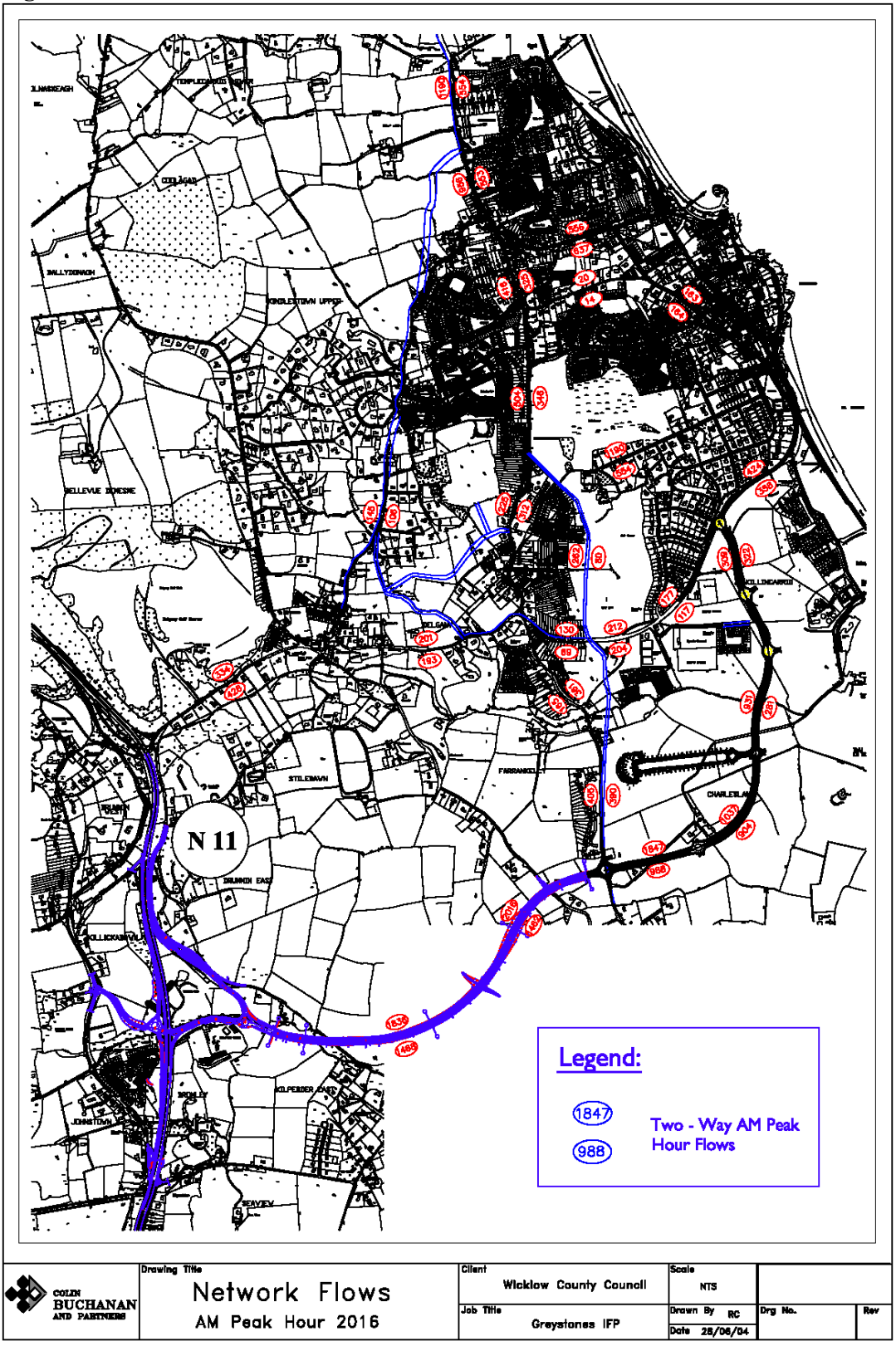
upto 20 vehicle queue
upto 15 vehicle queue
upto 10 vehicle queue
upto 5 vehicle queue
COLIN BUCHANAN AND PARTNERS
Drawing Title
Modelled Network Queues
Client
Wicklow County Council
Job Title
Greystones IFP
Scale
Figure 9.8.1
Drawn By
Date 30/06/04

Fig. 9.8.2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Two - Way AM Peak Hour Flows
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Network Flows
AM Peak Hour 2016
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Wicklow County Council
Job Title
Greystones IFP
Scale
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Drawn By RC
Date 28/06/04
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10.THE CONSULTATION PROCESS

10.1 Initial Consultation

10.1.1 This section details the public consultation process undertaken as an intrinsic part of this IFP.

10.1.2 These early stages established the land use planning, transportation, socio-economic, traffic and urban design context for the study. The consultants had the opportunity to meet with the Client and Steering Groups, and discuss issues in detail. Presentations were also made to Greystones Town Council, Wicklow County Council, and pertinent community representatives in the area in order to explain the objectives and process. Ultimately this allowed the consultants to enter into the subsequent phases of comprehensive stakeholder and public consultation, against a well-informed background.

10.1.3 Traditionally, transportation studies have been very strong in terms of quantitative analysis, through the use of traffic models, relating to issues of road capacity for example. The IFP seeks to further this understanding between the way people move, the need to make trips and by what mode. However, this still leaves a substantial gap in the understanding of local movements, and the motivation for these movements. If the IFP is to make any real potential in impacting upon local travel behaviour, this information is vital in a town of Greystones scale. It is also essential to consult to a wide degree with the general public in order to allow for ownership of the final report findings and recommendations. Residents, businesses, property owners and groups with an interest in Greystones and Environs were therefore provided for in an all-inclusive, transparent and objective manner with regard to issues facing the area.

10.1.4 The approach taken to public consultation is key to the creation of a robust and widely accepted framework plan for Greystones. A variety of methods were employed to proactively seek public and stakeholder involvement in the process. The methodology used is termed a stakeholder consultation, which aims to identify the main interests in the town and directly engage people in consultation rather than relying on interested parties to come forward. The following are the methodologies used and the reasons why;

a) **Stakeholder Meetings** - This involves either one-on-one meetings or small group meetings. These meetings are conducted in a *structured interview* format, seeking guidance on current key

issues, problems and aspirations, and opinions about land use, transportation and the local economy.

b) **Focus Group Meetings** - Focus groups are a means with which to consult with targeted groups to facilitate wide-ranging discussions and ideas testing. Each group would contain 8-10 people, with a consultant facilitator, helping, but not dominating the conversation. At the end of the session, feedback is given by each table and the overall key issues are summarised.

c) **Public Consultation Event** - The purpose of the community consultation event is to explore the strategic options for Greystones. People have the opportunity to debate key issues such as the goals and objectives of the plan in an informal, yet focused manner.

10.1.5 It is also notable that throughout the preparation of this report, unsolicited correspondence has been received from various groups and public representatives from the study area, which have been duly noted by the consultants.

10.2 Stakeholder Consultation

10.2.1 The stakeholder consultation formed part of the inception, data collection and analysis elements of the study. The stakeholders who were consulted were as follows:

- Wicklow County Council
- Greystones Town Council
- Irish Rail
- Bus Éireann
- IDA
- Greystones Chamber of Commerce and;
- SPGGDA

The following outlines the main findings from the stakeholder meetings:

Strategic Planning Guidelines for the Greater Dublin Area (SPGGDA) 20.03.03

10.2.2 The SPGGDA (represented by Ms. Mary Darley) was consulted as a key stakeholder in acknowledgement of their role in monitoring the implementation of the Regional Planning Guidelines. It was stated that their role is one of reviewing the Development Plan(s) within the area

and monitoring compliance with the overall strategy for the SPGGDA. Therefore they cannot formally comment on the Framework Plan, as it is the preserve of the local authority.

Greystones Chamber of Commerce (10.3.03)

10.2.3 The Chamber of Commerce (represented by Mr. Bernard Rogan and Mr. Noel Geraghty) represent a key stakeholder for the business community in Greystones. It was reflected that there was a need to coordinate plans and individual developments in the Greystones area. It was acknowledged that here is at present a significant gap in this regard, reflected in the many stresses on infrastructure and there was a need to focus on exiting users of facilities/infrastructure.

10.2.4 The Chamber had previously organised a number of traders meetings with 150 attendees from the environs in November 2002. It was stated that residents/businesses were not anti-development, but were keen to see development undertaken in the right manner and wished to build partnerships with the local authority. It was felt that there was a desire for accountability at a local level.

10.2.5 It was noted that while services have built up, the provision of retail in the town has not reflected the economic profile. It was also noted that crime prevention must be ensured through the provision of good lighting, CCTV, and addressing blind alleys.

10.2.6 Access to Greystones is crucial for the survival of retail and commercial interests in the town. Bus/DART reliability is fundamental in this respect, as much as the need to improve roads. There is considerable frustration regarding the efficiency/reliability of existing services.

IDA-Mr.Tom McGuire IDA, Mr.Eugene Duff, KMD, Ms.Kylie Nixon, ARUP (12.3.03)

10.2.7 This meeting was held in recognition of the significant location and scale of the IDA land holding south of the Mill Road in Greystones, the current planning application on the lands and its potential impact on the town as a whole.

10.2.8 It was noted that there is long history on the site, dating back to 1985 when AMD were close to locating there. The attraction of the

location was said to lie in the community, housing, education, coastal environment, water-sports potential, and rail line/airport connections.

10.2.9 The type of development envisaged is high tech, and would be of an order of next generation Stockley Park. It is a sensitive receiving environment for a technology park, and was approached on the basis of a park for the town. Security would be a matter for individual buildings as opposed to fencing off the entire area. The technology park was designed to facilitate flexibility in the number of occupiers. The IDA, noting that it could be some years before the development would be complete, regarded the investment as long term.

10.2.10 It was noted that a technology park of this scale would have significant implications for the town of Greystones in residential and commercial terms. For example it was forwarded that the development could support the investment in a hotel in the town. Clearly there was potential for public transportation integration with other elements in the town. Interest was expressed in the potential for a DART stop, closer to the site.

Irish Rail (Mr. Cormac Downes) 28.02.03 and 12.03.03

10.2.11 The DART Area Suburban Enhancement Project aims to boost the capacity of the rail infrastructure by providing longer platforms, increasing the power supply, re-signalling and improving access to stations. This initiative will create some additional capacity via the adoption of 8-car trains and associated infrastructure.

10.2.12 It was understood that there is general concern at the reliability of the DART services coupled with the infrequency of trains outside of the main peak periods. The lack of reliable and linked bus services was also acknowledged as a concern to residents.

10.2.13 It was confirmed that a total of 54 trains per weekday currently call at Greystones, the vast majority of which are DART services. Furthermore there are a total of 36 gaps of 10 minutes or more between trains where the potential exists to run additional trains within the limitations of single-track working. It was agreed that the potential for expanding the timetable of services should be discussed further. In particular, it would be of interest to provide additional commuter services from the north to accommodate the proposed expansion of employment in Greystones.

Bus Éireann (Mr. Sean Forde) 13.03.03

10.2.14 Bus Éireann services do not currently serve Greystones therefore the number of public transport options is limited. It was acknowledged that the proposed development of Greystones creates an opportunity to both enhance bus services on the N11 corridor and make them accessible for residents and workers in Greystones.

10.2.15 At present Bus Éireann doesn't have any major plans to enhance services on the N11, it is recognised that opportunities may present themselves in the future. It was agreed to investigate these opportunities further and to respond in more detail when the emerging strategies become clear.

10.2.16 CBP stressed the importance of Bus Éireann's continued involvement in the study via a genuine partnership set up and created by the Steering Group.

Greystones Harbour Liaison Committee (Mr. Tom Broderick) 7.4.03

10.2.17 The harbour area remains a crucial area of development potential in the town, as provided for through the designation of area for a Masterplan in the 1999 Development Plan. Mr. Broderick was consulted as a Stakeholder with involvement in the project since it was first initiated some 15 years ago.

10.2.18 It was noted that the harbour area had been subject of several feasibility studies, and schemes, and there was a general view that the balance of development detailed in the Masterplan, would not enable a profitable scheme to be delivered.

10.2.19 The scheme currently evolving at the site provides for the harbour/ marine facilities in conjunction with the development of residential and commercial units to essentially pay for the necessary works. Residential units are expected to number 300-350. There would also be potential to have cafes, a bar, and shops. There is potential for this area to become an attractive amenity, and generate trips to the area. It was considered a minimum of 18 months before a planning application would be lodged.

10.3 Focus Group Event

10.3.1 Following the stakeholder meetings a Focus Group Event was held on Tuesday 4th March 2003 in the La Touche Hotel. The event was a means with which to consult with groups and organisations active in the area. Appendix 1 outlines the groups and organisations invited to attend the event. Written invitations were sent out to all community groups available on the Town Council's register, so that a representative from each could be included. The response to this invitation was tremendous. Practically all groups notified; and indeed some who were not on the Council list attended. In total approximately 60 representatives took part on the night. Eight professionals from CBP ranging from traffic engineers, planners, and urban designers, staffed the event.

10.3.2 The findings derived from the initial stakeholder meetings were used to formulate exhibition boards highlighting key issues within the study area to stimulate debate on the problems and issues facing Greystones and Environs (see appendix). The boards had the following headings:

- Welcome
- Why prepare an Integrated Framework Plan
- Study Area
- Mobility and Me
- Better Places to Live
- The Future

10.3.3 After having the opportunity to review the boards, over tea and coffee, attendees were split up in to groups of 8-10, with 6 tables in all, each with CBP facilitators. The event commenced at 6.45pm with a welcome by Rod Black, Regional Director, CBP, who set the context for the event and the agenda for the evening. A 45-60 minute workshop session with a further 15-30 minutes devoted to feedback followed. The event concluded at 9pm.

10.3.4 The group discussions were focused on a number of key issues in order to stimulate debate and discussion. The main issues were;

- Public transport
- Cycling and walking
- Traffic management
- Planning and land use
- Amenities and facilities

The outcomes of this event are summarised in Section 10.5.

10.4 Public Consultation Event

10.4.1 Following the Focus Group Event a Public Consultation Event was held on Saturday 8th March 2003 in the La Touche Hotel Greystones. The event was advertised in the Wicklow People, the North Wicklow Times as well as on posters throughout the area. East Coast Radio was also used as a medium for advertisement and Michael Looby, Director of Services, Wicklow County Council was interviewed on 6th March 2003 about the Plan and the consultation process. The exhibition boards were also displayed in Greystones Library from Monday 3rd to Friday 14th March and comment sheets were also available for residents.

10.4.2 The event ran from 11am until 6pm and the exhibitions boards were on display highlighting the key issues facing the area. Maps and diagrams were also displayed to stimulate debate and discussion and ran concurrently with the displaying of the boards. This event was a fun and interactive way to enable people to discuss issues and to formulate ideas and solutions to alleviate problems facing Greystones and environs. A large base map of the area and art material was available for participants to illustrate some of their ideas. In total approximately 80-100 people attended the event. The findings are based on comments sheets handed in during, or posted after, the events, as well as conversations held during the event.

10.5 Summary of Key Findings

Public Transport

10.5.1 The attendees felt that the public transport service between Greystones and Dublin City is infrequent and unreliable. The majority of comments concerned the DART service; the frequency is poor, and some attendees commented that it was quicker to travel to Bray to use the DART during peak periods from there. The service was also regarded as unreliable outside of peak periods and the waiting time between trains can be up to 1hr and 45mins. There was also a stated need for reliable feeder buses to link up with the DART and mainline rail service during peak periods.

10.5.2 Attendees also stated that the bus service between Dublin and Greystones and between Bray and Greystones was infrequent and unreliable. A number of comments stated that the 84X was a good service, however outside of peak periods it should pick up at more bus stops along the route. There is also a need for a local shuttle bus service that operates within the town and environs, in this way car use would decrease and access to essential services would be ensured. Many

residents were concerned about the number of school students who travelled to school by private car, it was recognised that these short trips were adding to congestion levels in the town and environs. However, this was attributed to the risk of alternatives – cycling and walking. It was proposed that a school bus service (with supervision and seatbelts) was initiated to reduce congestion in and around the town and to ensure safety and security for children. The optimum service would include journeys within the town and between Greystones and Bray as a large number of children travel to Bray to attend secondary school.

10.5.3 It was stated that the park and ride site was inappropriately located with respect to the train station and the number of cars parked there during the day bears witness to this. It was suggested that a covered walkway be constructed with a number of associated retail facilities to promote its use and encourage the shift from private car to DART. However it was recognised that this shift would only occur in tandem with a more frequent and reliable service.

10.5.4 It was suggested that an integrated approach to public transport provision was necessary especially between bus and DART services. An interchange facility is required at the train station to accommodate bus set down and pick up as well as taxi ranks and cycle parking. The interchange facility would ideally create a transportation 'hub' within the town centre and would promote the shift from private car to public transport once efficient services were provided.

Cycling and Walking

10.5.5 The majority of residents were concerned about safety when cycling or walking in the town and surrounding area. The existing pedestrian routes are in poor condition and in need of enhancement and management. A number of routes are subject to anti-social behaviour, however it was felt that these links had an important function in the town and created a level of permeability and accessibility to essential services and facilities. In order to prevent such anti-social behaviour the lanes must be properly lit and redesigned to increase visibility and security.

10.5.6 The area is regarded as unsafe for children to walk or cycle to school due to traffic, speeding and the lack of an integrated cycle network. A number of residents from Delgany stated that parents had to drive their children to school (a journey of half a mile) because traffic congestion and speeding were such an issue. These short journeys are adding to the problem of congestion within Delgany village and an alternative is needed to allow a safe journey to school.

10.5.7 Overall the attendees wished to see facilities in place which would support and promote cycling and walking in the area therefore reducing the need to travel by car.

Traffic Management

10.5.8 Traffic management is a major concern to residents in the area and signage is regarded as poor. Delgany residents are concerned about the amount of construction traffic using the village as a through road to the N11, this type of traffic reduces safety, increases congestion and contributes to pollution.

10.5.9 Residents and businesses were concerned that Main Street is congested and undermined due to the level of on-street parking and two-way traffic. The footpaths are in need of maintenance and there is a need for more pedestrian crossings throughout the town.

10.5.10 The R761 is regarded as a natural bypass for the town and the road widening which has taken place at Redlands has increased the speed of traffic. Many residents felt that a Quality Bus Lane should have been included during road widening. A number of other issues were outlined with respect to traffic management, these included;

- A new junction at Blacklion
- Traffic calming at Kilcoole
- Traffic calming between Blacklion and Killincarrig
- More traffic lights.
- Access to the N11 is poor
- Introduce a 3-ton limit on the Delgany/ Killincarrig Road
- Introduce a filter light at Redford Park

10.5.11 Residents were also concerned about parking provision in Greystones town centre. Presently cars are allowed to park on both sides of Main Street and it was suggested that a parking study be undertaken to reduce on-street parking and possibly introduce disc-parking measures. However a number of businesses felt that by reducing on-street parking the town centre's viability as a commercial centre could be undermined.

10.5.12 Residents were very concerned about the construction of the Southern Access Route (SAR) and the timeframe for completion. It was strongly felt that the SAR should be completed or partially completed prior to the development of the ZAPI site to the south of the town centre. The development of the SAR is regarded as an integral part of the road infrastructure of the town without such the town will not be able to support the future population of the area.

Planning and Land Use

10.5.13 The majority of comments with respect to land use planning concerned the ZAPI development to the south of the town. Residents were angry that the development was granted without proper consultation with the local community. The population of the town will increase by 3,000 upon completion of the development and this will place enormous pressure on transport, social, educational and health services within the town. However it was recognised that the development of the SAR will greatly add to the transport network and the provision of community and social facilities, as required by the planning conditions, within the development will benefit the wider community. All in all residents felt that in future such a large development should not take place without an integrated approach to land use and transportation and they welcomed the preparation of the Framework Plan.

10.5.14 Residents were also concerned about density and design issues and were opposed to the development of high-density residential developments in edge of town locations. It was suggested that density, and in turn design should compliment and support the existing urban fabric as opposed to undermine it. However it was acknowledged that certain opportunities existed where medium to high densities may be suitable and acceptable.

10.5.15 The use of development levies as a means with which to finance the development of essential services and facilities was widely supported. Other issues raised are as follows;

- Delgany should remain a separate town as opposed to being part of Greystones.
- The green belt to the north of the town should be maintained.
- Community integration needs to be strengthened.
- A bottom up approach to planning should be developed.
- Industrial development should follow a needs assessment approach.

Amenities and Facilities

10.5.16 The number of amenities and facilities in the area is of concern to residents and businesses. There is a need for more community and social facilities to cater for the growing population of the town and environs. It was acknowledged that the provision of local services and facilities reduces the need to travel and therefore increases the quality of life of residents.

10.5.17 Bray Head and the coast are regarded as valuable amenity resources as well as areas of local and national heritage. Bray Head must be protected as an unspoilt natural amenity in the midst of an urban

metropolitan area. Residents wished to see it achieve Special Amenity Area Order (SAAO) status to protect and preserve it for present and future generations. The level of signage and interpretation was regarded as poor.

10.5.18 The seafront is one of the most important features of the town and it defines the character and feel of the area. There is a need to open up and enhance the seafront to ensure the long-term use of the resource. The town's relationship with the seafront is limited and in reality the town 'turns its back' on the sea. This resource should be an integral part of the town and a quality environment for all users.

10.5.19 Residents also felt that there was a need for more recreational facilities for young people such as playing pitches and running tracks. A number of residents commented that amenities in the village at present were only available to the rich.

Other Comments

10.5.20 The remainder of comments focused on the structure of the planning system and the decision making process. Residents suggested that in order to support sustainable development and social inclusion local representatives should be involved in the decision making process. Many commented that the consultation events were the first real opportunity to partake in, and understand the process, and there was a need to improve communications regarding planning and transportation matters. Therefore ensuring Local Agenda 21 is adhered to and ownership of the Plan can be achieved.

10.6 Conclusion

10.6.1 Response to the consultation process by the stakeholders and at the focus group and public consultation events was largely positive. It was notable that people were not anti-development, and appreciated that Greystones's proximity to Dublin City gave rise to great demand. There was serious concern about the future development of the area, especially if large-scale residential developments continue to be developed without sufficient social and community facilities.

10.6.2 The people of Greystones and environs were very appreciative of the opportunity for consultation and were knowledgeable and passionate about the issues, which affected their communities. Residents, businesses and organisations were all focused on enhancing the natural resources of

the town while at the same time encouraging the integration of transportation and land use concerns in a sustainable and all-inclusive manner. It is essential to continue to inform and communicate with residents and businesses within the study area in order to maintain the level of goodwill created.

10.6.3 Overall the project team appreciated the opportunity to meet with the residents, businesses and organisations of Greystones and environs, and were all the more motivated to tackle the problems at hand in an integrated and holistic fashion.

APPENDIX A

1. POPULATION AND SOCIO ECONOMIC INFORMATION

1.1 Study Area and Population

The study area is Greystones and the neighbouring village of Delgany. These villages fall mostly within two District Electoral Divisions (DED's), Greystones and Delgany, with a small remainder being within the Kilcoole DED to the south. These areas are illustrated in Figure 1.2. Greystones DED has an area of 3.78 sq km, Delgany 12.24 sq km and Kilcoole an area of 23.94 sq km. With total populations of 7,369, 4,502 and 4,058 respectively for the year 2002, this equates to population densities of 1949.5, 367.8 and 169.5 persons per sq km respectively.

1.2 Latest Census Figures

The results from the latest census of population are currently at a preliminary stage and nothing more than actual population figures are available for 2002, which have been mentioned above. The figures for Greystones, Delgany and Kilcoole all show that population has increased in each DED by 7%, 3.5% and 6.6% respectively from the last census in 1996. This equates to a 5.9% increase for the three DEDs overall. The population of the state as a whole and County Wicklow increased over the same period by 8% and 11.7%.

Greystones and Delgany are within the Rathdown rural area, which also includes the DEDs of Enniskerry, Powerscourt and part of Kilmacanoge. This rural area experienced a population increase of 16% over the six year period until 2002. Kilcoole is one of 30 DEDs within the Rathdrum rural area which experienced a 15.4% overall growth for the same period.

Population increase in Greystones and environs is just below the average overall increase for the State but is substantially less than the overall population increase for County Wicklow and particularly the surrounding rural area. The nearby DEDs of Enniskerry and Part of Kilmacanoge experienced a population increase of 32.4% and 55.6% respectively.

Table A1 - Population Change at State, County and Local Level

	1991	1996	2002	1991-1996	1996-2002
	(Thousands)			(% Change)	
State	3525.7	3621.0	3917.3	+2.7	+8.18
Wicklow County	97.3	102.7	114.7	+5.55	+11.68
Greystones		6.886	7.369		+7.01
Delgany		4.35	4.502		+3.49
Kilcoole		3.806	4.0587		+6.64

2. RESIDENTIAL DENSITIES

Residential densities have a significant impact on land use and transportation integration. Lower residential densities result in increased uptake of land with the consequence of greater travel distances to school, employment and recreation.

The National Sustainable Development Strategy identifies the need for higher residential densities for the achievement of greater levels of sustainability. The benefits of increased residential densities are recognised in the Department of the Environment and Local Government (DoELG) Circular Letter of May 1998 as including:

- More economic use of existing infrastructure and serviced land;
- A reduced need for the development of 'greenfield' sites, urban sprawl and ribbon development;
- Reduced need for investment in new infrastructure;
- Better access to existing services and facilities; and
- More sustainable commuting patterns.

The subsequent DoELG document Residential Density, Guidelines for Planning Authorities, September 1999 identified appropriate locations for increased residential densities. These were in town / city centres; brownfield sites; inner suburban / infill sites; outer suburban / 'greenfield' sites; institutional lands; and town / village.

Apart from outer suburban / 'greenfield' sites, all of these locations are usually situated within existing built up areas. The implementation of increased residential densities may therefore be havocked by what is surrounding the proposed development site. A planning authority may choose to refuse a high density infill development in an existing low density area because in would not be in keeping with its surroundings.

The Residential Density Guidelines state that the greatest efficiency in land usage for outer suburban / 'greenfield' sites should be achieved by providing net residential densities in the general range of 35-50 dwelling

per hectare (14-20 per acre) and such densities should be encouraged generally.

It also states that development at densities of less than 20 dwellings per hectare (8 per acre) should generally be discouraged in the interests of land efficiency, particularly on sites in excess of 0.5 hectares. On lands proximate to existing or proposed public transport corridors, densities in excess of 50 dwellings per hectare (20 per acre) should be permitted, subject to qualitative safeguards.

Table A2 - Zoned Residential Land in Greystones / Delgany

Residential Density	Total zoned area (ha)	Potential households	Household Size	Potential Population
2.5	153.9	384.75	3.18	1223.505
10	41.78	417.8	3.18	1328.604
12.4	10.89	135.036	3.18	429.41448
17.2	107.9	1855.88	3.18	5901.6984
17.3	108.2	1871.86	3.18	5952.5148
22.2	119.3	2648.46	3.18	8422.1028
TOTAL	**541.97**	**7313.786**		**23257.8**
Total	**541.97**	**7313.786**	**2.75**	**20112.911**

Table A2 shows a breakdown of the residential zoning from the 1999 Greystones / Delgany Development Plan. The plan contains eight different residential zoning types, which are largely dependent on densities and their whereabouts. The eight zoning types have been added together to form six residential densities as shown in the table.

The total amount of zoned residential land is multiplied by the density and by the average and projected household size to give the potential population. Much of the zoned land is already built upon and it is assumed that this developed land has been allocated the correct density.

Should household sizes in the study area remain constant until available zoned land is fully developed, these lands should accommodate a population of 23,258. It is more likely however, that household sizes will continue to fall. The Economic and Social Research Institute (ERSI) estimate that by the year 2011, the average household size for the State will be in the region of 1.98 persons. At present, Greystones / Delgany's average household size is above the State average of 3.22 persons and is likely to remain so. This is due to large areas of low-density residential development, which tends to contain larger houses and as a result, a greater number of occupants. For this reason a figure of 3.18 persons per house would be more realistic when making demographic assumptions for Greystones / Delgany. This would result in a population of 20,113 persons being accommodated, should all currently residentially zoned land be developed at the zoned density.

Table A3

Residential Density	**Available Land**	**Persons per Household**	**Households**	**Population**
2.5	63.09	3.18	157.725	501.5655
10	2.18	3.18	21.8	69.324
12.4	3.152	3.18	39.0848	124.28966
17.2	44.37	3.18	763.164	2426.8615
17.3	0.8039	3.18	13.90747	44.225754
22.2	24.58	3.18	545.676	1735.2496
Total	**138.1759**			**4901.5159**

The Census of Population for 2002 puts the population of Greystones and Delgany District Electoral Divisions at 11,871. Table A3 above shows a summary of an analysis of available zoned residential land. This analysis was carried out by simply measuring the area of zoned land which appears not to be built upon, when residential zoning is plotted on OS mapping (see Figure 11.1 below). It is likely however, that this will be an over-estimation as accurate OS mapping quickly becomes out of date. As mentioned earlier, when all residentially zoned land had its density applied to zoning, a population of 23,258 was calculated, based on an average household size of 3.18 persons. When *available* residentially zoned land had its density applied to zoning, a population potential of almost 5,000 was calculated. This suggests that land, which has been zoned at a certain density, has in actual fact a much lower density. There also seems to be few opportunities for infill development to bring the density up to what it is actually zoned.

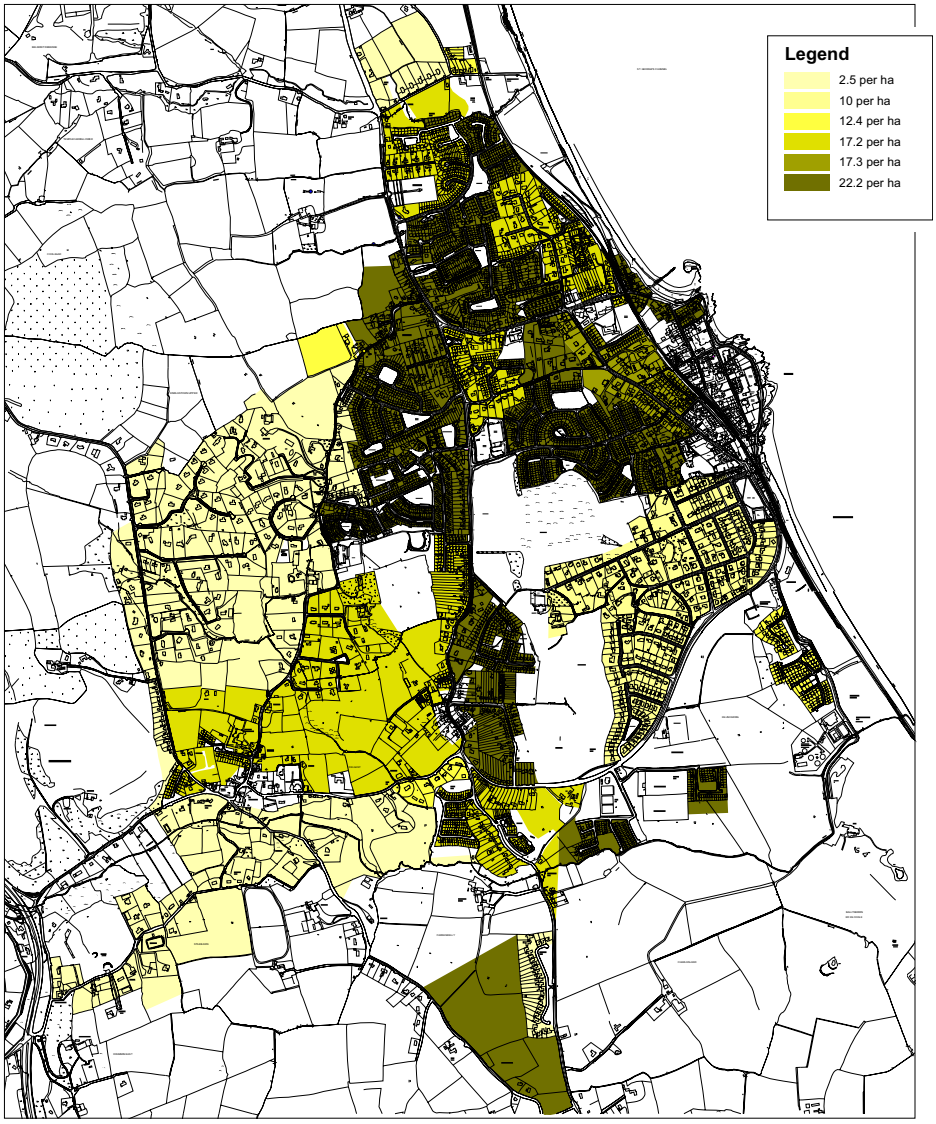


Figure A1

Figure A1 also shows the densities of all residentially zoned lands within the development plan. It can be seen that much of the higher density land is already built upon, whilst much of the low density land to the west and north is available for development. In most circumstances, the further away from the town centre the lower the density. This is quite common but in terms of transport, this type of development can really only be served by the private car.

Modern low density residential development tends to be of a deep cul de sac nature, as can be seen in the development to the west of Greystones above. This type of development is very difficult to service by bus because of the impracticalities of driving a bus into and out of the cul de sac. A patron may board the bus before entering the cul de sac and find that they may have spent 10 minutes on a bus driving around the cul de

sac and they are no further forward. Should the bus not penetrate the cul de sac then there is the impracticality of patrons having to walk the distance out of the cul de sac to the bus route.

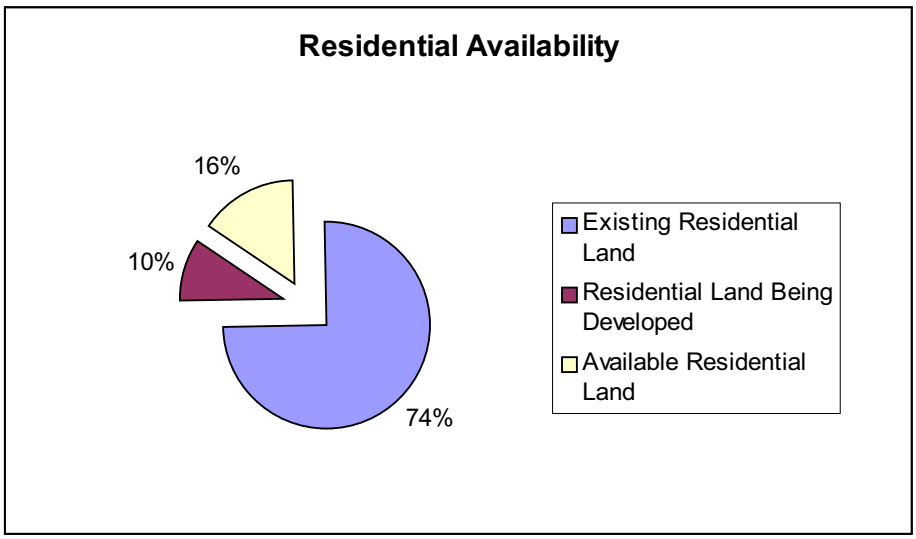


Figure A2

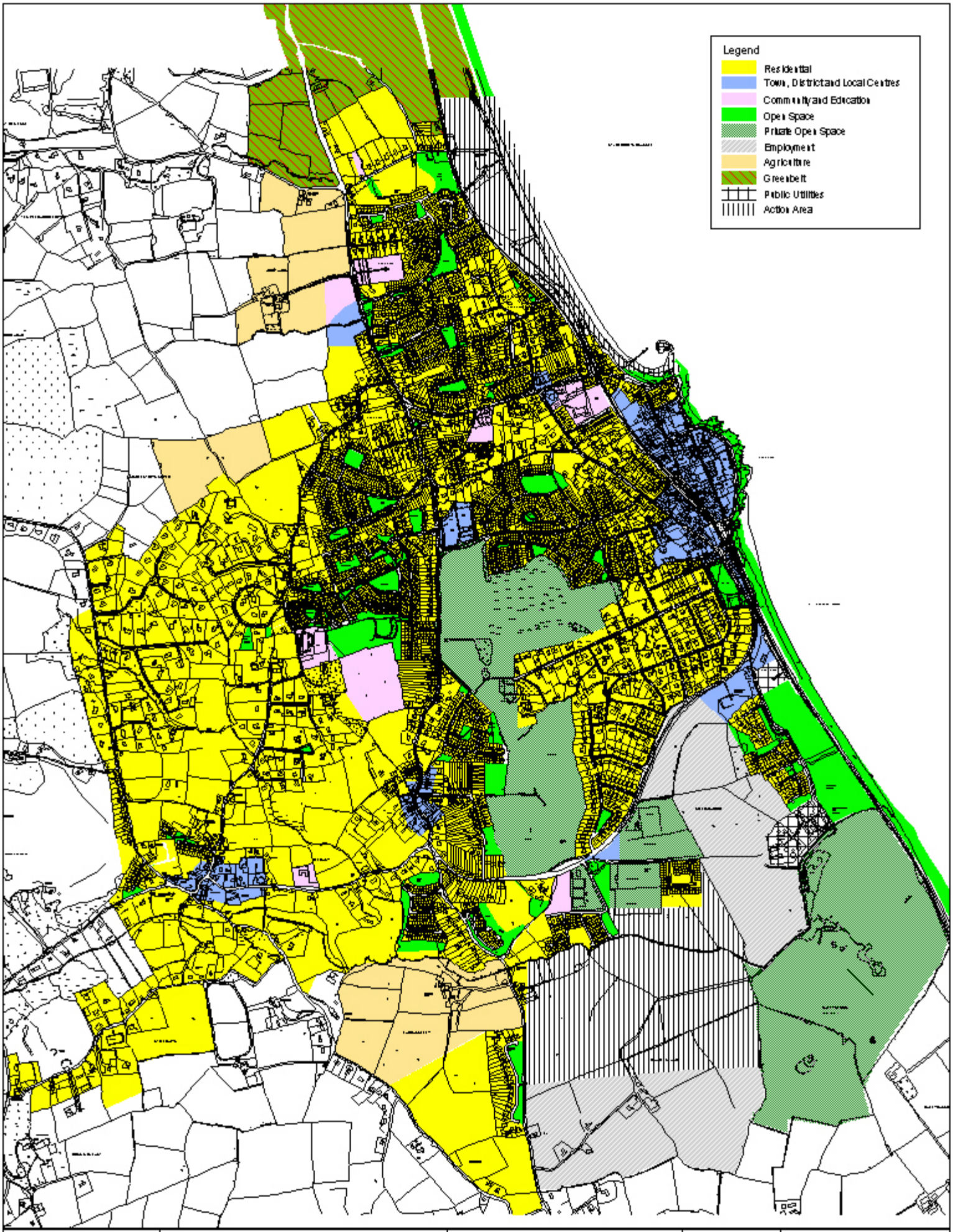
Table A4

Residential Density	Total zoned area (ha)	Potential households	Household Size	Potential Population
2.5	56.1	140.25	2.75	385.69
10	2.18	21.8	2.75	59.95
12.4	3.152	39.085	2.75	107.48
17.2	18.52	318.54	2.75	875.99
17.3	N/A	NA	2.75	N/A
22.2	4.517	100.28	2.75	275.77
Total	**84.469**	**619.96**		**1704.88**
		619.96	**3.18**	**1971.47**

Table A4 and Figure A2 above show a breakdown of *actual* available residentially zoned land. This was calculated by subtracting currently submitted planning applications from what was perceived to be available residentially zoned according to OS mapping. This does not include Action Areas at Charlesland or the Harbour Area. It was discovered that the actual land available amounts to 84.5 ha or 16% of all residentially zoned land. Of this available land, 56.1 Ha is zoned for residential at a rate of 25 houses per Ha. There is only the capacity for 100 households at the highest density rate of 22.2 houses per Ha.

APPENDIX B

DEVELOPMENT PLAN ZONING MAP



COLIN BUCHANAN AND PARTNERS

Drawing Title: Greystones/ Delgany Land Use Zoning Map

Client: Dublin Transportation Office & Wicklow County Council

Scale: N.T.S.

Job Title: Greystones/ Delgany Integrated Framework Plan for Land Use and Transportation

Drawn By: D.D.

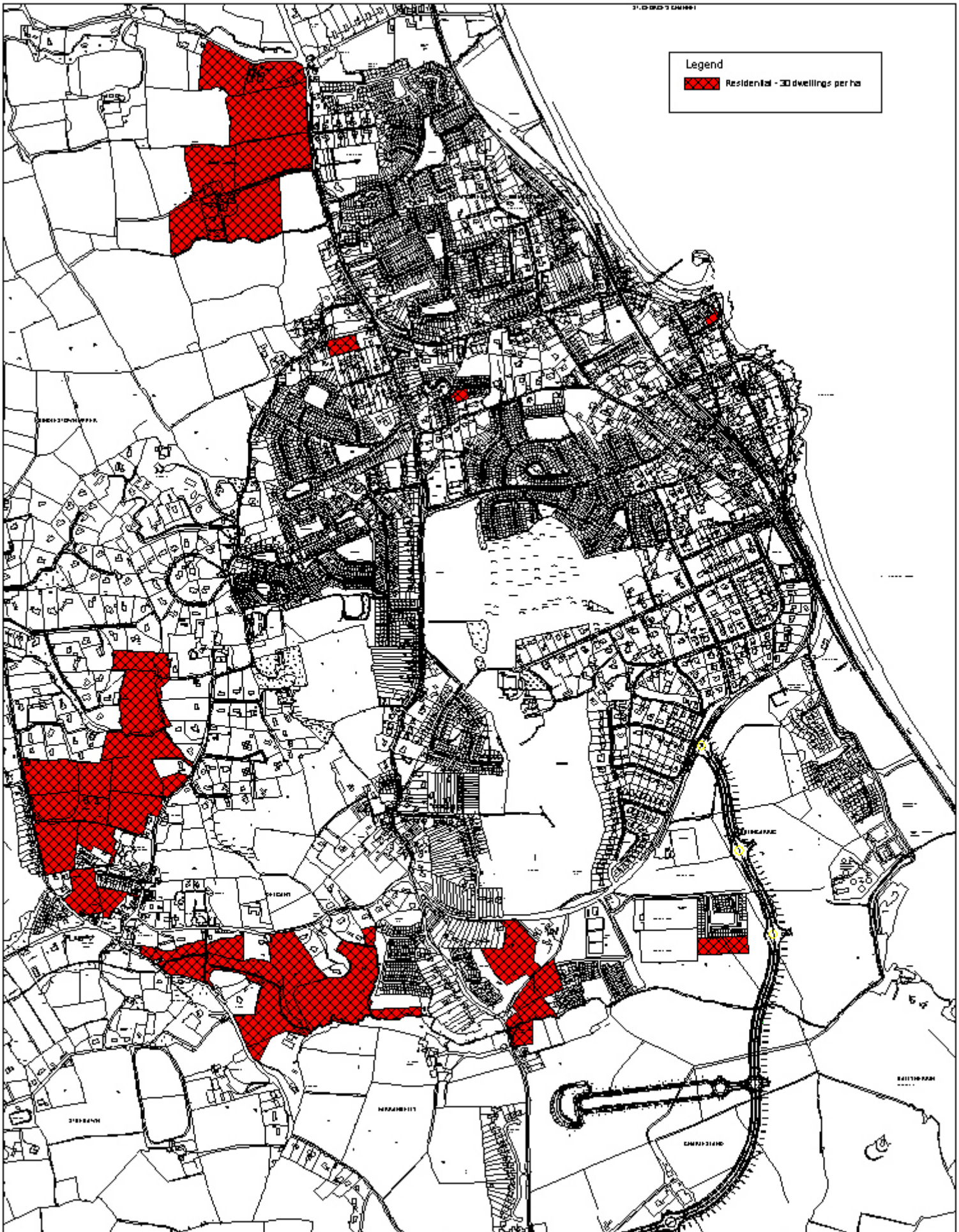
Date: 07/07/04

Drg No.: Appendix B

Rev:

APPENDIX C

SPATIAL SCENARIOS



COLIN BUCHANAN AND PARTNERS

Drawing Title: Scenario Do Normal

Client: Dublin Transportation Office & Wicklow County Council

Scale: N.T.S.

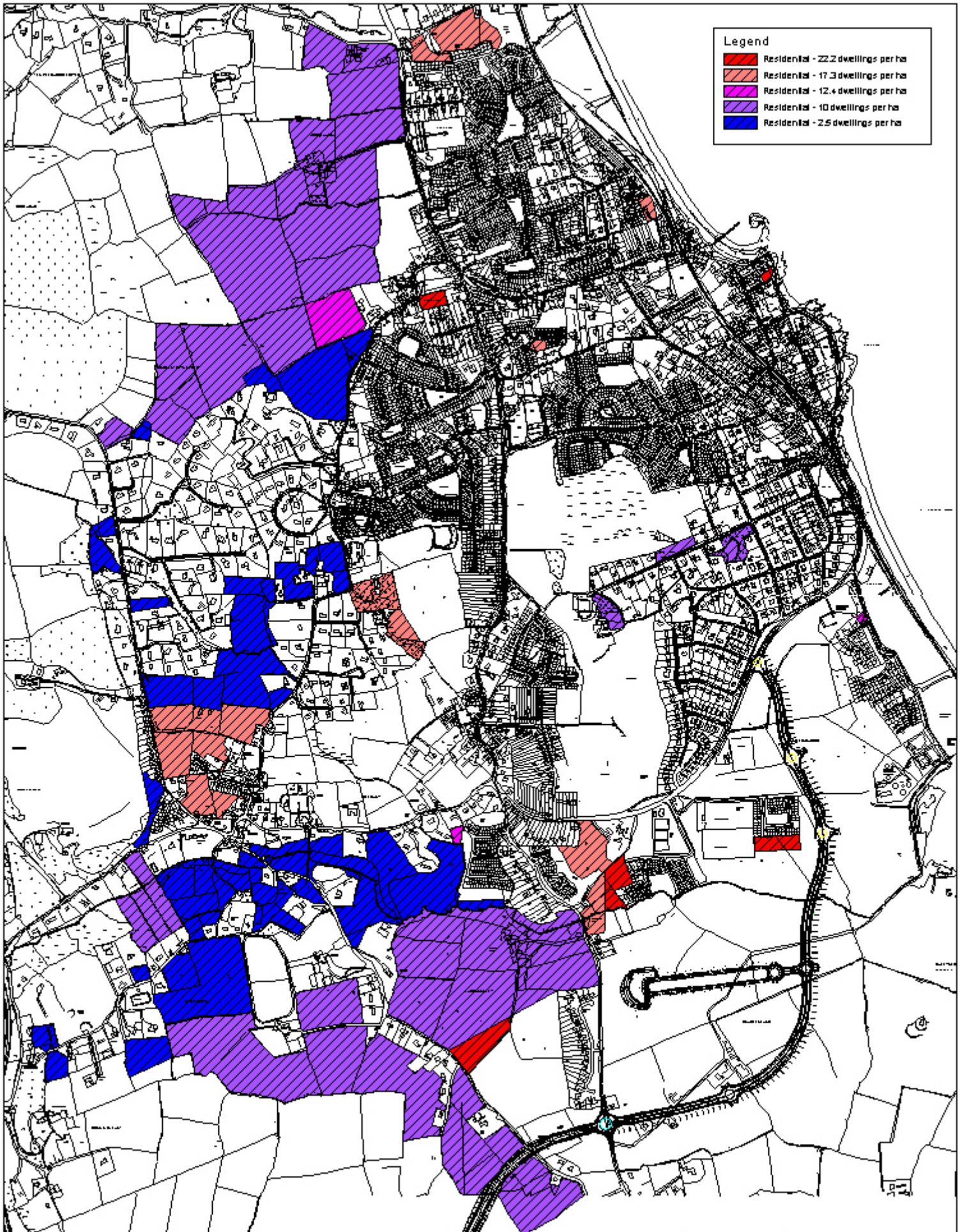
Job Title: Greystones/ Delgany Integrated Framework Plan for Land Use and Transportation

Drawn By: D.D.

Date: 07/07/04

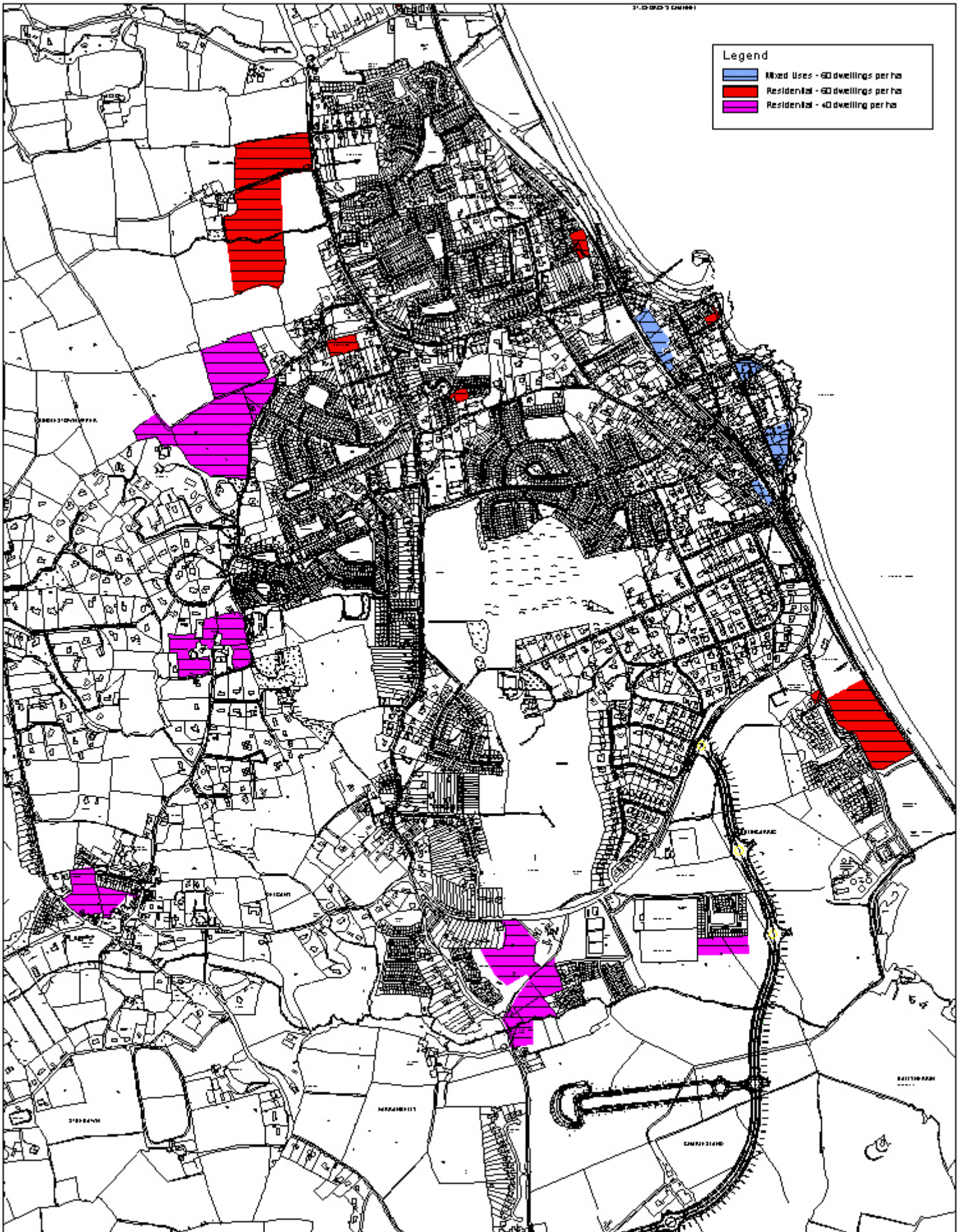
Drg No.: Appendix C 1

Rev: 2



COLIN BUCHANAN AND PARTNERS

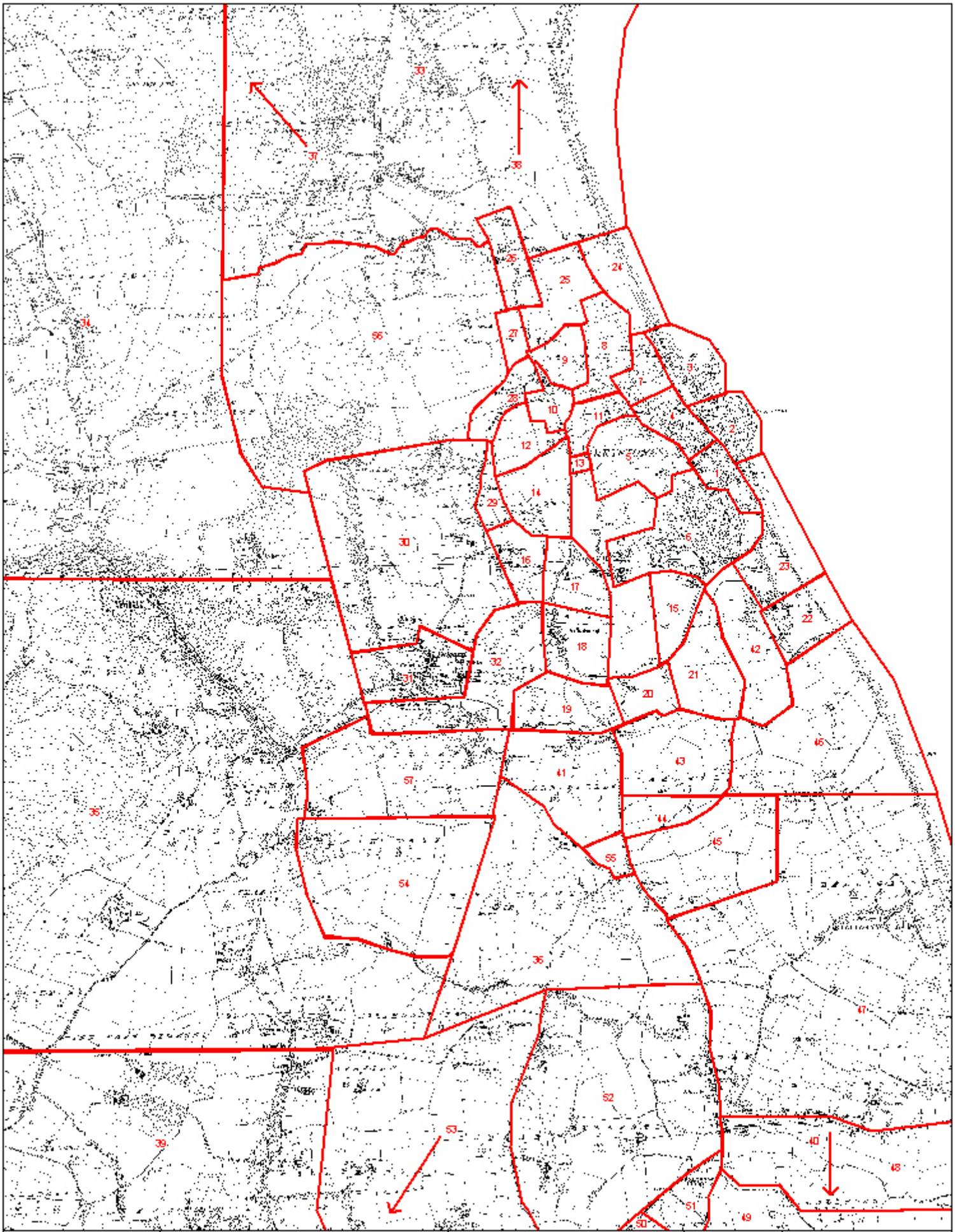
Drawing Title: Scenario Do Spread	Client: Dublin Transportation Office & Wicklow County Council	Scale: N.T.S.	
	Job Title: Greystones/ Delgany Integrated Framework Plan for Land Use and Transportation	Drawn By: D.D.	Drg No.: Appendix C 2
		Date: 07/07/04	Rev: 2



COLIN BUCHANAN AND PARTNERS	Drawing Title: Scenario Do Concentrate	Client: Dublin Transportation Office & Wicklow County Council	Scale: N.T.S.		
		Job Title: Greystones/ Delgany Integrated Framework Plan for Land Use and Transportation	Drawn By: D.D.	Drg No.: Appendix C 3	Rev: 2
			Date: 07/07/04		

APPENDIX D

MODEL ZONES



COLIN BUCHANAN AND PARTNERS	Drawing Title: Model Zones	Client: Dublin Transportation Office & Wicklow County Council	Scale: N.T.S.		
		Job Title: Greystones/ Delgany Integrated Framework Plan for Land Use and Transportation	Drawn By: D.D.	Drg No.: Appendix D	Rev
			Date: 07/07/04		

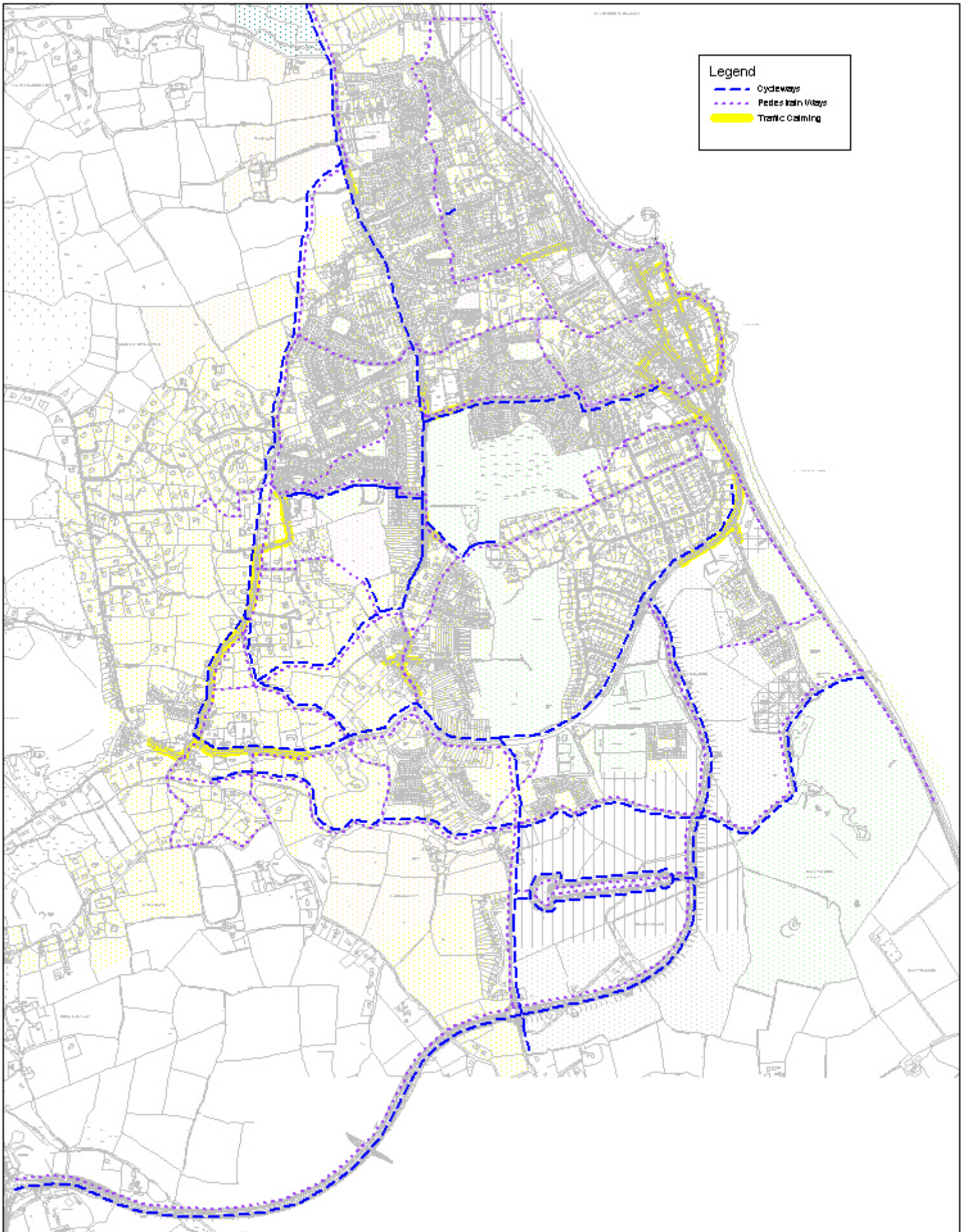
APPENDIX E

INITIAL BUS ROUTE OPTIONS

COLIN BUCHANAN AND PARTNERS	Drawing Title: Initial Bus Route Options - Possible Alterations to Existing Dublin Bus Services	Client: Dublin Transportation Office & Wicklow County Council	Scale: N.T.S.		
		Job Title: Greystones/ Delgany Integrated Framework Plan for Land Use and Transportation	Drawn By: D.D.	Drg No.: Appendix E	Rev
			Date: 07/07/04		

APPENDIX F

WALKING AND CYCLING NETWORKS



COLIN BUCHANAN AND PARTNERS	Drawing Title: Walking and Cycling Networks	Client: Dublin Transportation Office & Wicklow County Council	Scale: N.T.S.		
		Job Title: Greystones/ Delgany Integrated Framework Plan for Land Use and Transportation	Drawn By: D.D.	Drg No.: Appendix F	Rev
			Date: 07/07/04		