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Appendix D

RMP Sites within the surrounding area
Stray finds within the surrounding area
Legislative framework protection the archeological resource
Impact assessment and the cultural heritage resource
Mitigation measures and the cultural heritage resource

RMP No.:	WM027-002
Townland:	Newdown
Parish:	Killucan
Barony:	Farbill
NGR:	251305, 250363
Classification:	Ringfort
Dist. from development:	c. 120m southeast
Description:	<p>Ringfort shown in hashers on OS map. Photographic evidence of surviving banks/fosse also in file.</p> <p>Field Survey Notes 1971: "Much disturbed. A small circular uneven enclosure with a general slight slope from SSW-NNE, bounded by a steep scarp with remains of a steep-sided bank on its upper edge and with remains of a wide U shaped fosse at its foot from west-south-SSE. There is a steep-sided narrow counterscarp bank from west-south-SSE. Much of the scarp and bank has been quarried away on the southeast and north, also on the WNW. The ground outside the scarp from north-northeast-ENE has been dug away and the hole has been filled with old tree roots.</p> <p>The original entrance way is not recognisable. The interior and outer bank support large trees. Sited on the northeast slope of a gentle rise of good pasture. Wet hollow adjacent to the site on the northeast. The banks of this earthwork appear to be too steep and sharp looking to be those of a rath. The site may be a rath which was modified when the trees were planted. The fosse looks like the fosse of a rath and I do not know of any plantain or tree-ring with a counterscarp bank. Northeast-southwest diameter from top of inner bank 23.60m."</p>
Reference:	SMR Archive

RMP No.:	WM27-001
Townland:	Newdown
Parish:	Killucan
Barony:	Farbill
NGR:	250885, 250401
Classification:	Earthwork/Ringfort
Dist. from development:	c. 200m southwest
Description:	<p>Site shown in hashers on OS map first and second editions (1837 & 1876); also visible in aerial photography. A sub-triangular enclosure with some trees on the perimeter marked fort.</p> <p>Field Survey Notes 1971: "Completely levelled. No recognisable feature on the surface. The site, a gentle natural rise on gently undulating land of good pasture, would have been suitable for a rath. Boulders set against the modern field boundary on the southeast. Possible belonged to the monument and they look as if they were set there recently."</p>
Reference:	SMR Archive

RMP No.:	WM027-004
Townland:	Newdown
Parish:	Killucan
Barony:	Farbill
NGR:	250800, 250261
Classification:	Earthwork
Dist. from development:	c. 350m southwest
Description:	<p>Site is shown on first and second edition (1837 & 1876) OS map edition; as an irregular oval enclosure with a smaller almost circular enclosure inside it, marked fort. Also visible on aerial photography.</p> <p>Field Survey Notes 1971: "Completely demolished. No recognisable trace of the earthwork is visible on the surface. The site – a slight rise on gently undulating land of good pasture and tillage would have been suitable for a rath. Bog visible nearby to the south and southwest. There are large boulders piled against the modern field boundary on the northwest. They look as if they were only recently deposited there."</p>
Reference:	SMR Archive

RMP No.:	WM027-003
Townland:	Newdown
Parish:	Killucan
Barony:	Farbill
NGR:	251813, 250524
Classification:	Road/Togher
Dist. from development:	c. 500m east
Description:	The exact location of this monument cannot be identified with certainty. The associated documentary evidence does not show the precise location. No further description or detail on file.
Reference:	SMR Archive

RMP No.:	WM20-106
Townland:	Newdown
Parish:	Killucan
Barony:	Farbill
NGR:	251273, 251432
Classification:	Ringfort
Dist. from development:	c. 700m north
Description:	<p>Not marked on 1876 OS map.</p> <p>Field Survey Notes 1970: "Almost completely destroyed by quarrying for rock. The site is divided in two by a modern WNW-ESE field fence. There is a short segment of a well defined scarp on the west with a modern trench at its foot. This is the only part of the Rath which is recognisable. The outline of the perimeter is suggested by a very vague scarp from southwest-south-southeast.</p> <p>Situated on a natural rise on gently undulating land of average to poor pasture. Good views. Bog to the north. Height of scarp from bottom of trench=1.5m, Top width of trench=2.6m, Bottom width of trench=1.5m, Depth of trench=45cm."</p>
Reference:	SMR Archive

RMP No.:	WM020-105
Townland:	Newdown
Parish:	Killucan
Barony:	Farbill
NGR:	251048, 251537
Classification:	Ringfort
Dist. from development:	c. 800m north
Description:	<p>Shown in hashers on OS map.</p> <p>Field Survey Notes 1970: "The site is divided by a NNW-SSE modern field fence and that part of the earthwork which was to the north of where the fence is, is completely demolished. The surviving platform consists of two widely-shaped steep scarps boarding a sub-rectangular area. The inner scarp has no trace of a bank on its upper edge or of a fosse at its foot. The outer scarp has slight traces of a bank on its upper edge. It has a fosse at its foot from southwest-south-east. The fosse is best preserved from southeast-east. The outer scarp is disturbed in places by old quarry depressions. The original entrance is not visible.</p> <p>On the inside the outer scarp rises towards the centre approximately. It has definite traces of northwest-southeast cultivation ridges. The outer scarp supports some thorn trees on the south. Situated on a high natural rise. Good vies in all directions. Height of inner scarp at south= 1.1m, east-west diameter from upper edge of outer scarp=60m."</p>
Reference:	SMR Archive

RMP No.:	WM027-005
Townland:	Newdown
Parish:	Killucan
Barony:	Farbill
NGR:	251896, 249686
Classification:	Earthwork
Dist. from development:	c. 1.05km
Description:	<p>Earthwork is shown on the 1813 Estate Maps as small enclosure, partially circular with hashers.</p> <p>Field Survey Notes 1983: "A slight rise, the northern part of which has been quarried away. No trace of an earthwork or any archaeological feature."</p>
Reference:	SMR Archive

RMP No.:	WM020-104
Townland:	Greatdown
Parish:	Killucan
Barony:	Farbill
NGR:	250300, 251620
Classification:	Cist
Dist. from development:	c. 1.05km
Description:	<p>Account A: "The site was surveyed and partially excavated by Joe McCabe and Brian Rowayne on the 2nd, 3rd and 4th of April 1979. The owner was building a house and found the cist. Thinking that the 'cave' might run under his house foundations he pulled out all the large stones with an excavator and uncovered the crouched burial and food vessel. The food vessel was soft and damp but was preserved by the owner's wife who stored it indoors. The burial was severely disturbed and the skeleton seems to have been scooped out of the cist.</p> <p>When we arrived on the site we retrieved the food vessel and most of the skeleton but further excavation could only reveal the extent of the pit in which the cist had been built. The bones and pot were photographed in the survey office both by me and by Leo Daly, a local historian. As I recall a report appeared in a local newspaper. The skull was that of a full grown male and was remarkable for the extent to which both upper and lower teeth projected forwards."</p> <p>Joe McCabe's Account: "On the 29th of March 1979 I had a telephone call from Mr. Jeremiah Sheehan informing me that Mrs. Michael Byrne, Great Down, The Downs, Mullingar called to his Mullingar office to report the discovery by her husband of a skeleton and pot in a stone grave in his land at Great Down. Mr. Sheehan was of the opinion from Mrs Byrne's account of the find that we were dealing with a Bronze Age crouched burial in a short stone cist. Subsequent inspection of the pot-a bowl food vessel and of the cist itself together with Mr Byrne's recollection of the site as observed by him originally leaves no doubt about Mr. Sheehan's opinion.</p> <p>The cist was discovered by Mr. Byrne when digging a drainage trench beside his house, an investigation of the site by Mr. Brian Rowayne and myself revealed that the cist was constructed in a pit in the ground, that it measured about 80cm by 50cm and that the long axis had been aligned ENE-WSE approximately. While Irish Bronze Age cists have been found aligned in many different directions there is a noteworthy tendency for the long axis to lie in a general west-east direction.</p> <p>The cist contained a human skeleton lying on its left side with its head to the east and with the knees drawn up to the chin. Behind its shoulders was placed a well preserved bowl food vessel of a type that dates the burial to the Earlier Irish Bronze Age which on present evidence began shortly before 200BC. The bowl has a flat base 6.5cm in diameter. It is 15.7cm in diameter at the rim and 12cm in height. It is light brown in colour. The upper portion</p>

	<p>is almost vertical and has four narrow horizontal ridges perhaps primarily intended to strengthen the vessel. The rim is round and slightly everted. Decoration consists mainly of panels of square toothed comb impressions which extend to the inside of the rim and to the outer edge of the base.</p> <p>The cist is the most common form of Irish Bronze Age grave. About 700 have been recorded. About 30 sites with cists have been recorded for Co. Westmeath. They were used mainly by the Food Vessel people. The remains were either cremated or inhumed. Cremation was about twice as frequent as inhumation. In the vast majority of cases the cist contained one burial representing a single burial tradition in contrast to the communal burials of the earlier Neolithic. Cists can occur singularly or in cemeteries. The cemeteries may be flat as at Ballybrennan, Co. Westmeath or the can occur in artificial mounds as at Knockast, Co. Westmeath."</p>
Reference:	SMR Archive

RMP No.:	WM019-086
Townland:	Greatdown
Parish:	Killucan
Barony:	Farbill
NGR:	250177, 251638
Classification:	Holy Well
Dist. from development:	c. 1.1km northwest
Description:	No details.
Reference:	SMR Archive

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Information on artifact finds from the study area in County Westmeath has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area.

Museum No:	1929:1516
Townland:	Newdown
Parish:	Killucan
Barony:	Farbill
Find:	Gold Ornament
Find place:	Discovered in June 1929 by Thomas O'Hara of The Downs Mullingar while cutting turf on the Bog of New Down (also known as Woodfort and Dysart).
Description:	The piece was found in the second 'plour' of black peat i.e. about 14 feet below the surface of the bog. No other finds at the time. About 20 years previously a shapeless lump of gold was found some distance away in the same stretch of bog.
Reference:	NMI Topographical Files

Museum No:	1948:17
Townland:	Newdown
Parish:	Killucan
Barony:	Farbill
Find:	Lignite Ring
Find place:	Found in July 1948 while cutting turf in a bog about 15 feet below the surface.
Description:	The object is most likely a bracelet or anklet
Reference:	NMI Topographical Files

Museum No:	IA/213/64
Townland:	Newdown
Parish:	Killucan
Barony:	Farbill
Find:	Bog Road
Find place:	Bog
Description:	<i>1964 Notes "During a visit to the neighbourhood of Killucan Co. Westmeath I was shown an old road through the bog in the townland of Newdown. Only a very short stretch of this road remained but my informant told me that during turf-cutting operations it had been encountered right across the bog. Running in a straight line from the remaining stretch. The road could be seen in three or four places, nowhere clearly and it seemed to consist chiefly of grey maul and gravel about 10-15cm thick. A layer of brushwood was laid transversely across the marl and gravel. It seemed to be about 4-5ft wide and 1.25m below the surface of the bog. Local tradition of some calling it 'The Old Coach Road' a portion of which is still in existence (OS 6, Sheet 27). A gold clasp like the handle of a kettle or the ear of a pot is said to have been found on this road about 50 years previously."</i>
Reference:	NMI Topographical Files

Museum No:	1979:109, 1979:110
Townland:	Great Down
Parish:	Killucan
Barony:	Farbill
Find:	Food Vessel-Bowl Type (1979:109), Human Bone (1979:110)
Find place:	Description relates to cist discovery at Great Down. 29 th March 1979. Bronze Age crouched burial in a short, stone-lined grave discovered during digging of drainage ditch for Mr. Byrne's house.
Description:	Food vessel of ribbed bowl type intact except for some ancient clipping on the rim and base. Portion of the rim inside and out is cracked in a calcitic connection? The vessel is of a coarse fabric, light brown in colour containing many granite grits up to 4mm in length. The neck is upright with an internally bevelled rim. There are four inscribed?? ribs of the body and below the vessel tapers to a narrow base. The rim, body and base all covered with comb impressions. These are arranged horizontally at rim and base and vertically on the body. The neck is further decorated with a row of light finger tip impressions while the lower body bears a row of continuous v-shaped impressions. Height 12cm, Diameter at Rim 15cm, Max Diameter 16cm, Diameter of Base 6.2cm, Found with a collection of human bones, un-burnt said to be of an adult. Skull missing.
Reference:	NMI Topographical Files

Museum No:	IA/79/67
Townland:	Greatdown
Parish:	Killucan
Barony:	Farbill
Find:	Quern (?) and Stone Head (Both granite)
Find place:	1967 Found in a farm of a man called Burns in the townland of Newdown where there is a Holy Well called St. Kieran's Well and also the site (only a green mound) of a reputed small monastery
Description:	It is a stone built well but on the top stone is a long oval stone the size of a human head elongated horizontally, with a face on either end. The stone is rough and of poor quality 28cm long and 15cm wide and 17cm high. The face is flat has pointed oval slightly hollow eyes and straight sided squared ended nose. This stone was dug up near the well. In the same farmers yard is a very large granite quern stone in perfect condition with its grinding stone. The lower stone is 109cm in outer diameter and 39cm high. It is hollowed out to a depth of 33cm, the side sloping inwards from the top. There are two drainage holes from the bottom both running through the walls on opposite parts of the 'trough'. Upper stone is 67.5cm in diameter and has a flat underside, vertical outer edge and convex upper surface.
Reference:	NMI Topographical Files

Museum No:	1976:39-40
Townland:	Knockmant
Parish:	Killucan
Barony:	Farbill
Find:	Bronze strip, Iron Object
Find place:	Gravel pit
Description:	Dates for Knockmant IA/37/76 = 1165+/-35 BP. 95.4% Calibration= AD 770-980. A souterrain passage was found during quarrying operations at a gravel pit in 1975. The gravel pit was situated in Knockmant, Killucan, Co. Westmeath. A preliminary investigation of the site was carried out in May 1975 by Dr. J Raftery. A full investigation followed. When examined a portion of the passage had been exposed in the quarry face and some of the wall stones and roof stones had been dislodged. The passage walls were of dry-stone and it was roofed with lintels. Excavations revealed the Souterrain entrance and bee-hive chamber. The passage decreased in internal height from 1m at the entrance to 85cm at a point where a bend in the passage occurred 1.5m west of the entrance. The chamber was perfectly preserved. It was bee-hive and had 7 courses of corbels in its construction. The only artefact associated with the Souterrain was a small strip of bronze (1976:39). This was found over the bend in the passage immediately W of the entrance. A pointed iron object was found in topsoil 4m to N of the entrance. Parallel sided strip of corroded bronze. Broken at back end. Small circular rivet hole 4mm from one end. This is 1mm in diameter. Max Length of strip 4.6cm, Width 1.25cm, Thickness 6mm. Heavily corroded iron object consists of a bar of rectangular cross section which begins to taper to a point approx. 3cm from one end. Max Length 6.6cm, Max dimensions of cross section 9mmx7mm. Charcoal sample recovered from Souterrain identified and sent for AMS dating.
Reference:	NMI Topographical Files

Museum No:	1965:70
Townland:	Knockmant
Parish:	Killucan
Barony:	Farbill
Find:	Human Skeleton Fragments
Find place:	sandridge
Description:	Fragments of long bones, pelvis etc of a skeleton found 20cm below surface of sandridge. A tree on the site is called the 'Bishops' Bush' possibly a sacred tree? Described by J.B. Coakley as 'Fragments of human skeletal remains of an individual aged about 16 years. Very fragmented.
Reference:	NMI Topographical Files

Museum No:	1964:223-224 & 1964:240
Townland:	Knockmant
Parish:	Killucan
Barony:	Farbill
Find:	Bronze Pin (1964: 223) Human Bones (1964: 224) Lump of Iron Slag (1964:240).
Find place:	Sandpit
Description:	Disc headed bronze pin in very good condition except that the stem is broken into two parts and that about ¼ of the edge of the disc head is ragged. The stem is very long, round in cross-section and tapers to a sharp point. The disc head is at right angles to the stem. It is thin and flat except for a very slight and thin ridge around the top. Length 47.7cm, diameter of disc head 4.7cm, diameter and height of central cone 9.9mm and 1.025cm respectively. Un-burnt skeleton of what appears to be a young person. Found buried in the top of a sandpit, lying face downwards head to the W and feet to the east. Fairly large lump of iron slag. Some gritty grey clay adheres to the underside, presumably from contact while still hot with the bottom of the furnace. Weight 1lb, 8 oz. Found in 954 at the bottom of a 'burnt area' in a sandpit about 15 yards from where the burial was found.
Reference:	NMI Topographical Files

Museum No:	IA/213/64
Townland:	Knockmant
Parish:	Killucan
Barony:	Farbill
Find:	Bog Butter
Find place:	Bog
Description:	A large lump of bog butter was found in this bog circa 1934. No details except that it did not seem to be contained in any wooden, leather or other protection.
Reference:	NMI Topographical Files

Museum No:	1966:184–192
Townland:	Knockmant
Parish:	Killucan
Barony:	Farbill
Find:	Food Vessel (184) & Cremation (186), Cinerary Urn Crimsherd (185) & Skeleton (188), Skeleton A (187), Skeleton B (188) , Skeleton C (189), Skeleton D (190-191), Skeleton F (192), Skeleton E (186).
Find place:	
Description:	<p>1966:184: The internal surface of the urn is decorated in horizontal row of triangular impressions. Externally the neck bears a well pronounced band of horizontal chevron executed in false relief technique. From the shoulder to the base the surface is divided into vertical panels divided from one another by groups of from 4-7 plan incised lines. The ware is reddish-brown on the outer surface and brown on the inner surface. Height 9.8cm, Rim Diameter 10.2cm, Middle Diameter 12.2cm, external Base Diameter 4.8cm, Thickness 1.2cm. The vessel was found standing upright and filled with clay. A spread of cremated bone 10cm thick was found on the N & W sides of the food vessel.</p> <p>1966:185 A small fragment of thick rim sherd which may represent portico of the rim of a cinerary urn. Portion of the inner surface of the body wall, portion of the inner level of the rim as well as a portion of the outer surface of the rim is present. It would appear that the rim is an everted rim. The ware is dark brown in colour on the outer and inner surfaces. Height of sherd 2.8cm, Thickness of rim 1.4cm, Thickness of body wall 1.6cm. Found close to the left arm of skeleton (188).</p> <p>1966:186 Cremated Human Bone found associated with & beside an upright food vessel (1966:184) at a depth of 75cm below the surface of the sand & gravel ridge. The burial was about a meter E of a tree known as 'Bishop's Bush'. In the near vicinity a number of excavated skeletal burials. The skeletons were about 1 meter apart and parallel to each other in a row roughly E-W. The skeletons were orientated NE-SW.</p>
Reference:	NMI Topographical Files

Museum No:	1982: 26
Townland:	Knockmant
Parish:	Killucan
Barony:	Farbill
Find:	Polished stone axehead
Find place:	No details
Description:	No details
Reference:	NMI Topographical Files

Museum No:	1984:106
Townland:	Windtown
Parish:	Mullingar
Barony:	Moyashel and Magheradernon
Find:	Spherical Stone
Find place:	No details
Description:	Spherical stone of almost perfect symmetry. The surface is pocked and bears an iron oxide encrustation. D 7.4cm, Weight 645.5g. Found during tillage operations on land adjacent to a bog. The stone was identified as either Dolerite or Gabbro and it probably originated from Co. Antrim.
Reference:	NMI Topographical Files

Museum No:	1928:835
Townland:	Windtown
Parish:	Rathaspick
Barony:	Moygoish
Find:	Stone axe (broken)
Find place:	Found in the back of a private house garden at Windtown.
Description:	No details
Reference:	NMI Topographical Files

Museum No:	1988:114
Townland:	Windtown
Parish:	St. Feighins
Barony:	Fore
Find:	Fragment of Bronze Cauldron
Find place:	Found on 'big island' on Lough Lene.
Description:	No details
Reference:	NMI Topographical Files

Museum No:	1988: 37-40
Townland:	Windtown
Parish:	St. Feighins
Barony:	Fore
Find:	Flat Bronze Axe (1988:37) Socketed Bronze Axe (1988:38) Flat Bronze Axe (1988:39) Bronze Bell (1988:40)
Find place:	Found on island site on Lough Lene.
Description:	No details
Reference:	NMI Topographical Files

Protection of Cultural Heritage

The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the *European Convention on the Protection of the Archaeological Heritage* (Valletta Convention), ratified by Ireland in 1997.

The Archaeological Resource

The *National Monuments Act 1930 to 2004* and relevant provisions of the *National Cultural Institutions Act 1997* are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2).

A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Ownership and Guardianship of National Monuments

The Minister may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Register of Historic Monuments

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

Preservation Orders and Temporary Preservation Orders

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Record of Monuments and Places

Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for the Environment, Heritage and Local Government) to establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises a list of monuments and relevant places and a map/s

showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994. All recorded monuments on the proposed development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that 'where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in the case of urgent necessity and with the consent of the Minister, commence the work until two months after the giving of notice'.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding €3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding €10,000 or imprisonment for up to 5 years is the penalty. In addition they are liable for costs for the repair of the damage caused.

In addition to this, under the *European Communities (Environmental Impact Assessment) Regulations 1989*, Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the proposed development will have on the existing environment, which includes the cultural, archaeological and built heritage resources. These documents' recommendations are typically incorporated into the conditions under which the proposed development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

The Planning and Development Act 2000

Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

County Westmeath Development Plan 2008-2014

Policy

P-EH113 It is the policy of the Council to preserve *in situ* all archaeological remains and sites of importance, such as National Monuments, Recorded Monuments, their setting and context and zones of archaeological potential. Within zones of archaeological potential and in the vicinity of Recorded Monuments, development will only be permitted where the Council considers the importance of the proposed development or other material considerations outweigh the value of the remains in question.

Aims

O-EH43 To strictly control development that may be detrimental to any feature or site of archaeological significance or that may seriously detract from the interpretation and setting of these sites.

O-EH44 To carry out further research into the archaeological potential of areas around the County, taking account of existing Urban Archaeology Studies and other research, and of incidences of chance finds of archaeological objects around the County

Policy

P-EH114 It is the policy of the Council to promote public awareness of the rich archaeological heritage that exists in County Westmeath through publications, research and the availability of information

Aims

O-EH45 To endeavour to ensure that all reports, excavation results and other information relating to the archaeological heritage be made available for public viewing at libraries or where otherwise appropriate and in a timely manner.

O-EH46 To create and maintain a database of all archaeological reports and Environmental Impact Statements and make it available for public viewing.

O-EH47 To promote pre-planning consultations in relation to proposed developments that may potentially impact upon archaeological heritage.

O-EH48 To provide guidance to developers and landowners in relation to proposals for development that may potentially impact upon the archaeological heritage, drawing their attention to additional published government guidance available such as 'Framework and Principles for the Protection of the Archaeological Heritage, 1999'.

O-EH49 To endeavour to improve access to Uisneach, in support of the County Heritage Plan and with the involvement of landowners and relevant authorities.

O-EH50 The Council shall seek in consultation with the National Monuments Service of the DoEHLG to designate Kilbixy and the Hill of Uisneach as Archaeological Landscape Areas in recognition of their high density of archaeological monuments and national heritage significance

Policy

P-EH115 It is the policy of the Council to ensure that all sites of archaeological potential are protected from development that may injure any potentially important archaeological features or sites.

Aims

O-EH51 To require, where appropriate, that an archaeological assessment be carried out by a suitably qualified person prior to the commencement of any activity that may impact upon the archaeological heritage.

O-EH52 To ensure that any development taking place either above or below ground which is within, adjacent to, or might affect sites and features of historical and archaeological interest shall respect the character of the archaeological site and its setting and shall be sited and designed with care for the character of the site and setting.

O-EH53 To define buffer zones, where appropriate, for the prohibition or limitation of development or for the requirement of archaeological assessment to be carried out prior to development, in the vicinity of areas of archaeological importance.

O-EH54 To impose conditions on development that will affect sites of archaeological potential to ensure that appropriate measures are taken for the identification and mitigation of the archaeological impacts, including a licensed excavation and recording of remains prior to commencement of development where appropriate.

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Potential Impacts on Archaeological and Historical Remains

Impacts are defined as 'the degree of change in an environment resulting from a development' (Environmental Protection Agency 2003: 31). They are described as profound, significant or slight impacts on archaeological remains. They may be negative, positive or neutral, direct, indirect or cumulative, temporary or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways.

- Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape.
- Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation.
- Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits.
- Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value.
- Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow.
- Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits.
- Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

Predicted Impacts

The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;
- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected;
- Assessment of the levels of noise, visual and hydrological impacts, either in general or site specific terms, as may be provided by other specialists.

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Potential Mitigation Strategies for Cultural Heritage Remains

Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce or offset negative effects.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved *in situ*.

Definition of Mitigation Strategies

Archaeological Resource

The ideal mitigation for all archaeological sites is preservation *in situ*. This is not always a practical solution, however. Therefore a series of recommendations are offered to provide ameliorative measures where avoidance and preservation *in situ* are not possible.

Full Archaeological Excavation involves the scientific removal and recording of all archaeological features, deposits and objects to the level of geological strata or the base level of any given development. Full archaeological excavation is recommended where initial investigation has uncovered evidence of archaeologically significant material or structures and where avoidance of the site is not possible.

Archaeological Test Trenching can be defined as 'a limited programme... of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land or underwater. If such archaeological remains are present test trenching defines their character and extent and relative quality.' (IFA 2001c, 1)

Archaeological Monitoring can be defined as a 'formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons within a specified area or site on land or underwater, where there is possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive.' (IFA 2001b, 1)

Underwater Archaeological Assessment consists of a programme of works carried out by a specialist underwater archaeologist, which can involve wade surveys, metal detection surveys and the excavation of test pits within the sea or riverbed. These assessments are able to access and assess the potential of an underwater environment to a much higher degree than terrestrial based assessments.

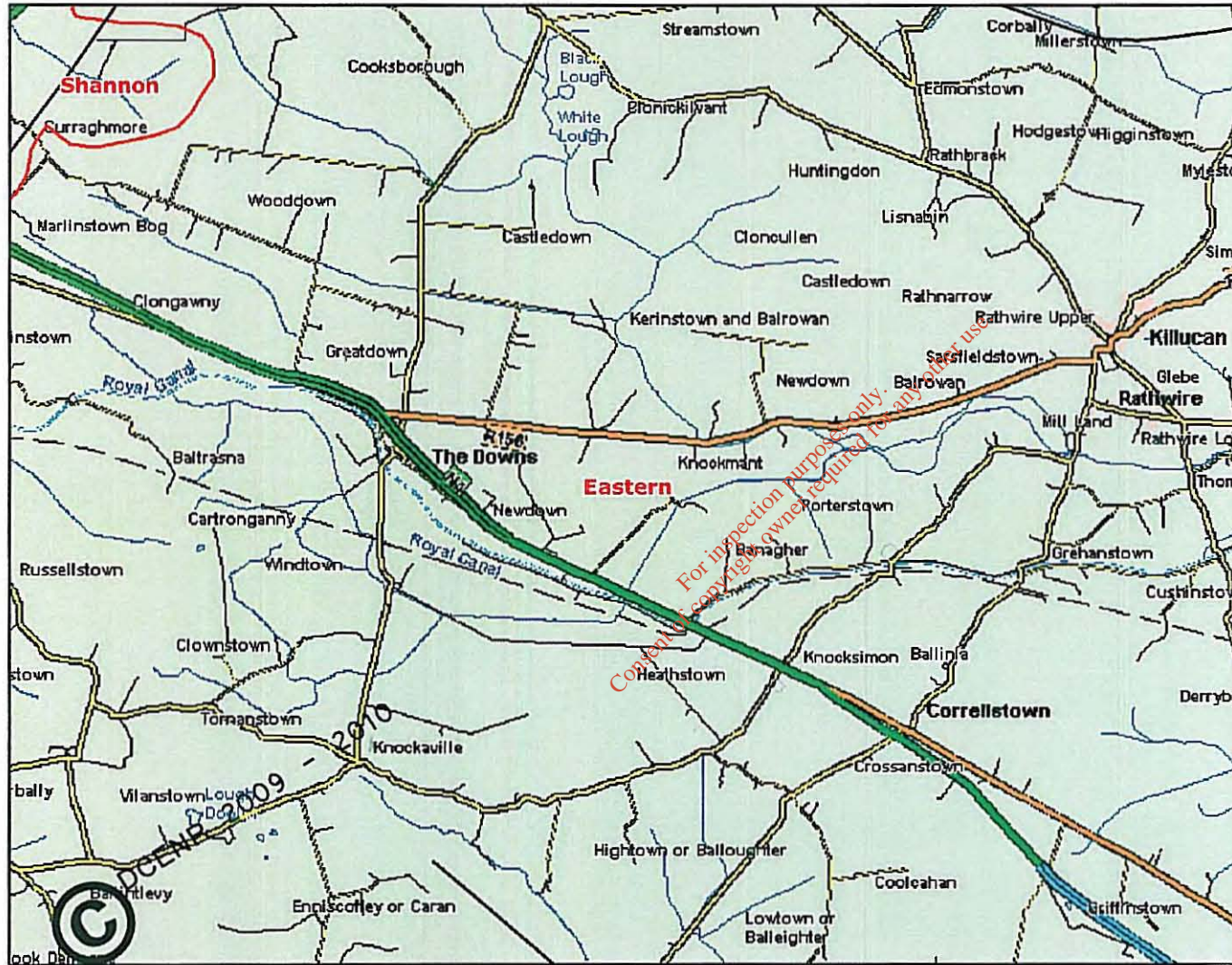
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Appendix E

Bedrock Faults 100k
National Draft Generalised Bedrock (DPUL)
Nation Draft Gravel Aquifer Map
Teagasc Subsoils (Peat)
Bedrock1:1 Million Solid Geology
Groundwater Well Data
Source Protection Area
Eastern Interim Vulnerability
National Draft Bedrock Aquifer map
Karst Features
Soils Map
Sub Soils Map
River Catchment
Hydrometric Area
River Basin District
Trial Pit Locations



111_001_Bedrock Faults 100k



Legend

- Bedrock Faults 100k
- RBD Boundaries

Scale: 1:60,000



Map center: 252399, 250530

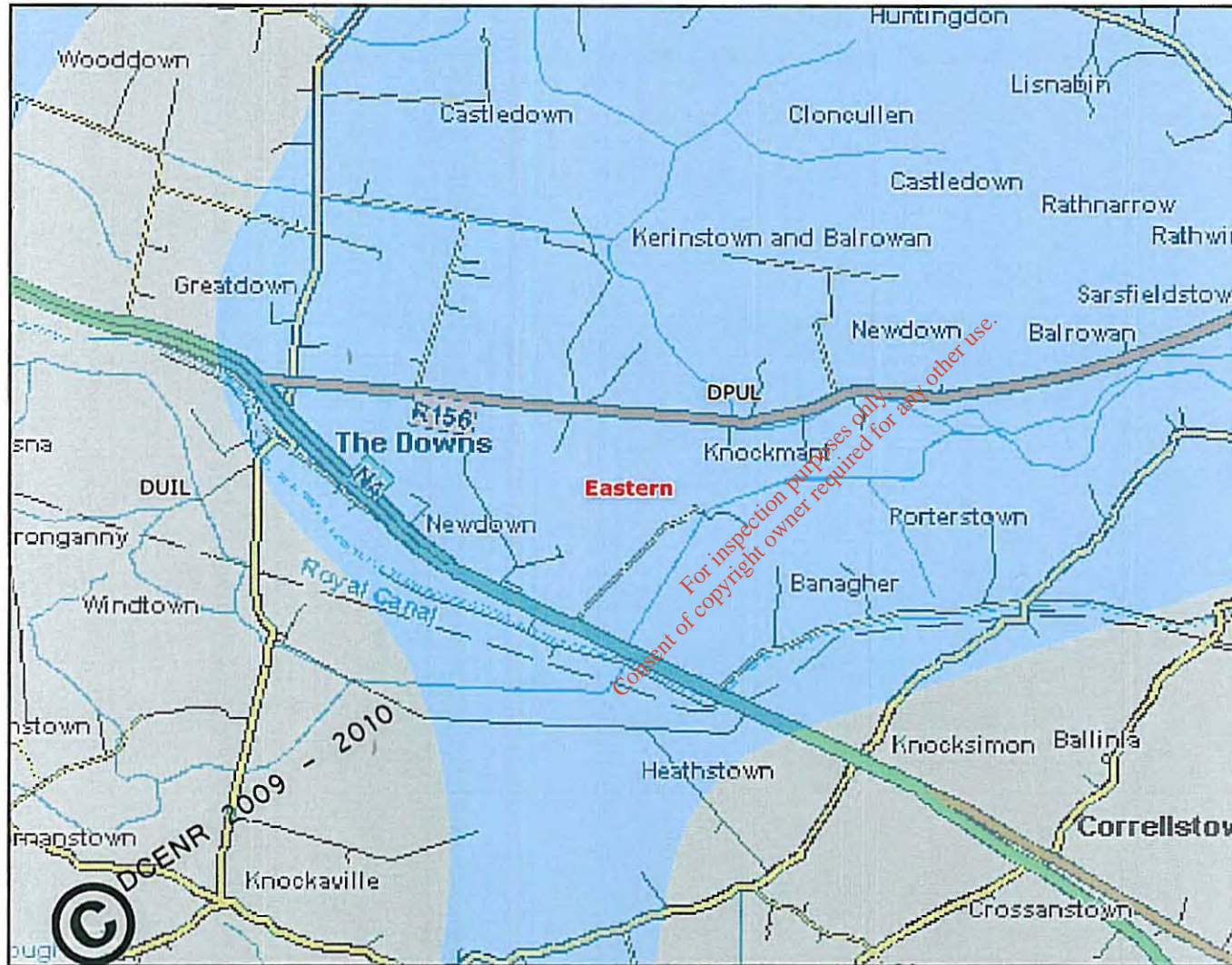


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Snapshot Date: 16-Mar-2011



111_001_National Draft Generalised Bedrock (DPUL)



Legend National Draft Generalised Bedrock Map

- BV - Basalts and other Volcanic rocks
 - CM - Cambrian Metasediments
 - DDL - Dinantian Dolomitic Limestones
 - DESSL - Dinantian early Sandstones, Shales and Limestones
 - DKS - Devonian Kiltoran type Sandstones
 - DLIL - Dinantian Lower Impure Limestones
 - DMSC - Dinantian Mudstones and Sandstones Cork Group
 - MSSL - Dinantian Mixed Sandstones, Shales and Limestones
 - DORS - Devonian Old Red Sandstones
 - DPBL - Dinantian Pure Bedded Limestones
 - DPUL - Dinantian Pure Unbedded Limestones
 - DS - Dinantian Sandstones
 - DSL - Dinantian Shales and Limestones
 - DUIL - Dinantian Upper Impure Limestones
 - GI - Granites and other Igneous Intrusive rocks
 - NSA - Namurian Sandstones
 - NSH - Namurian Shales
 - NU - Namurian Undifferentiated
 - OM - Ordovician Metasediments
 - OV - Ordovician Volcanics
 - PM - Precambrian Marbles
 - PQGS - Precambrian Quartzites, Gneisses and Schists
 - PTMG - Permo Triassic Mudstones and Gypsum
 - PTS - Permo Triassic Sandstones
 - SMV - Silurian Metasediments and Volcanics
 - WSA - Westphalian Sandstones
 - WSH - Westphalian Shales
- RBD Boundaries



Map center: 252399, 250530

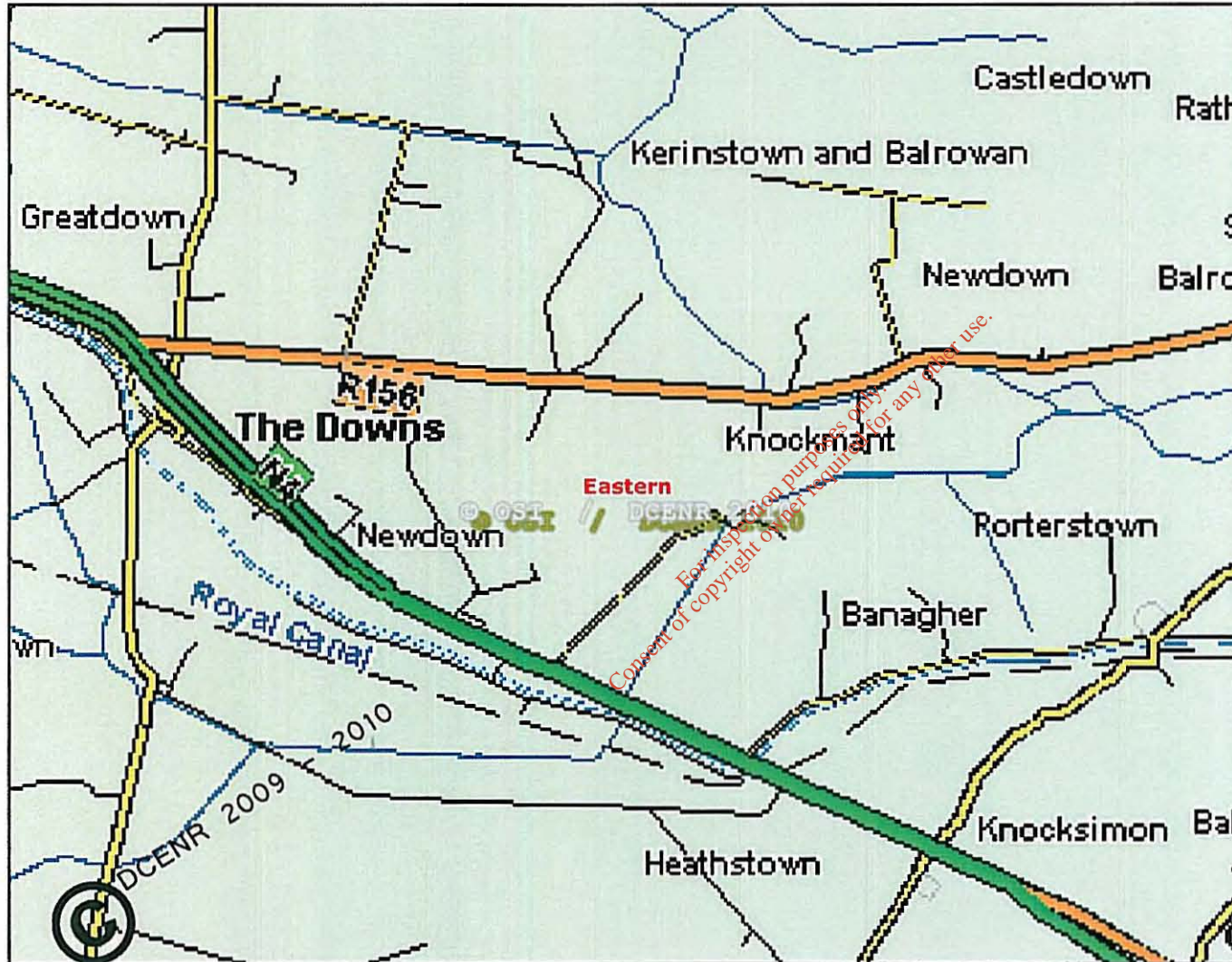
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Snapshot Date: 16-Mar-2011



111_001_National Draft Gravel Aquifer Map



Legend
National Draft Gravel Aquifer Map

- █ Rg - Regionally Important, extensive sand/gravels aquifers
- █ Lg - Locally important, sand/gravel aquifers
- No gravels present
- Not Mapped
- RBD Boundaries
- Watermark



Map center: 252399, 250530

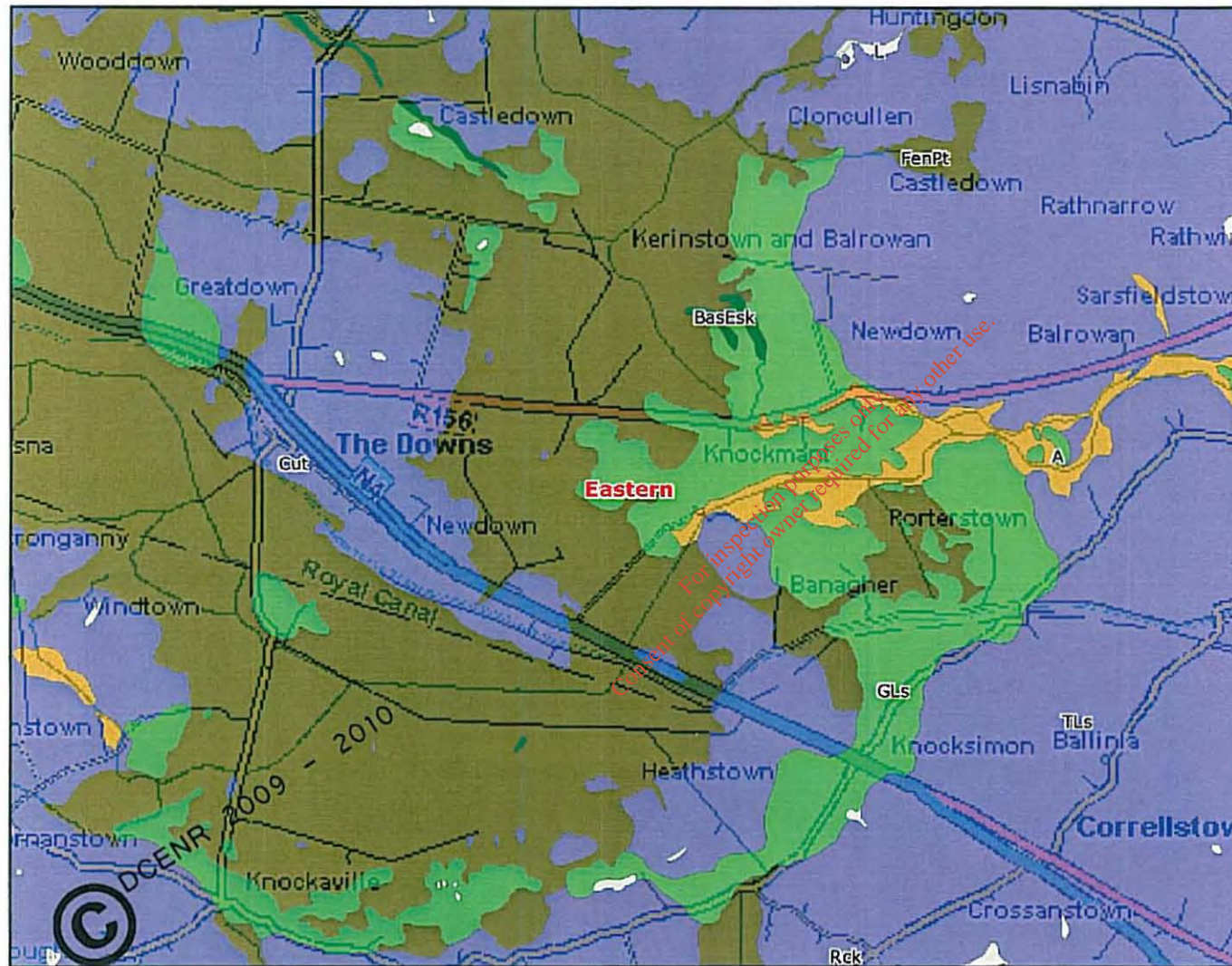
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Snapshot Date: 16-Mar-2011



111_001_Teagasc Subsoils (Peat)



Legend

RBD Subsoils

- Alluvium
- Beach sands and gravels
- Bedrock outcrop and subcrop
- Esker sands and gravels
- Glaciofluvial sands and gravels
- Lake sediments
- Made ground
- Marine/estuarine silts and clays
- Marsh
- Peat
- Scree
- Till derived chiefly from Devonian sandstones
- Till derived chiefly from Lower Palaeozoic rocks
- Till derived chiefly from Namurian rocks
- Till derived chiefly from granites
- Till derived chiefly from limestone
- Till derived chiefly from metamorphic rocks
- Till derived from metamorphic rocks
- Till derived from mixed Devonian and Carboniferous rocks
- Water
- Windblown sands
- RBD Boundaries

Scale: 1:40,000

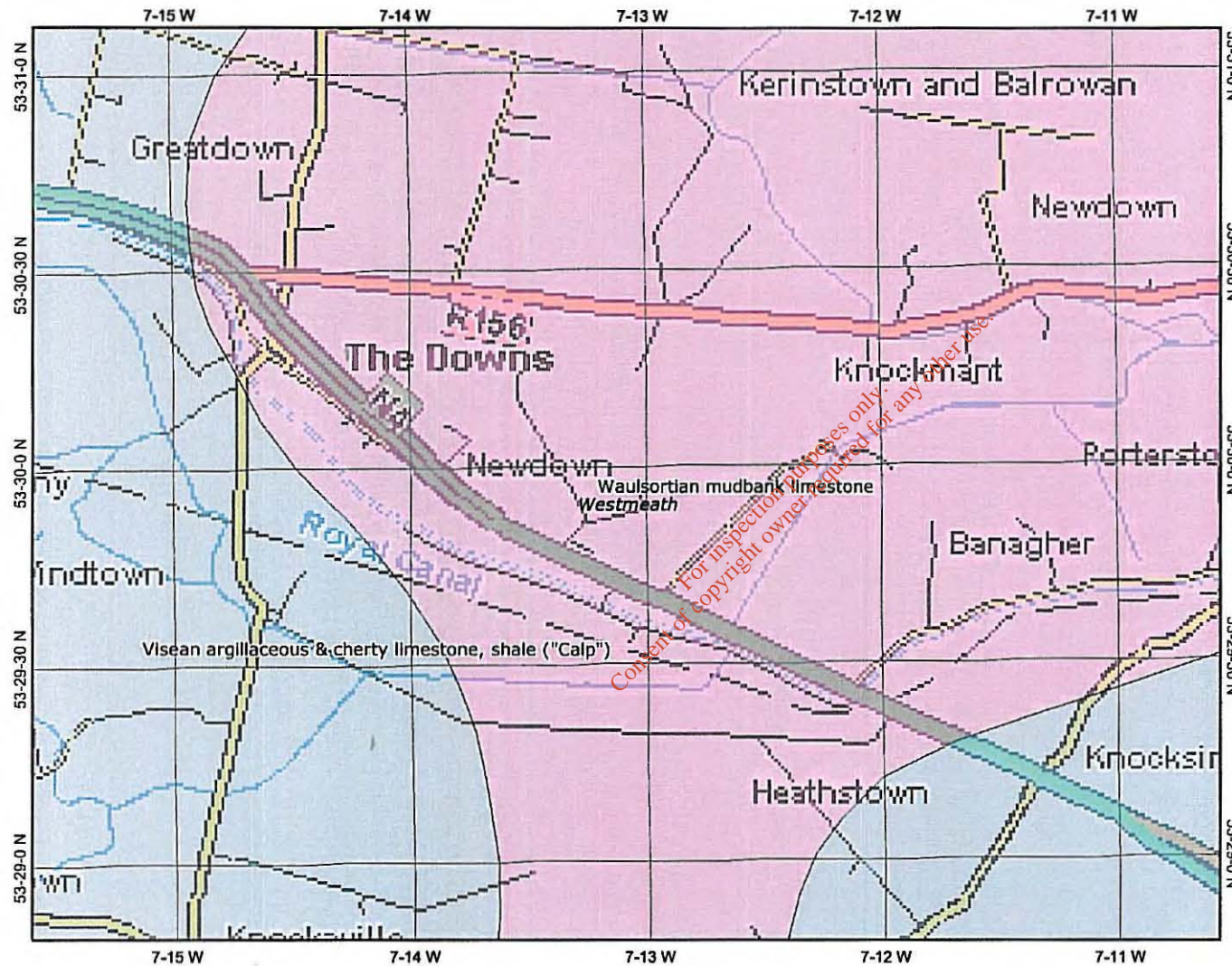
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111_001_Bedrock_1_1 Million Solid Geology



Legend

Bedrock Geology 1:1 Million

- Appin Group, Dalradian, schist, marble, quartzite
- Argyll Group, Dalradian, schist, marble, quartzite, amphibolite
- Cambrian greywacke, slate, quartzite
- Carboniferous volcanic rocks
- Cretaceous chalk, flint, glauconitic sandstone
- Devonian volcanic rocks
- Grampian Group, Dalradian, schist
- Jurassic mudstone & limestone
- Lower-Middle Ordovician slate, sandstone, greywacke, conglomerate
- Lower-Middle Ordovician volcanic rocks
- Mesoproterozoic gneiss
- Meta-dolerite, meta-gabbro
- Mid. Devonian ORS, sandstone, siltstone & mudstone
- Middle-Upper Ordovician slate, sandstone, greywacke, conglomerate
- Middle-Upper Ordovician volcanic rocks
- Moffat Shale - facies shale & greywacke (Ordovician-Silurian)
- Namurian shale, sandstone, siltstone & coal
- Neoproterozoic schist and gneiss
- Oligocene clay, sand & lignite
- Ordovician granitic rocks
- Ordovician metagabbro & orthogneiss suite (Coni.....)
- Palaeocene columnar tholeiitic basalt lava
- Palaeocene laterite, bauxite & lithomarge
- Palaeocene olivine basalt lava (Lower Basalt Fm.)
- Palaeocene olivine basalt lava (Upper Basalt Fm.)

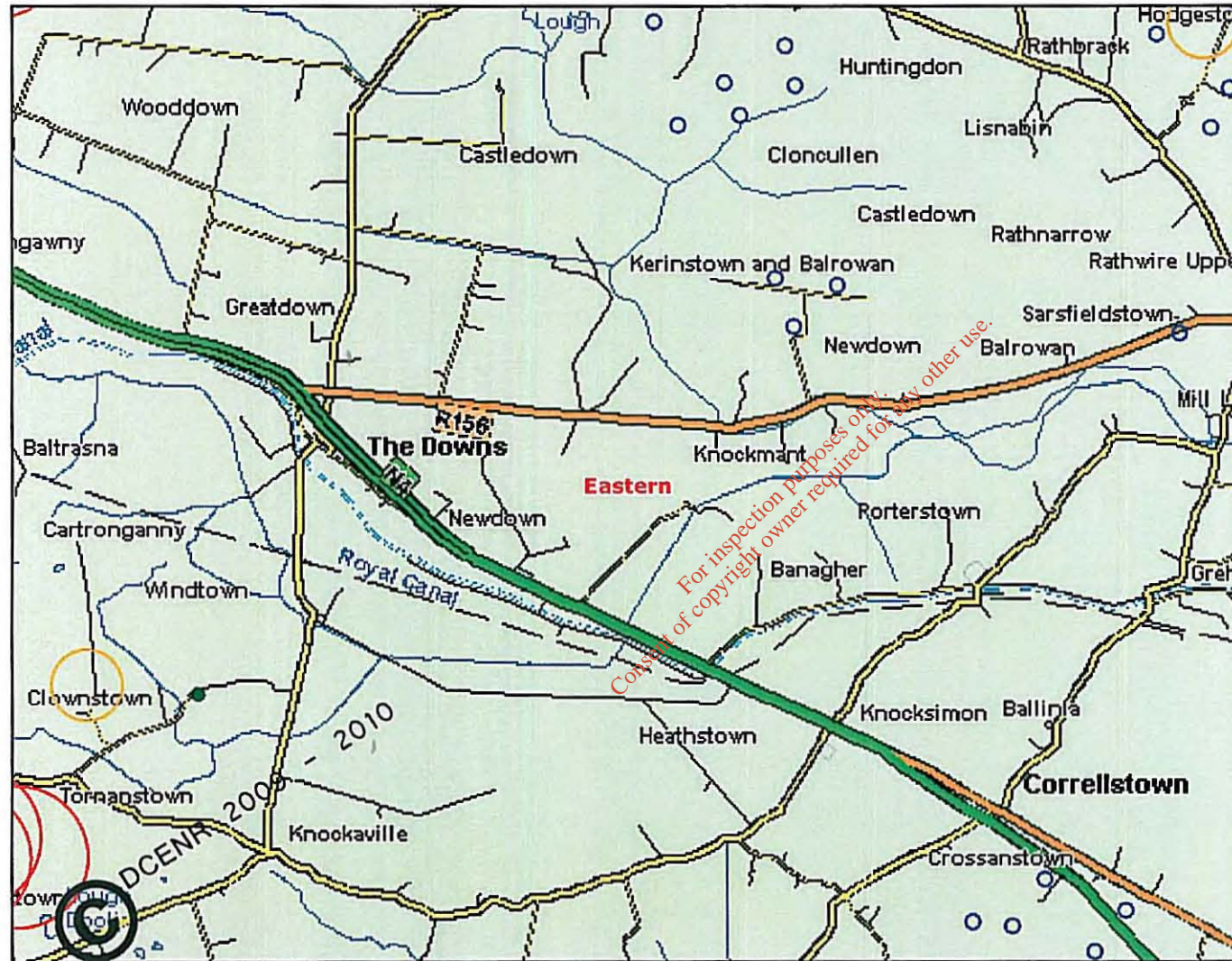
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111_001_Groundwater Well Data



Legend

- Wells Accuracy within 10m to 50m
- Wells Accuracy within 100m
- Wells Accuracy within 200m
- Wells Accuracy within 500m
- Wells Accuracy within 1km
- RBD Boundaries



Map center: 252399, 250530

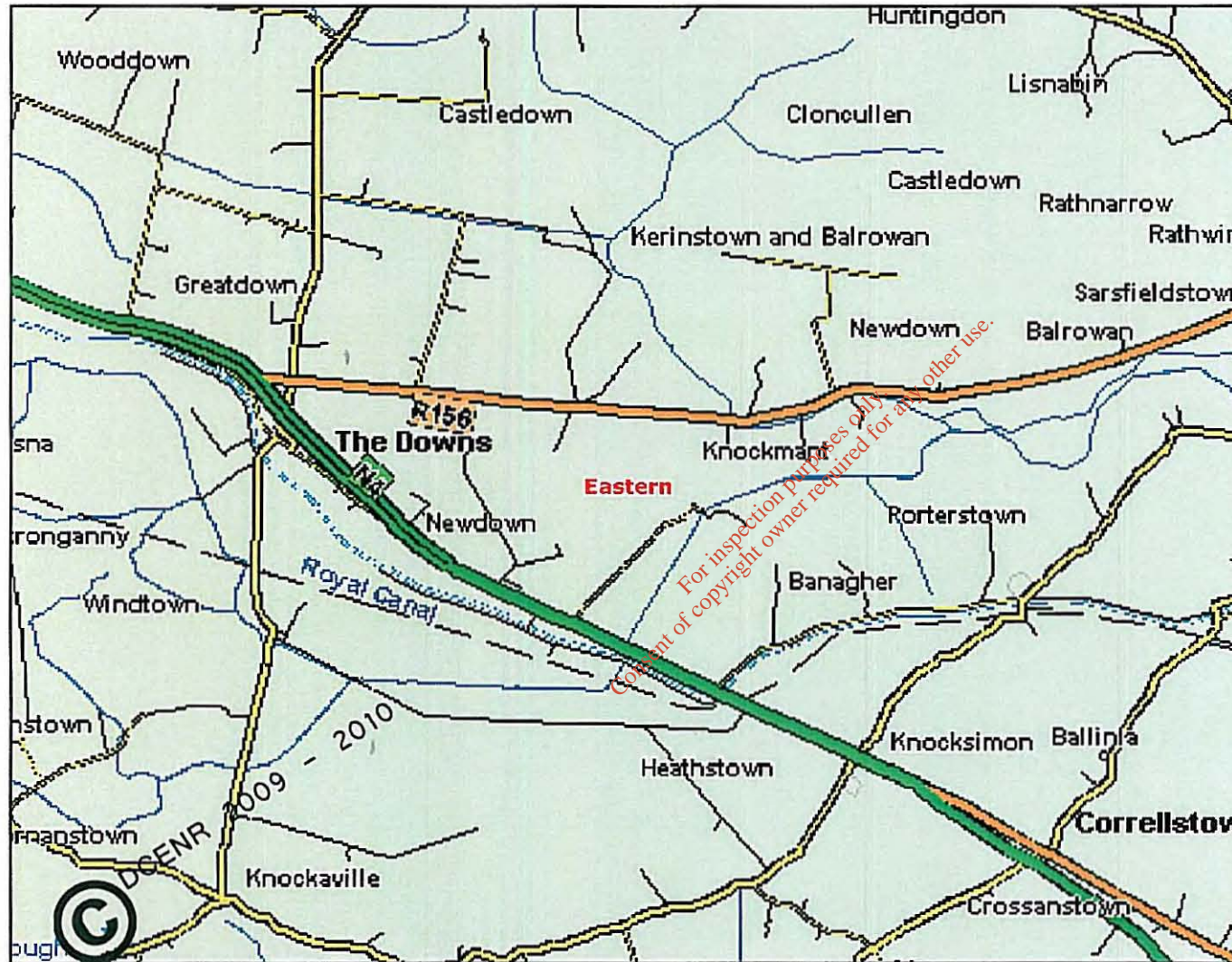
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Snapshot Date: 16-Mar-2011



111_001_Source Protection Area



Legend

- Source Protection Area
- SI - Inner Protection Area
- SO - Outer Protection Area
- RBD Boundaries



Map center: 252399, 250530



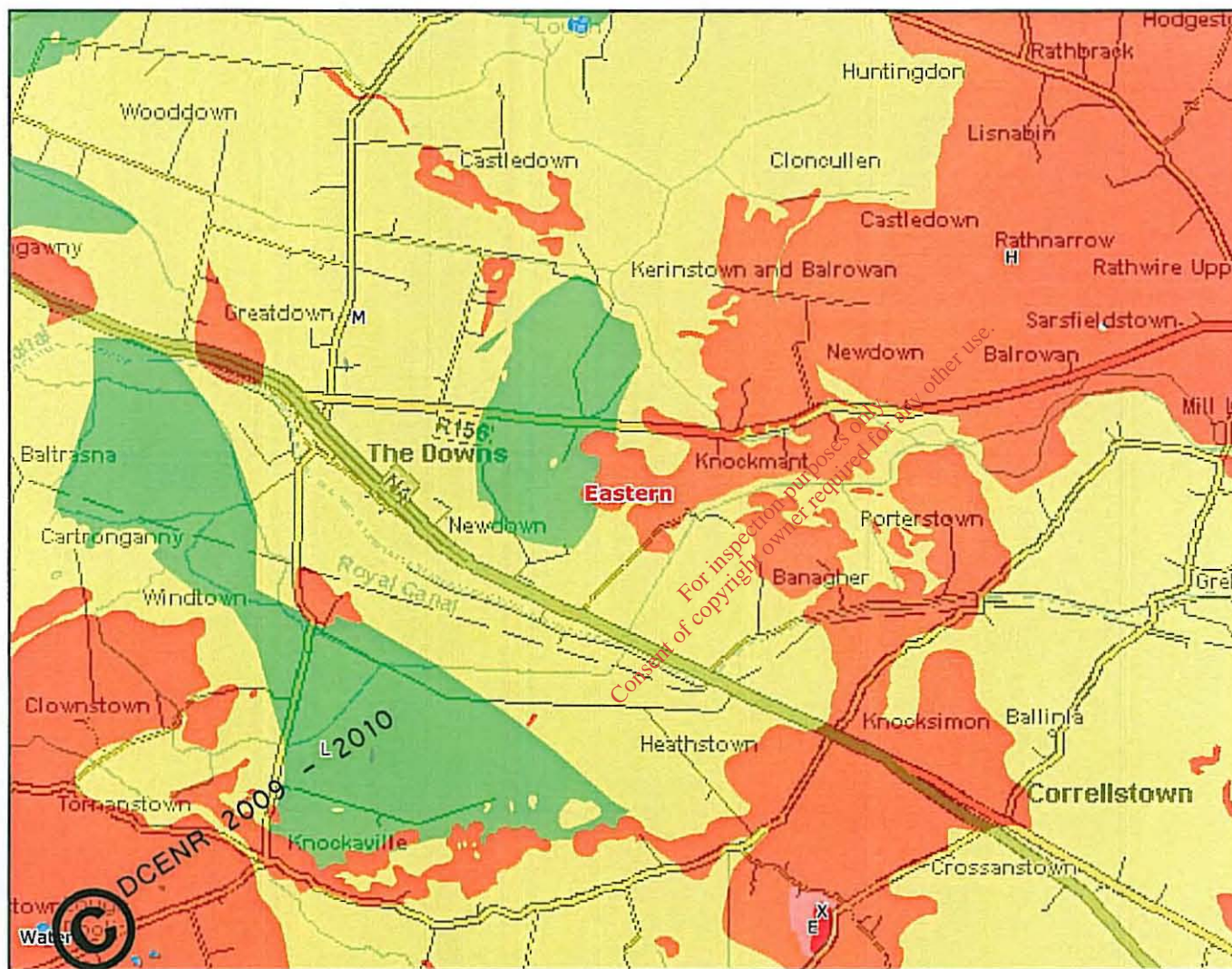
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Snapshot Date: 16-Mar-2011



111_001_Eastern Interim Vulnerability



Legend

Interim Vulnerability

- E (Rock near Surface or Karst)
- E - Extreme
- H - High
- M - Moderate
- L - Low
- HL - High to Low. Only an interim study took place.
- Water
- RBD Boundaries



Map center: 252399, 250530



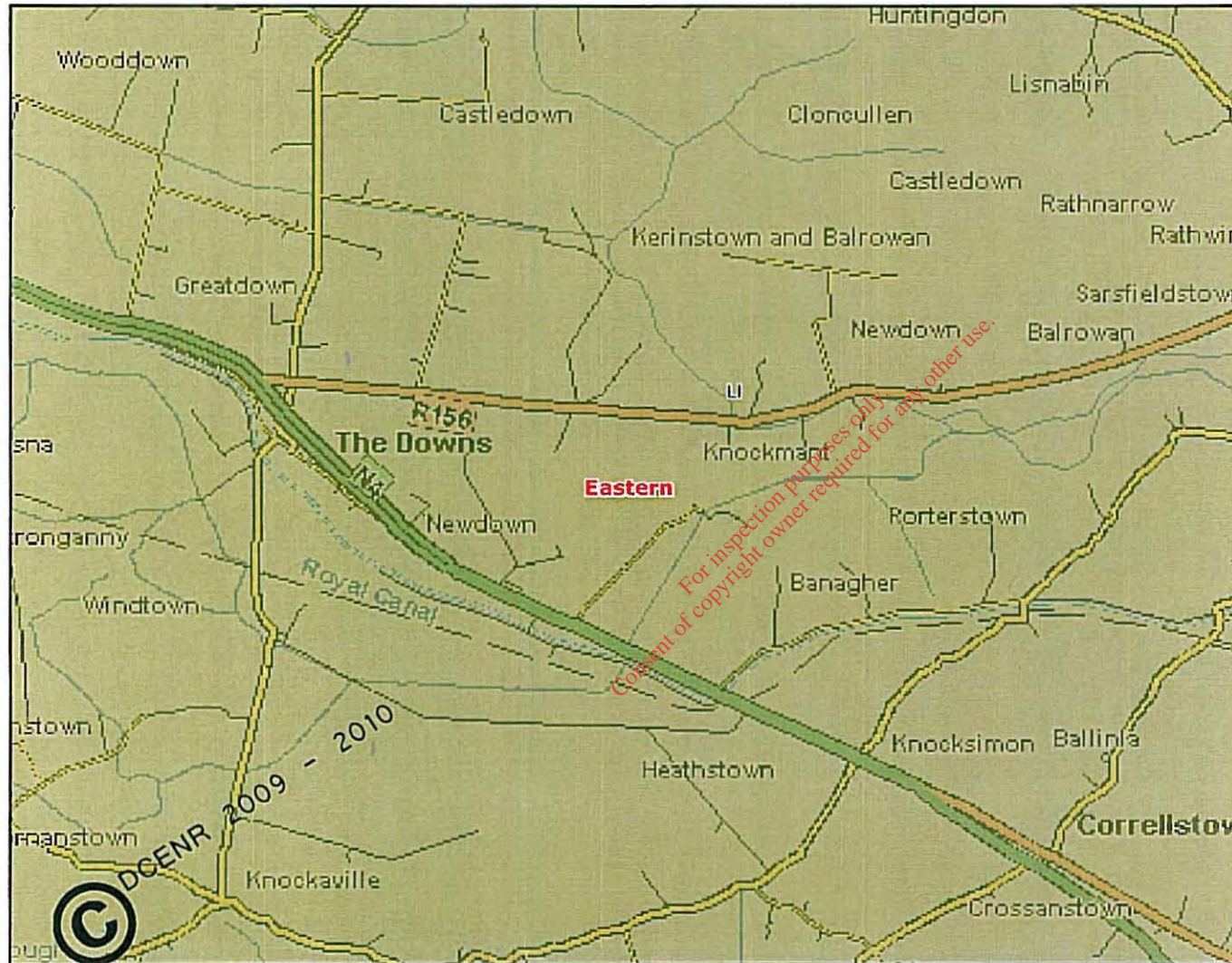
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Snapshot Date: 16-Mar-2011



111_001_National Draft Bedrock Aquifer Map (LI)



- Legend**
- National Draft Bedrock Aquifer Map
- Rf - Regionally Important Aquifer - Fissured bedrock
 - Rk - Regionally Important Aquifer - Karstified
 - Rkd - Regionally Important Aquifer - Karstified (diffuse)
 - Rkc - Regionally Important Aquifer - Karstified (conduit)
 - Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
 - Lk - Locally Important Aquifer - Karstified
 - Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
 - Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
 - Pu - Poor Aquifer - Bedrock which is Generally Unproductive
 - Unclassified
 - RBD Boundaries

0 1000 2000 3000 m.

Map center: 252399, 250530



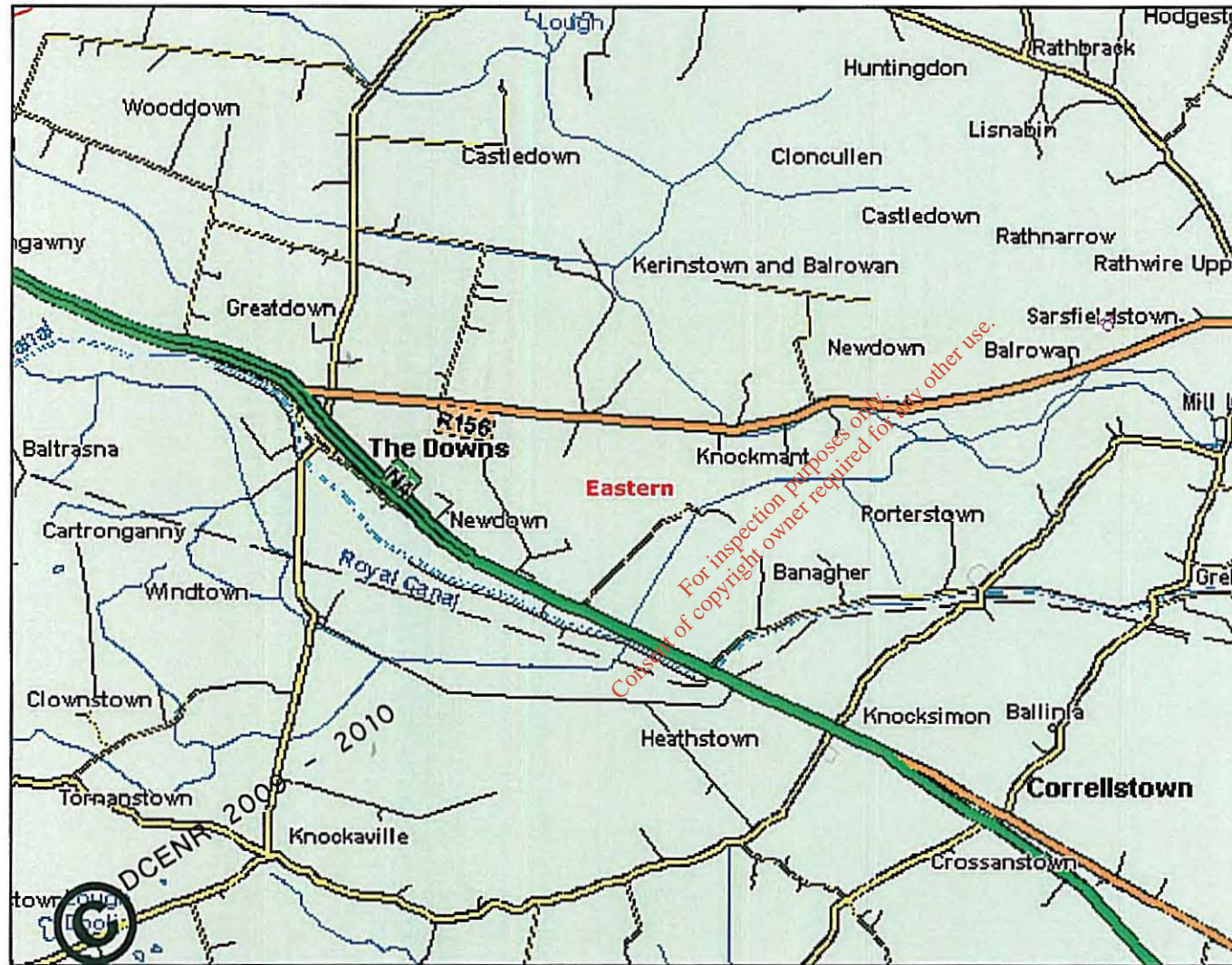
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Snapshot Date: 16-Mar-2011



111_001_Karst Features



Legend

Karst Features

- Borehole
- Cave
- Dry Valley
- Enclosed Depression
- Estoville
- Spring
- Superficial Solution Features
- Swallow Hole
- Turlough
- RBD Boundaries

Scale: 1:45,000



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SOILS MAP



LEGEND



- BminDW - Grey Brown Podzolics
Brown Earths, Basic**

- Cut - Raised Bog
cutaway/cutover**

SUB SOILS MAP



LEGEND

-  **Cut - Cutover peat**
-  **TLs - Limestone till
Carboniferous**

RIVER CATCHMENT



HYDROMETRIC AREA



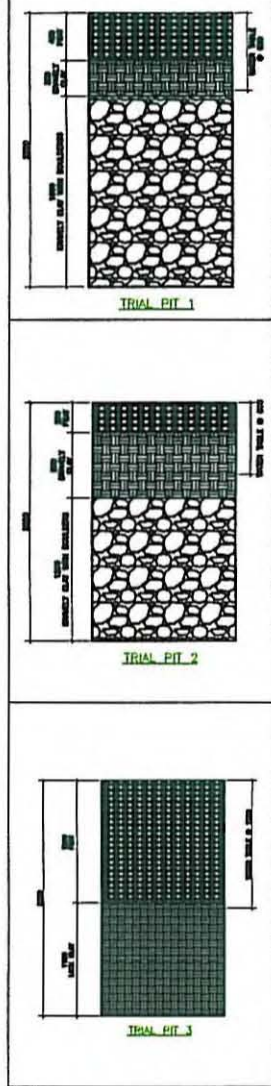
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GROUNDWATER VULNERABILITY TRIAL PIT LOCATIONS

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			MOC	

CLIENT:	BIO AGRIGAS LTD		
PROJECT:	PROPOSED BIOENERGY FACILITY AT THE DOWNS, MULLINGAR CO. WESTMEATH		
TITLE:	TRIAL PIT LOCATIONS		
DRAWN:	CHECKED:	APPROVED:	DRAWING NO.:
MOC			111_001_802
DATE:	SCALE:		REV:
15/11/11			D1



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Appendix F

Traffic Generation Information
Junction Capacity
Traffic Flow Diagrams
Traffic Survey Information

Traffic Generation Data for Anerobic Digestion Power Generation Facility		
Maximum 20,000 Tonnes of Organic Feedstock required per Annum		
Assumptions based on information from Applicant		
Delivery of Material Via 20 tonne Roll on Roll off Skip trucks. Deliveries over a period of 5.5 days a week, 50 weeks a year (Maximum). Operation of Facility to be over 24 hours a day, 365 days a year. Facility to be operated by approximate 10 staff over three shifts. (10,000 Tonnes to be sourced locally. This material to be pumped overland.)		
Above information implies the following:		
Facility to take deliveries 275 days over the year. 3 Staff over three shifts (08:00-18:00 - 18:00-02:00- 02:00-10:00)		
Assuming Baseline Data obtained by applicant	Arrivals	Departures
Truck Deliveries		
Maximum demand (10,000 tonnes) delivered with 20 tonne trucks 500 truck Deliveries per annum	500	500
Deliveries Per Day (Assuming 275 days of deliveries)	1.18 say 2	1.18 say 2
including 10% sensitivity loading on deliveries (Per Day) (All data rounded up)		3
Assuming Baseline Data obtained by applicant Staff Traffic Generation	Arrivals (Per Shift)	Departures (Per Shift)
Maximum 10 staff 3 staff per shift(1 staff per private vehicle)	3	3
Assuming additional traffic movements (Errands, Lunch, Etc)	3	3
Total Staff Movements per Shift	6	6
Ancillary Trips to and From the Site	Arrivals (Per Shift)	Departures (Per Shift)
Include Post, Visitors, Maintenance, etc	5	5
Total Traffic Generation for AD Facility as from first principles	Arrivals (Per Shift)	Departures (Per Shift)
Assume Maximum traffic during (08:00-18:00 shift) NB: No deliveries of waste materials anticipated during night time shifts.		
Delivery of Waste Material	3	3
Staff	6	6
Ancillary Trips	5	5
Total Traffic Generation per Shift	14	14
Total traffic generation per shift multiplied by a factor of 2 for total traffic generation over 24 hours.		
Total Traffic Generation per Day	24	24

Peak Times on Proposed R156 is between the hours of (08:00-09:00) and (17:00-18:00)		
	Arrivals	Departures
Deliveries shall be evenly distributed throughout the day Worst Case Scenario is to assume: 30% of trip rates between morning AM Peak 40% of trip rates throughout the remainder of the day 30% of trip rates between Evening PM Peak		
AM Peak Flow (@30% Daily total)	7.2 say 8 8	7.2 say 8 8
PM Peak Flow (@30% Daily total)	7.2 say 8 8	7.2 say 8 8
Of the total hourly trip rates 30% of total is large 20 Tonne Delivery Vehicles	3	3

Traffic Generation Data Summary	Arrivals	Departures
AM Peak (08:00-09:00)		
Cars and LGV's	5	5
HGV's	3	3
PM Peak (17:00-18:00)		
Cars and LGV's	5	5
HGV's	3	3

Traffic Generation Data for Anerobic Digestion Power Generation Facility
20,000 Tonnes of Digestate Material to be removed from site (Removal of material over a period of 7 months) Assumptions based on information from Applicant
Removal of material via 10 tonne liquid tank trucks. Removed over a period of 5.5 days a week, approximately 30 weeks a year (over 7 month period). Above information implies the following:
Removal of liquid material over 165 days per annum 20,000/10 tonnes= 2000 movements 2000/165 days= 13 daily removal trips 13x2= 26 two-way trips movements a day

Peak Hour Trips for Digestate Material		
Assume 30% AM and PM traffic distribution as previously assumed for worst case scenario.		
8 vehicles two-way movements per AM and PM Peak hour		
	Arrivals	Departures
AM Peak Hour	4	4
PM Peak Hour	4	4

Total Generated Traffic Summary		
Traffic Summary assuming 'Worst Case Scenario' including 7 month removal period.		
	Arrivals	Departures
Total Daily Trip Rate	37	37
AM Peak (08:00-09:00)		
Cars and LGV's	5	5
HGV's/ 20 Tonne/ 10 tonne trucks	7	7
PM Peak (17:00-18:00)		
Cars and LGV's	5	5
HGV's/ 20 Tonne/ 10 tonne trucks	7	7

Junction Capacity for T-Junction on R156 to Proposed Development (Scenario 1)			
2013 Year of Opening AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.021	97.9	OK
to N4 (R156)	0.014	98.6	OK
2013 Year of Opening PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.021	97.9	OK
to N4 (R156)	0.014	98.6	OK
2018 Mid-Term Year AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.021	97.9	OK
to N4 (R156)	0.014	98.6	OK
2018 Mid-Term Year PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.021	97.9	OK
to N4 (R156)	0.014	98.6	OK
2028 Future Year AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.022	97.8	OK
to N4 (R156)	0.014	98.6	OK
2028 Future Year PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.014	98.6	OK
to Proposed Development	0.021	97.9	OK
to N4 (R156)	0.014	98.6	OK

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Junction Capacity for Proposed New Roundabout on R156 with Proposed Development (Scenario 2)			
2013 Year of Opening AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.132	86.8	OK
to Proposed Development and N4	0.084	91.6	OK
R156	0.027	97.3	OK
L5603	0.006	99.4	OK
2013 Year of Opening PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.079	92.1	OK
to Proposed Development and N4	0.136	86.4	OK
R156	0.017	98.3	OK
L5603	0.004	99.6	OK
2018 Mid-Term Year AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.140	86	OK
to Proposed Development and N4	0.089	91.1	OK
R156	0.029	97.1	OK
L5603	0.007	99.3	OK
2018 Mid-Term Year PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.084	91.6	OK
to Proposed Development and N4	0.144	85.6	OK
R156	0.018	98	OK
L5603	0.004	99.6	OK
2028 Future Year AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.152	84.8	OK
to Proposed Development and N4	0.098	90.2	OK
R156	0.031	96.9	OK
L5603	0.008	99.2	OK
2028 Future Year PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Killucan (R156)	0.092	90.8	OK
to Proposed Development and N4	0.157	84.3	OK
R156	0.020	98.0	OK
L5603	0.004	99.6	OK

Junction Capacity for Proposed T-Junction from Proposed Development to New N4 Grade Separate (Scenario 2)			
2013 Year of Opening AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.021	97.9	OK
to N4	0.013	98.7	OK
2013 Year of Opening PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.021	97.9	OK
to N4	0.013	98.7	OK
2018 Mid-Term Year AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.021	97.9	OK
to N4	0.013	98.7	OK
2018 Mid-Term Year PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.021	97.9	OK
to N4	0.013	98.7	OK
2028 Future Year AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.022	97.8	OK
to N4	0.013	98.7	OK
2028 Future Year PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Proposed New Roundabout (R156)	0.013	98.7	OK
to Proposed Development	0.021	97.9	OK
to N4	0.013	98.7	OK

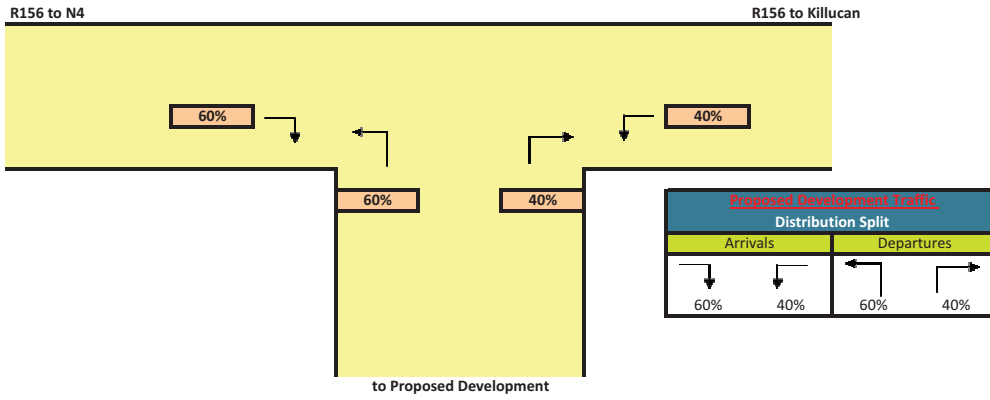
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Junction Capacity for Roundabout on New N4 Grade Separate with Proposed Development (Scenario 2)			
2013 Year of Opening AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.012	98.8	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.012	98.8	OK
N4 Off Ramp	0.072	92.8	OK
to R156/Proposed Development	0.114	88.6	OK
2013 Year of Opening PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.011	98.9	OK
N4 Off Ramp	0.124	87.6	OK
to R156/Proposed Development	0.069	93.1	OK
2018 Mid-Term Year AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.009	99.1	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.012	98.8	OK
N4 Off Ramp	0.076	92.4	OK
to R156/Proposed Development	0.120	88	OK
2018 Mid-Term Year PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.012	98.8	OK
N4 Off Ramp	0.131	86.9	OK
to R156/Proposed Development	0.073	92.7	OK
2028 Future Year AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.010	99	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.013	98.7	OK
N4 Off Ramp	0.082	91.8	OK
to R156/Proposed Development	0.131	86.9	OK
2028 Future Year PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.013	98.7	OK
N4 Off Ramp	0.142	85.8	OK
to R156/Proposed Development	0.080	92	OK

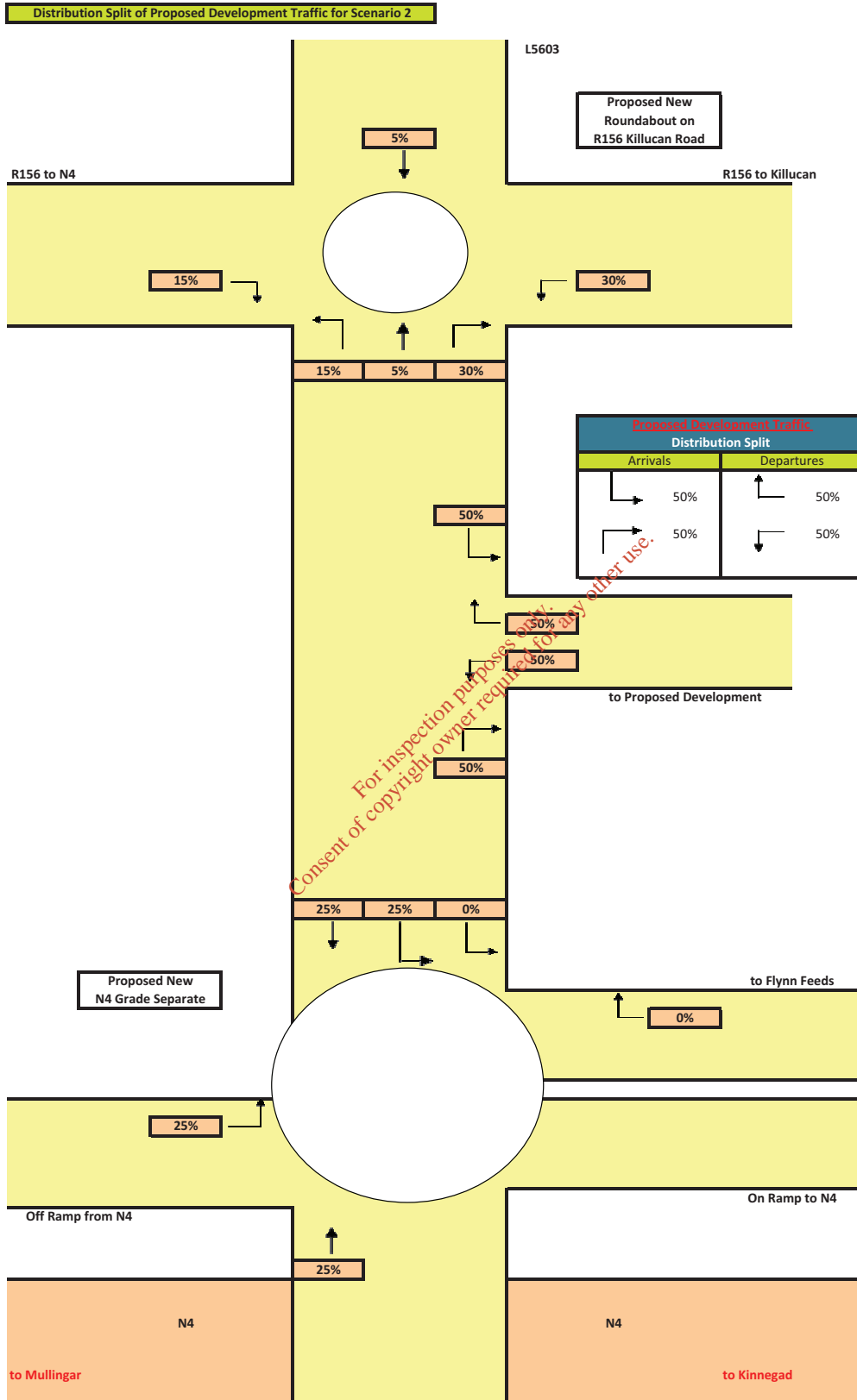
Junction Capacity for Proposed New Roundabout on R156 with No Development (Scenario 3)			
	Maximum RFC Value	Reserve Capacity (%)	Status
2013 Year of Opening AM Peak			
to Killucan (R156)	0.128	87.2	OK
to Proposed Development and N4	0.080	92.0	OK
R156	0.027	97.3	OK
L5603	0.006	99.4	OK
2013 Year of Opening PM Peak			
to Killucan (R156)	0.076	92.4	OK
to Proposed Development and N4	0.132	86.8	OK
R156	0.016	98.4	OK
L5603	0.004	99.6	OK
2018 Mid-Term Year AM Peak			
to Killucan (R156)	0.136	86.4	OK
to Proposed Development and N4	0.085	91.5	OK
R156	0.028	97.2	OK
L5603	0.007	99.3	OK
2018 Mid-Term Year PM Peak			
to Killucan (R156)	0.080	92.0	OK
to Proposed Development and N4	0.140	86.0	OK
R156	0.017	98.3	OK
L5603	0.004	99.6	OK
2028 Future Year AM Peak			
to Killucan (R156)	0.148	85.2	OK
to Proposed Development and N4	0.094	90.6	OK
R156	0.030	97.0	OK
L5603	0.008	99.2	OK
2028 Future Year PM Peak			
to Killucan (R156)	0.088	91.2	OK
to Proposed Development and N4	0.153	84.7	OK
R156	0.018	98.2	OK
L5603	0.004	99.6	OK

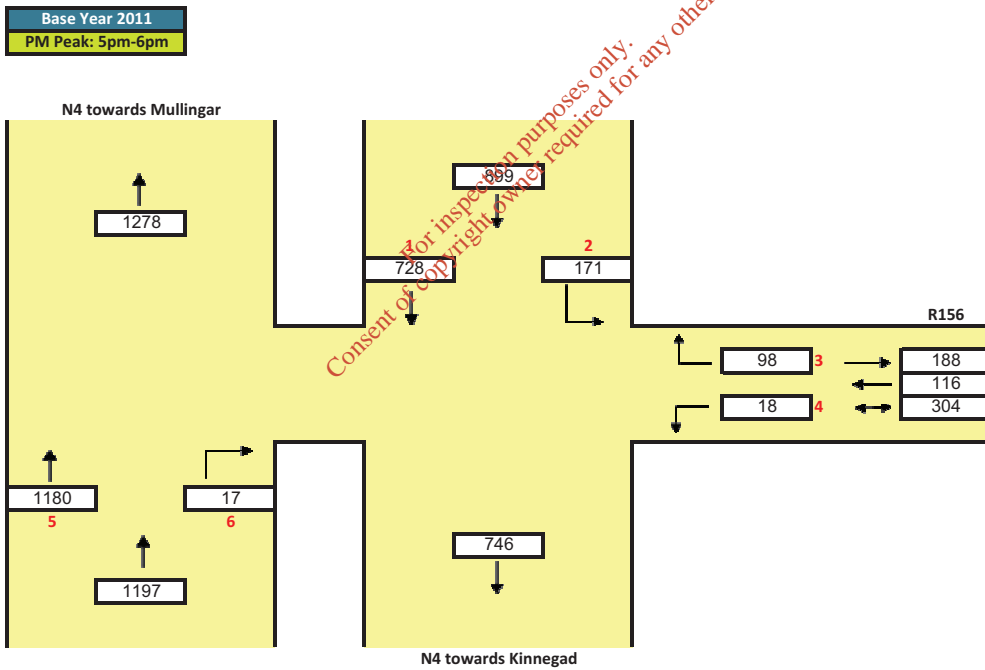
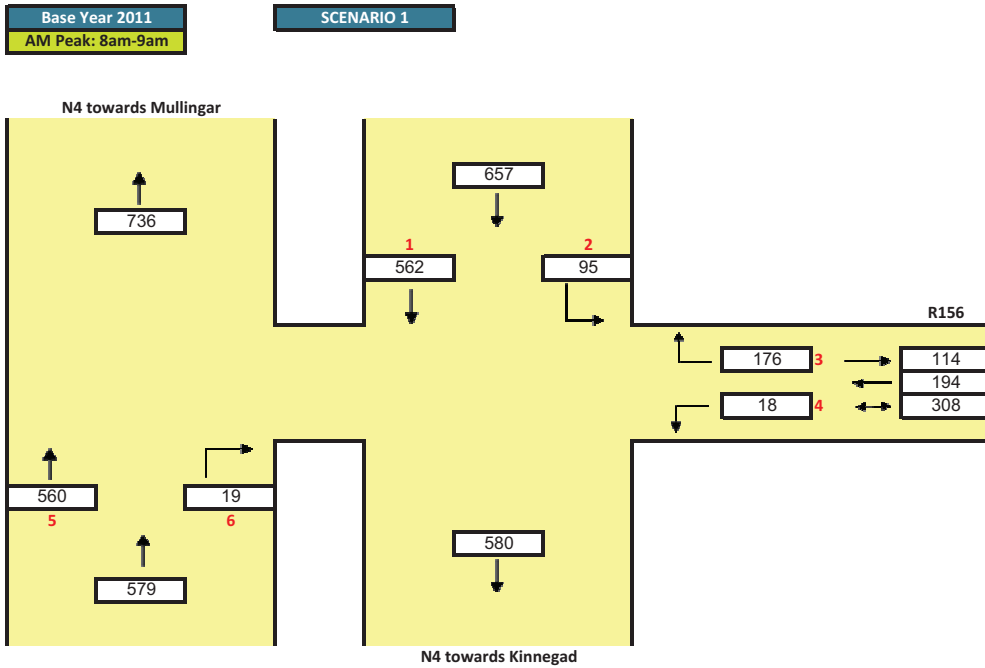
Junction Capacity for Roundabout on New N4 Grade Separate with No Development (Scenario 3)			
2013 Year of Opening AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.009	99.1	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.010	99	OK
N4 Off Ramp	0.070	93	OK
to R156/Proposed Development	0.110	89	OK
2013 Year of Opening PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.010	99	OK
N4 Off Ramp	0.122	87.8	OK
to R156/Proposed Development	0.066	93.4	OK
2018 Mid-Term Year AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.009	99.1	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.011	98.9	OK
N4 Off Ramp	0.074	92.6	OK
to R156/Proposed Development	0.117	88.3	OK
2018 Mid-Term Year PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.010	99	OK
N4 Off Ramp	0.129	87.1	OK
to R156/Proposed Development	0.069	93.1	OK
2028 Future Year AM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.010	99	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.012	98.8	OK
N4 Off Ramp	0.080	92	OK
to R156/Proposed Development	0.128	87.2	OK
2028 Future Year PM Peak	Maximum RFC Value	Reserve Capacity (%)	Status
to Flynn Feeds	0.018	98.2	OK
N4 On Ramp	-	-	OK
to N4 On Ramp towards Mullingar	0.011	98.9	OK
N4 Off Ramp	0.140	86	OK
to R156/Proposed Development	0.077	92.3	OK

Distribution Split of Proposed Development Traffic for Scenario 1

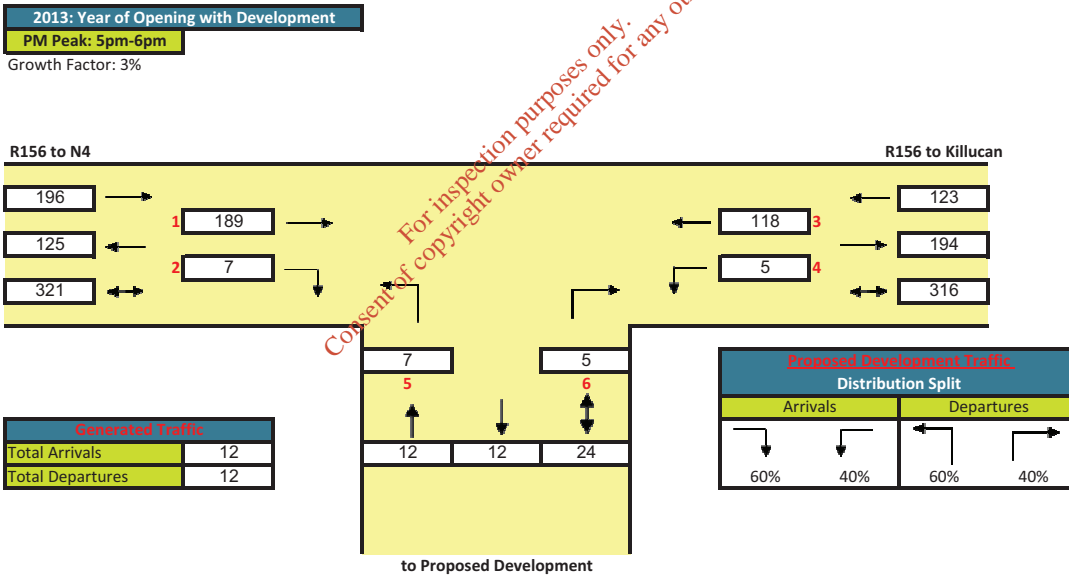
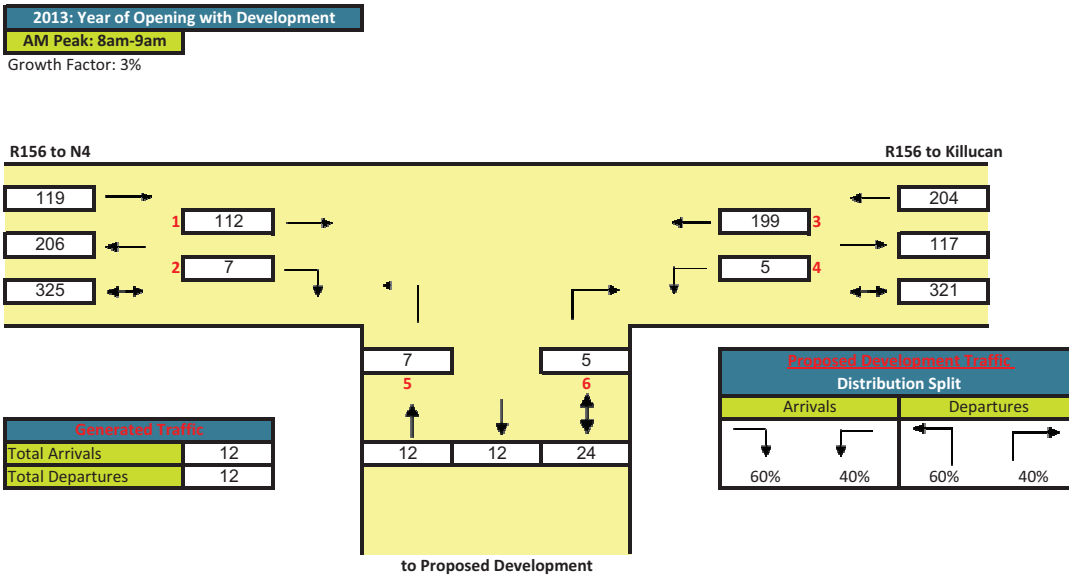


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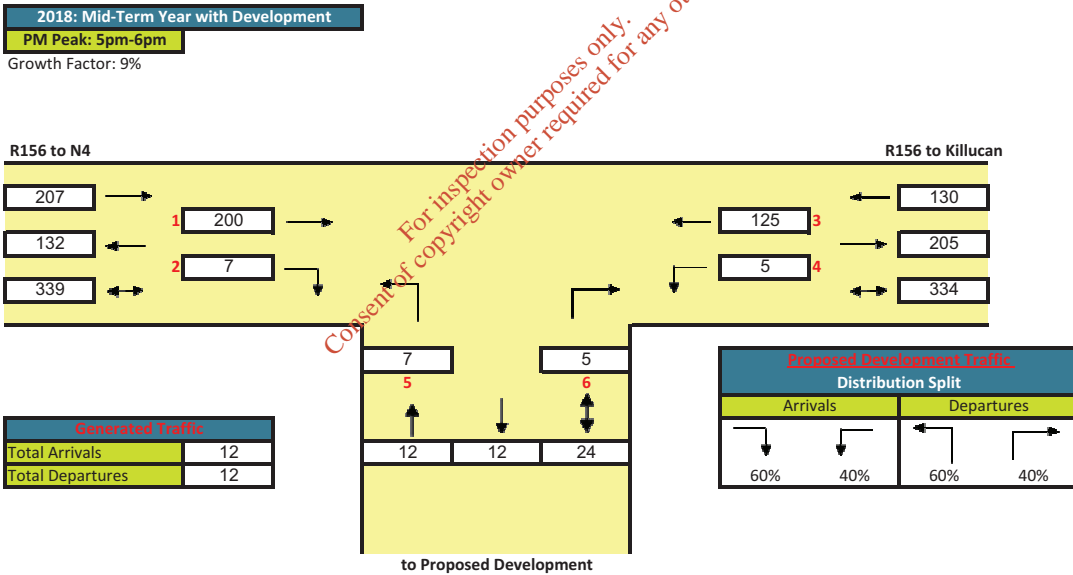
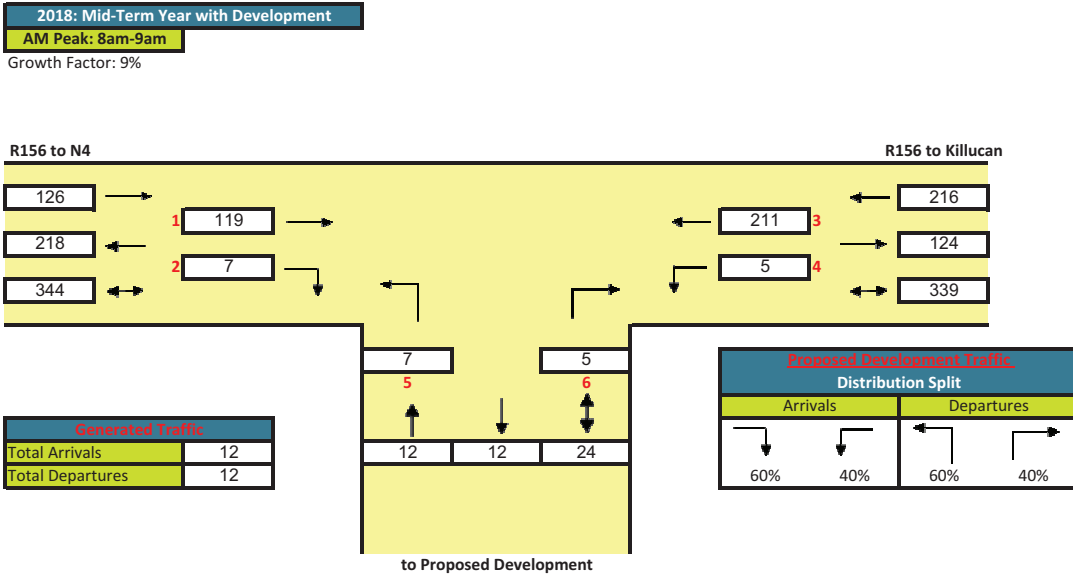




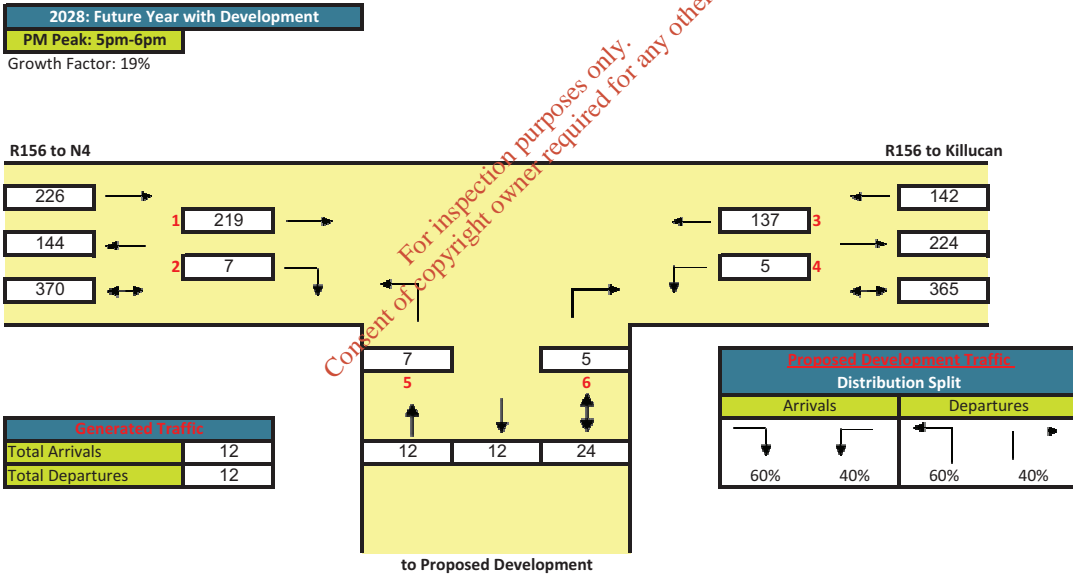
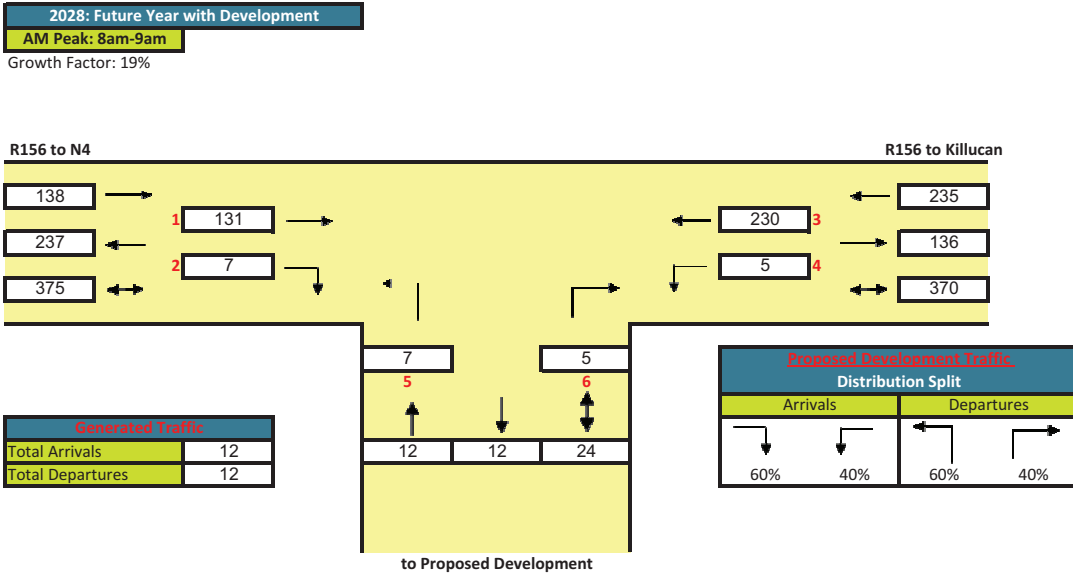
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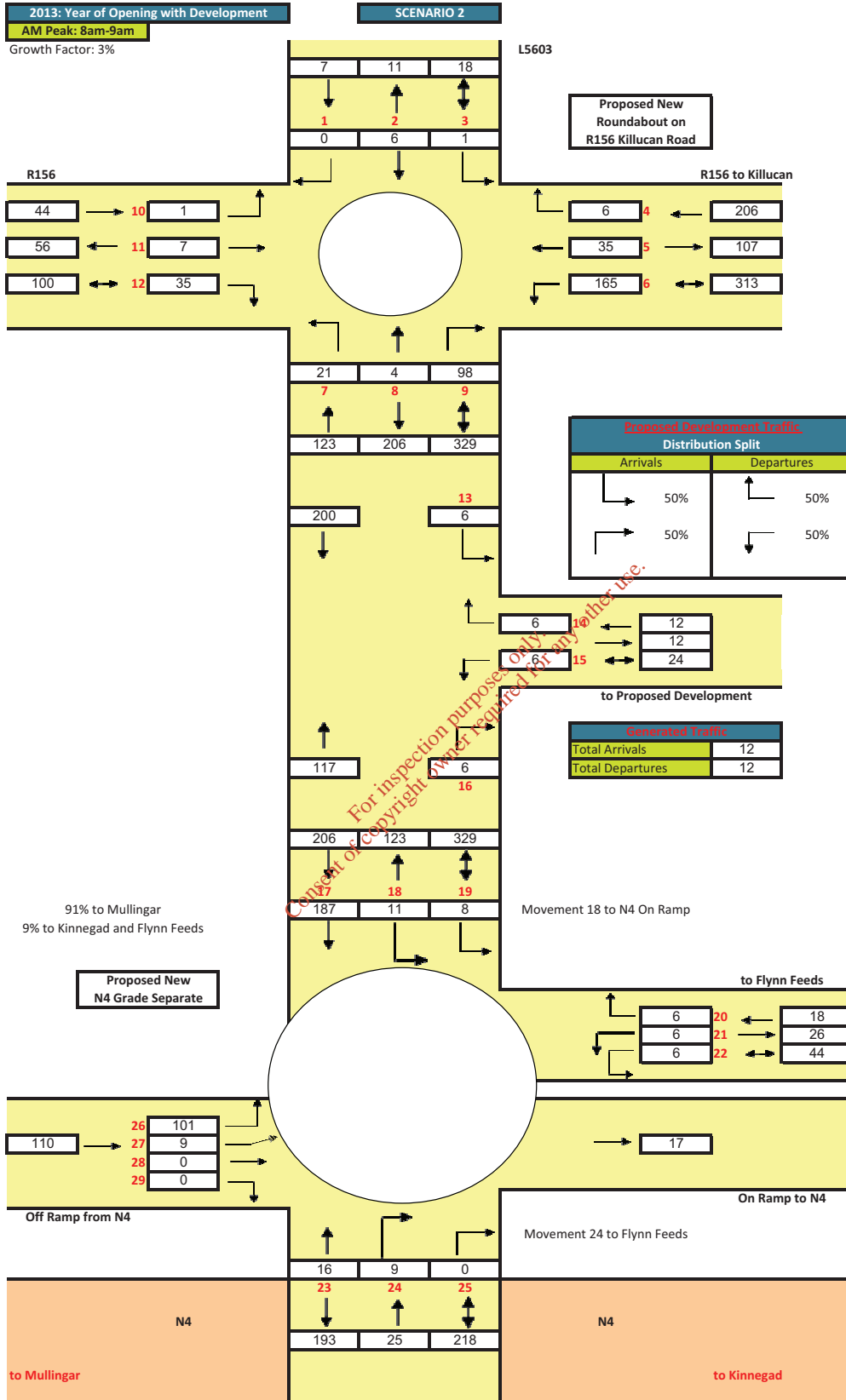


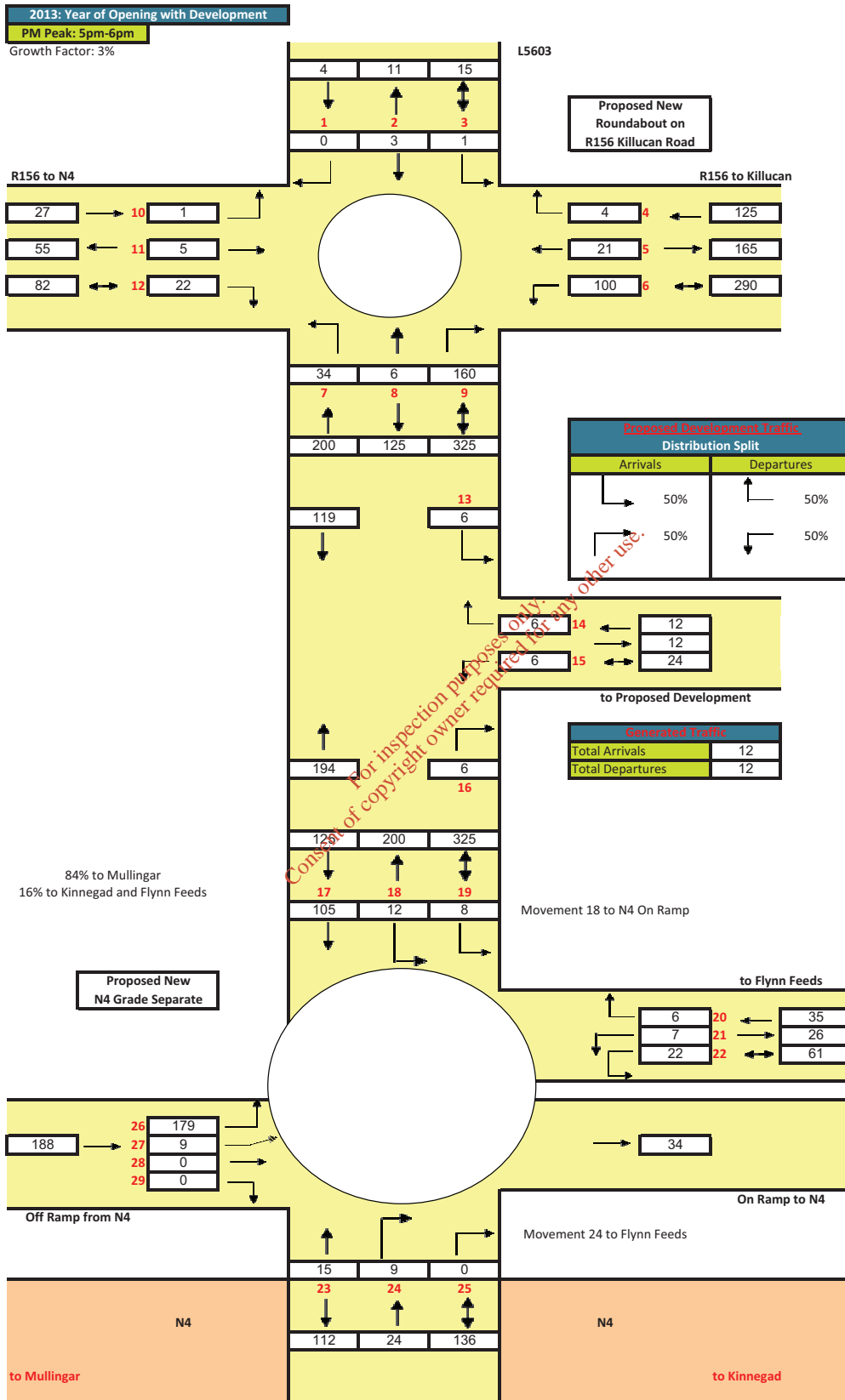
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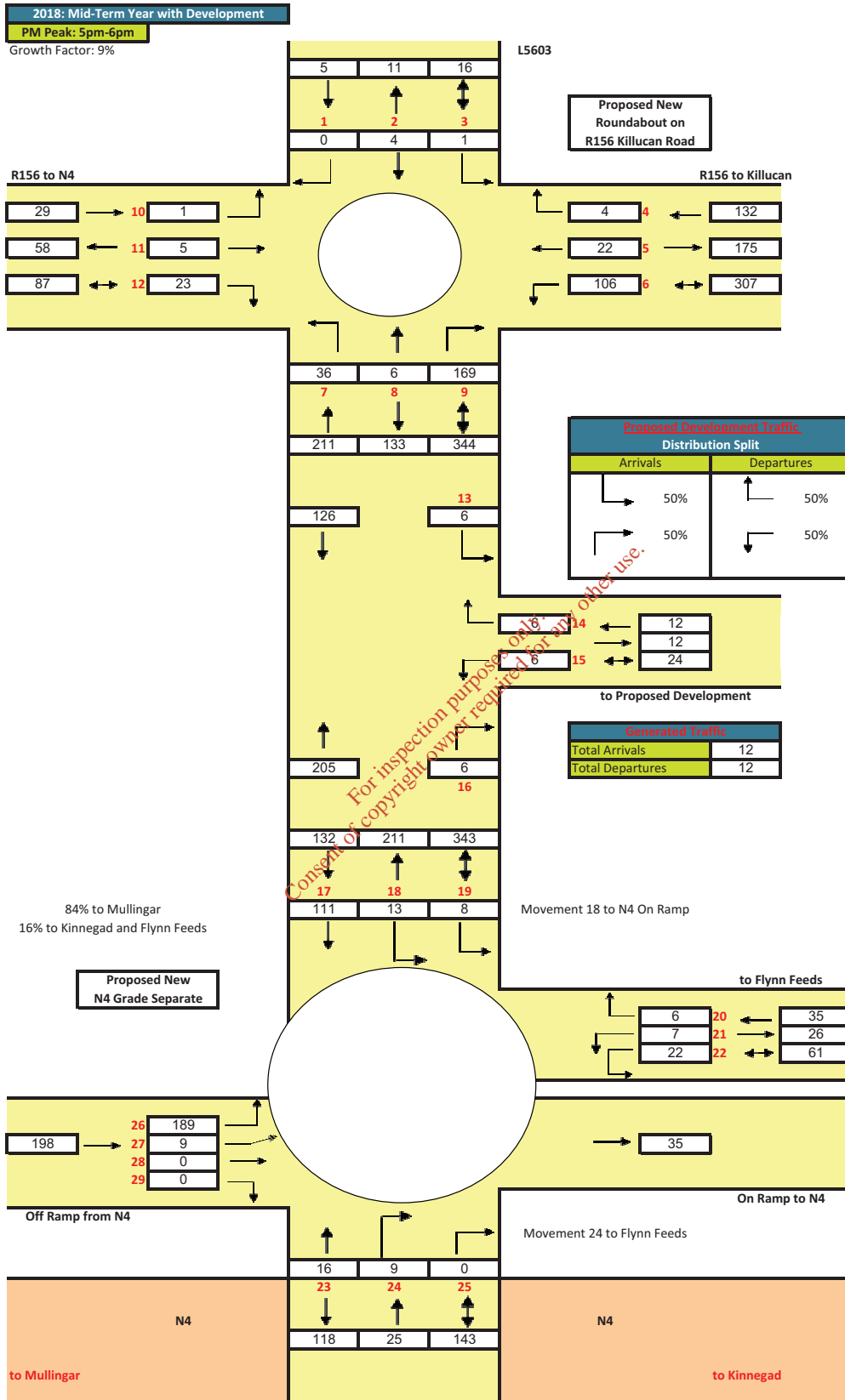


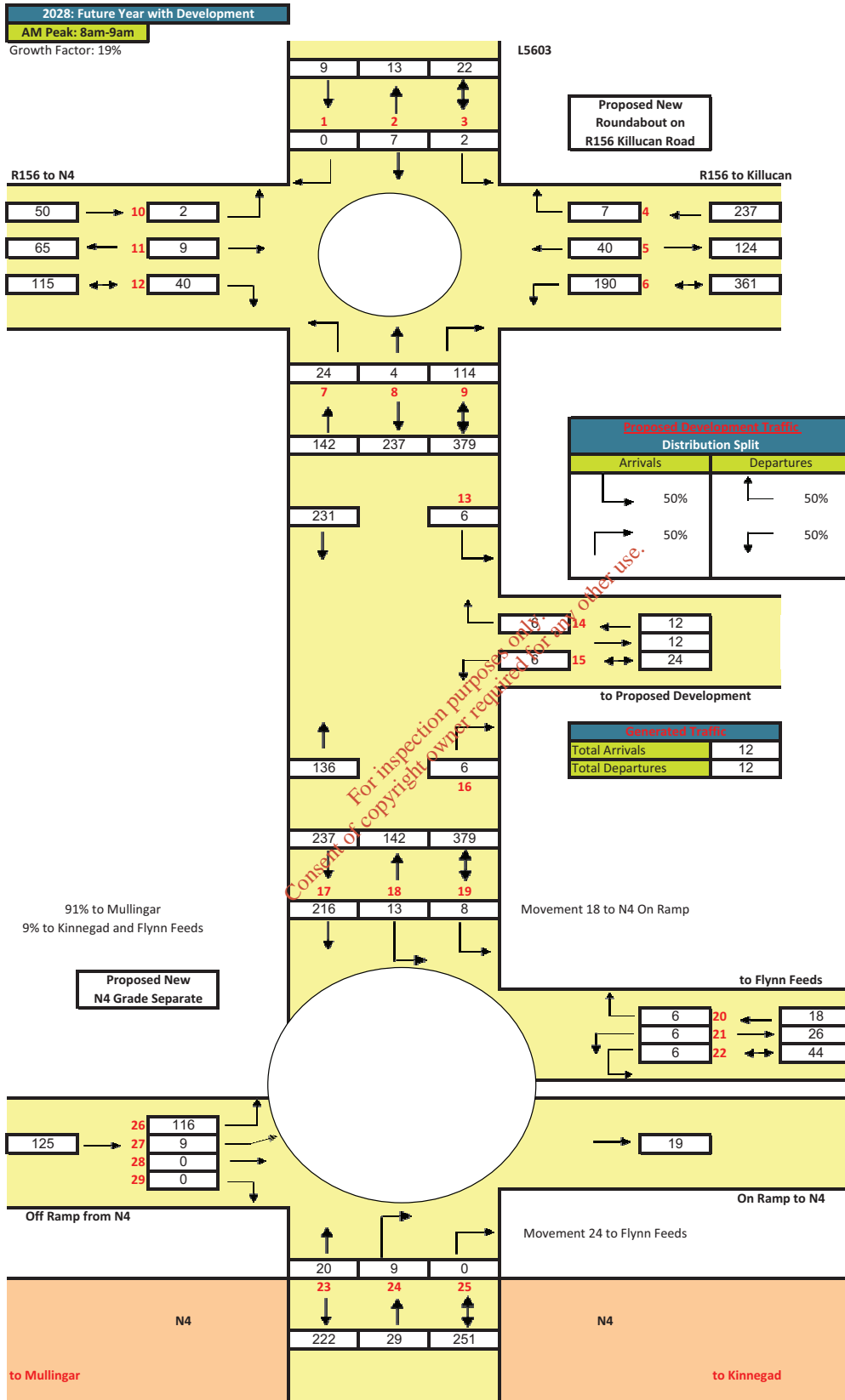
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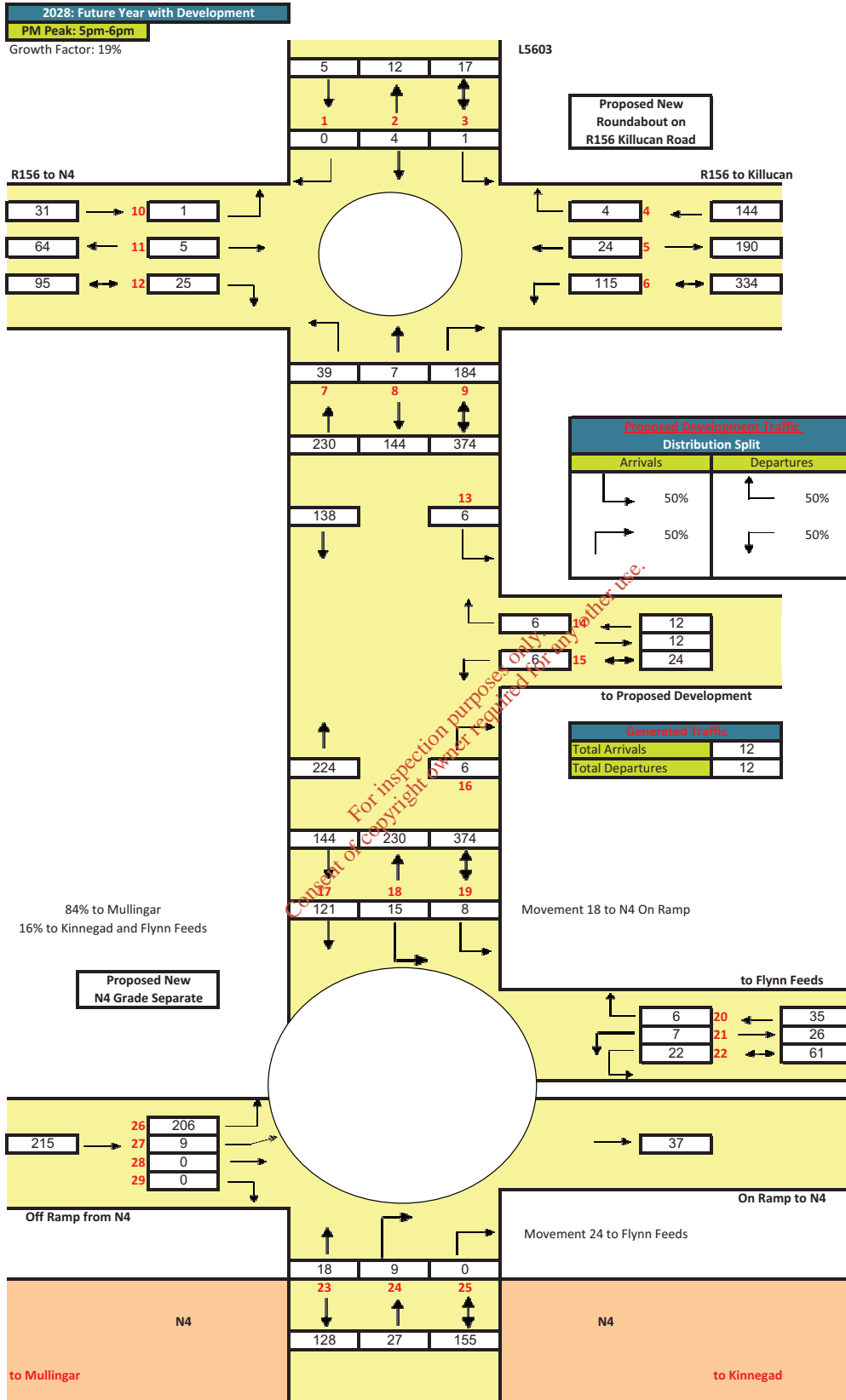


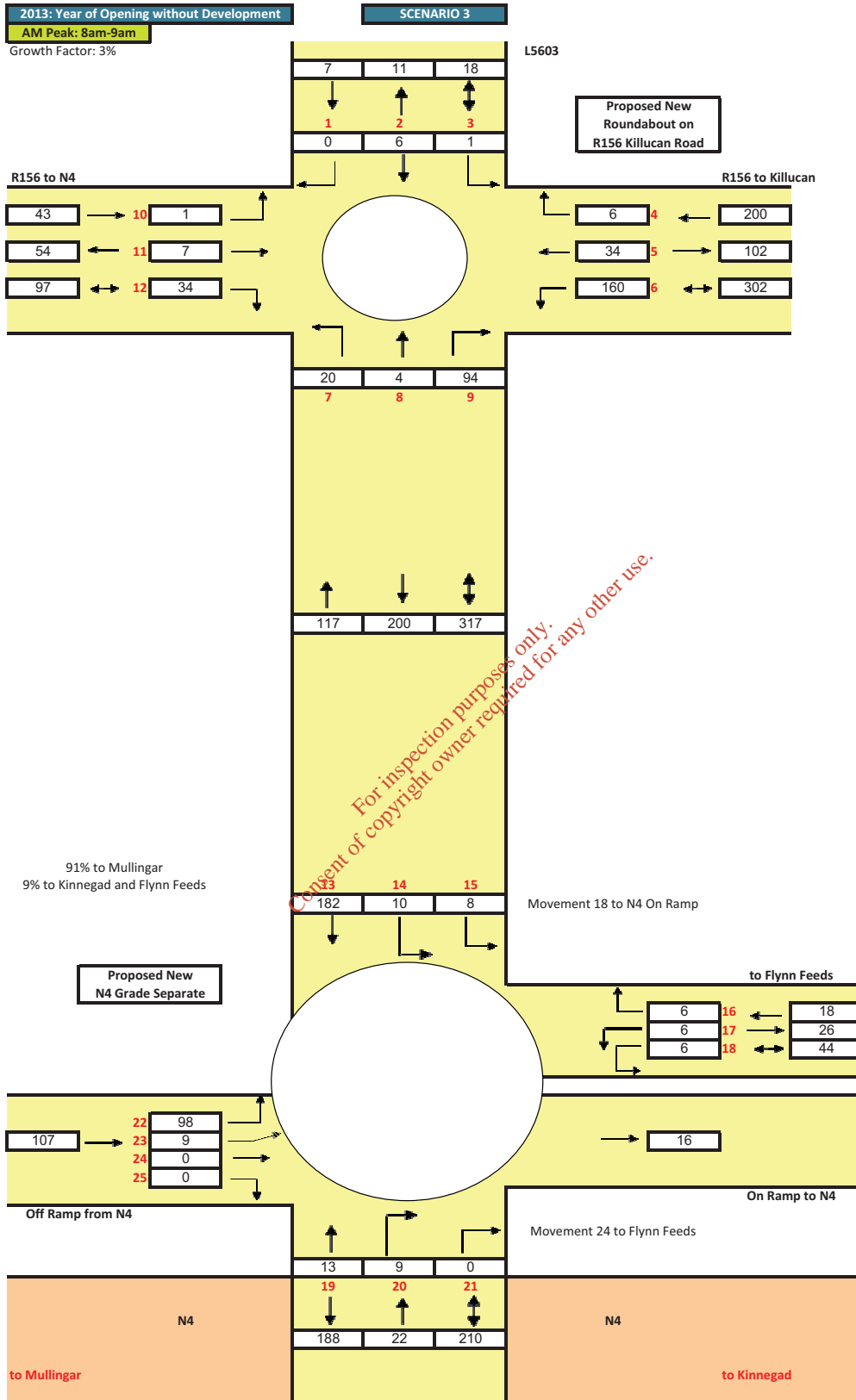


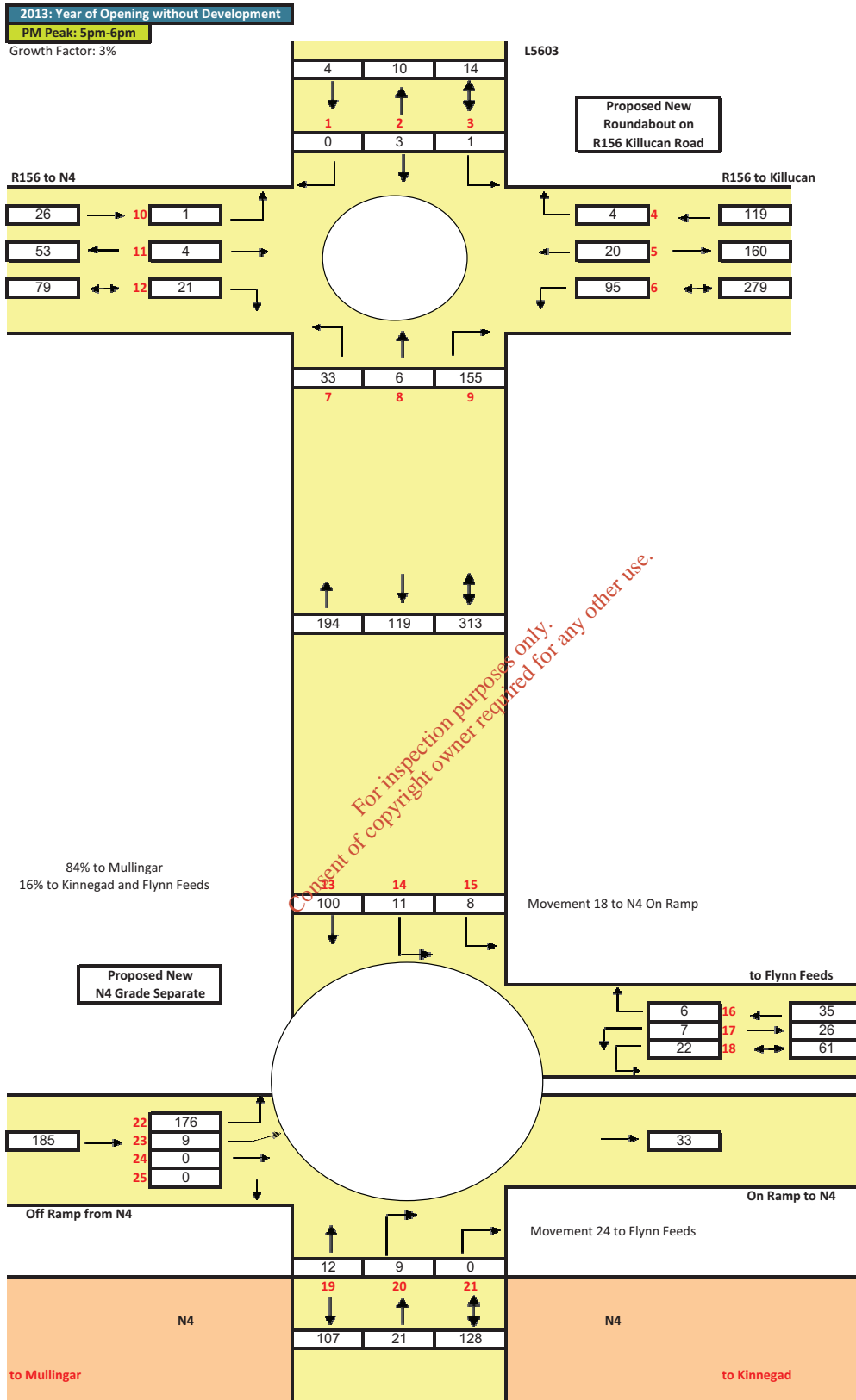


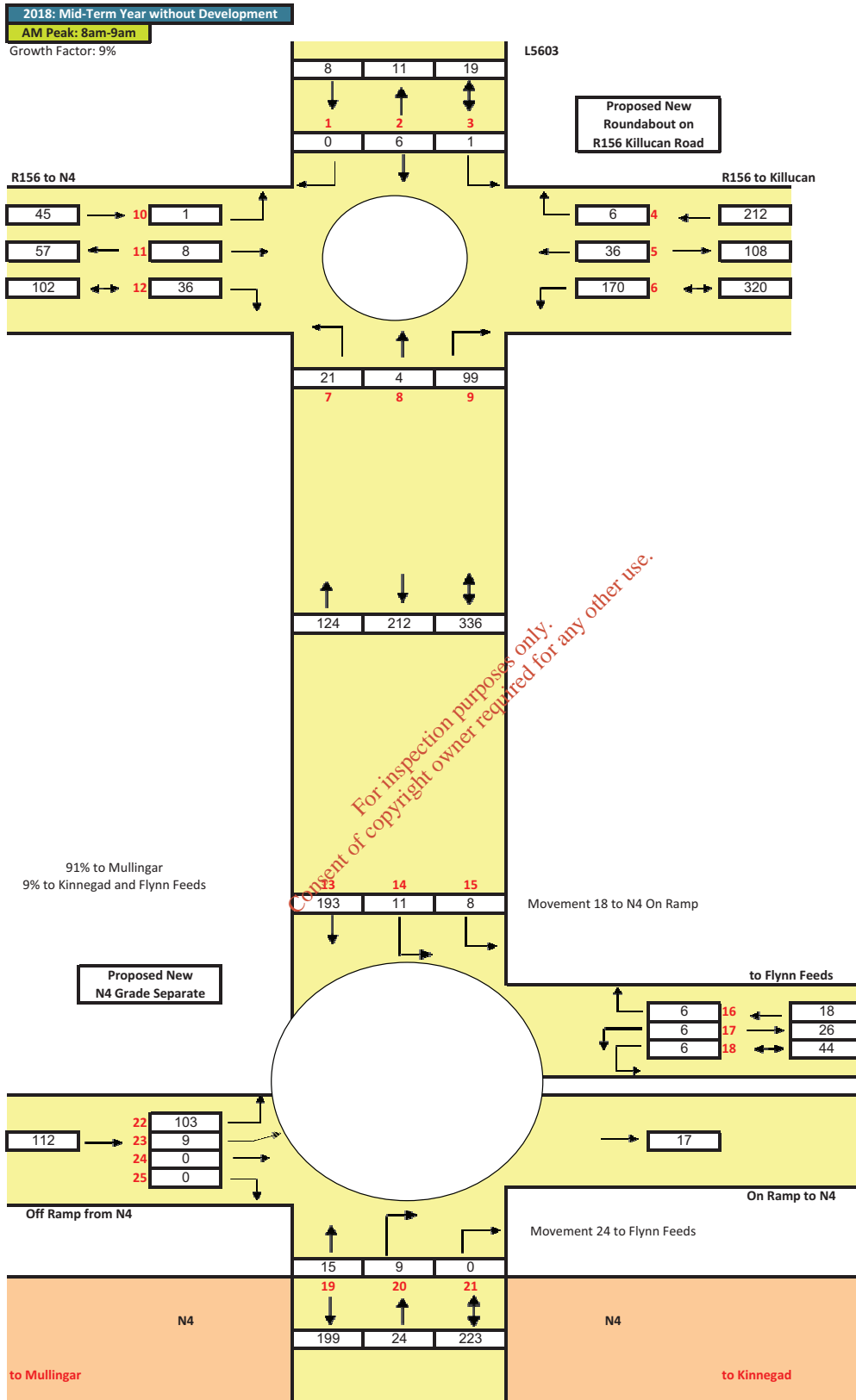


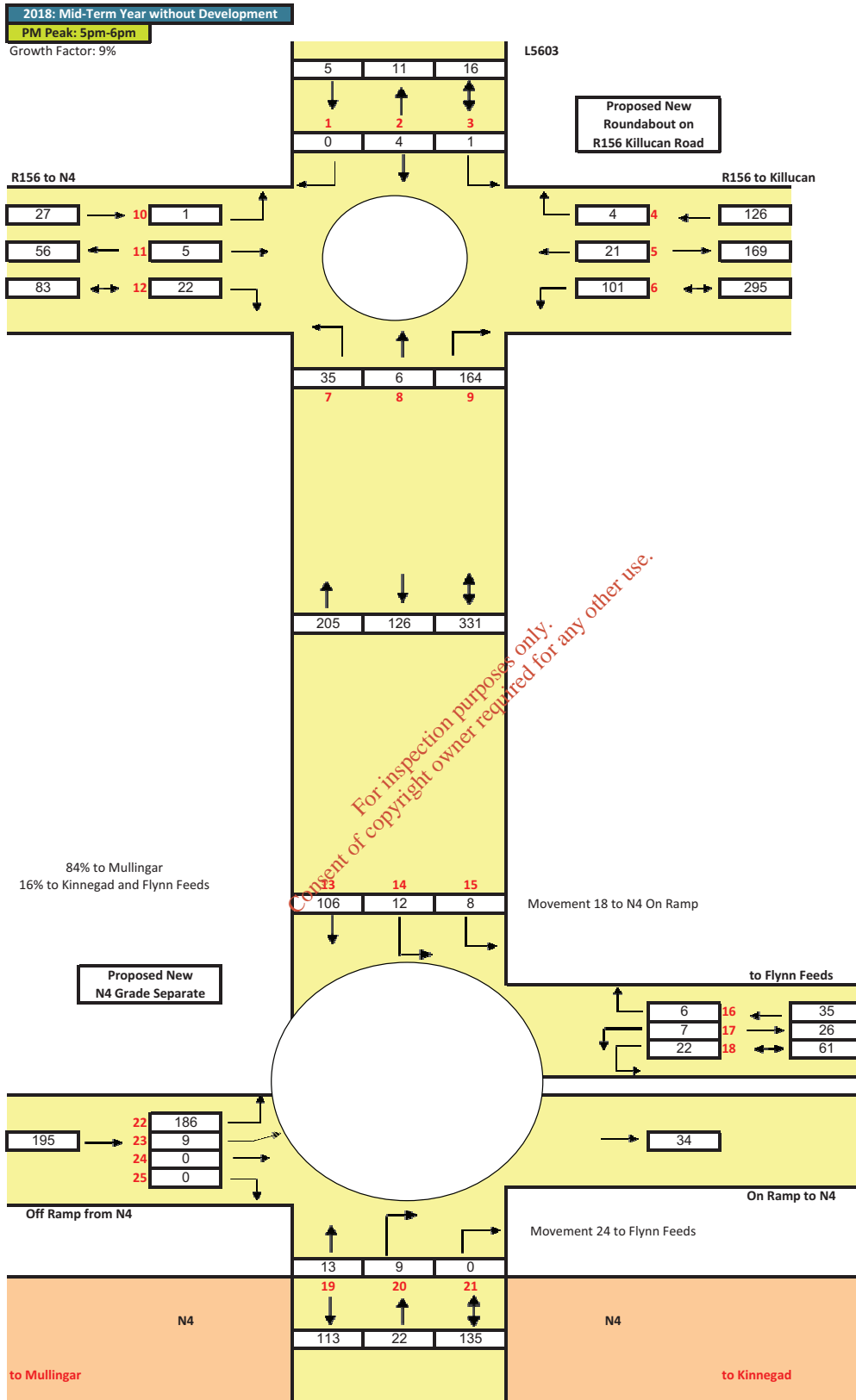


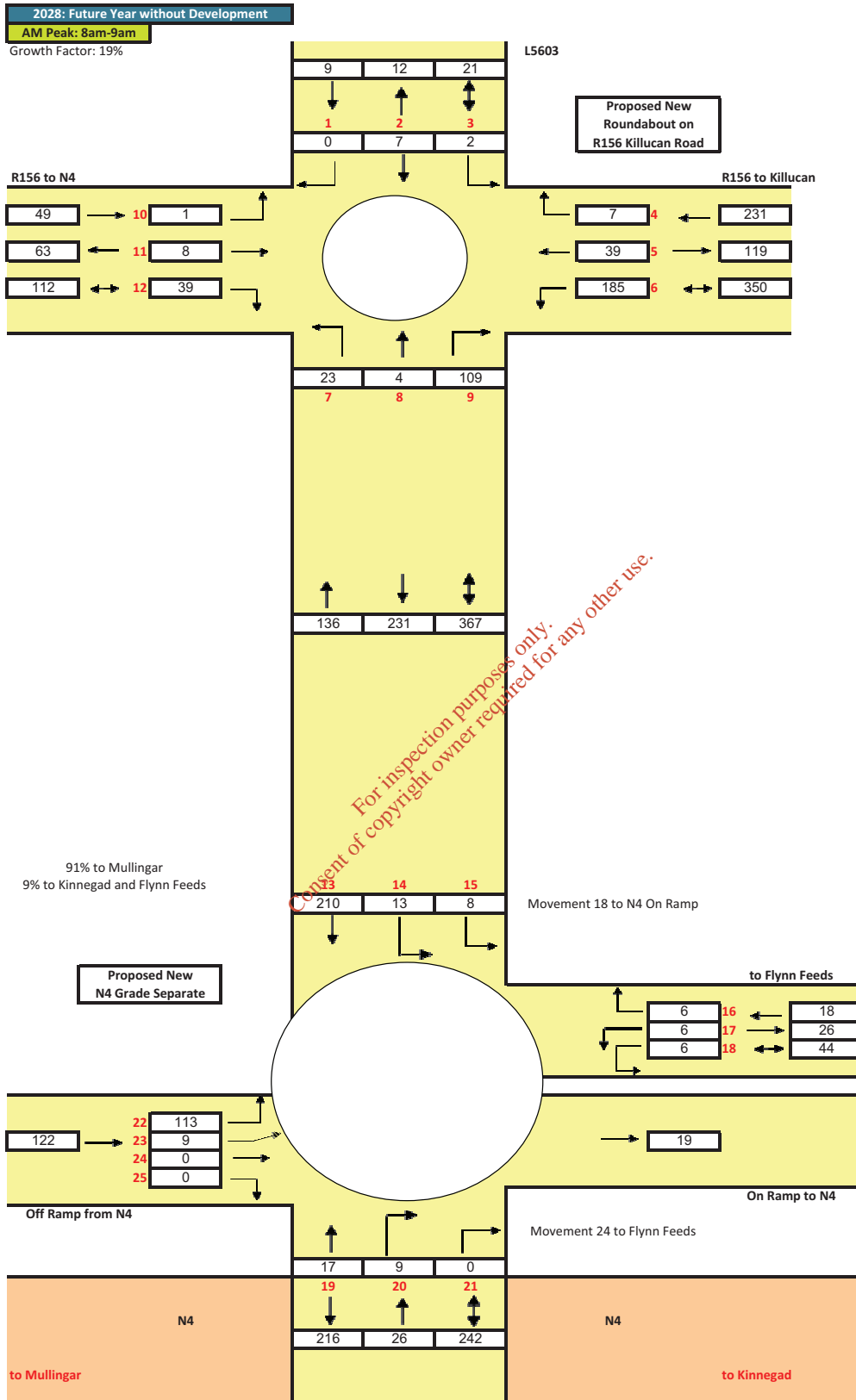


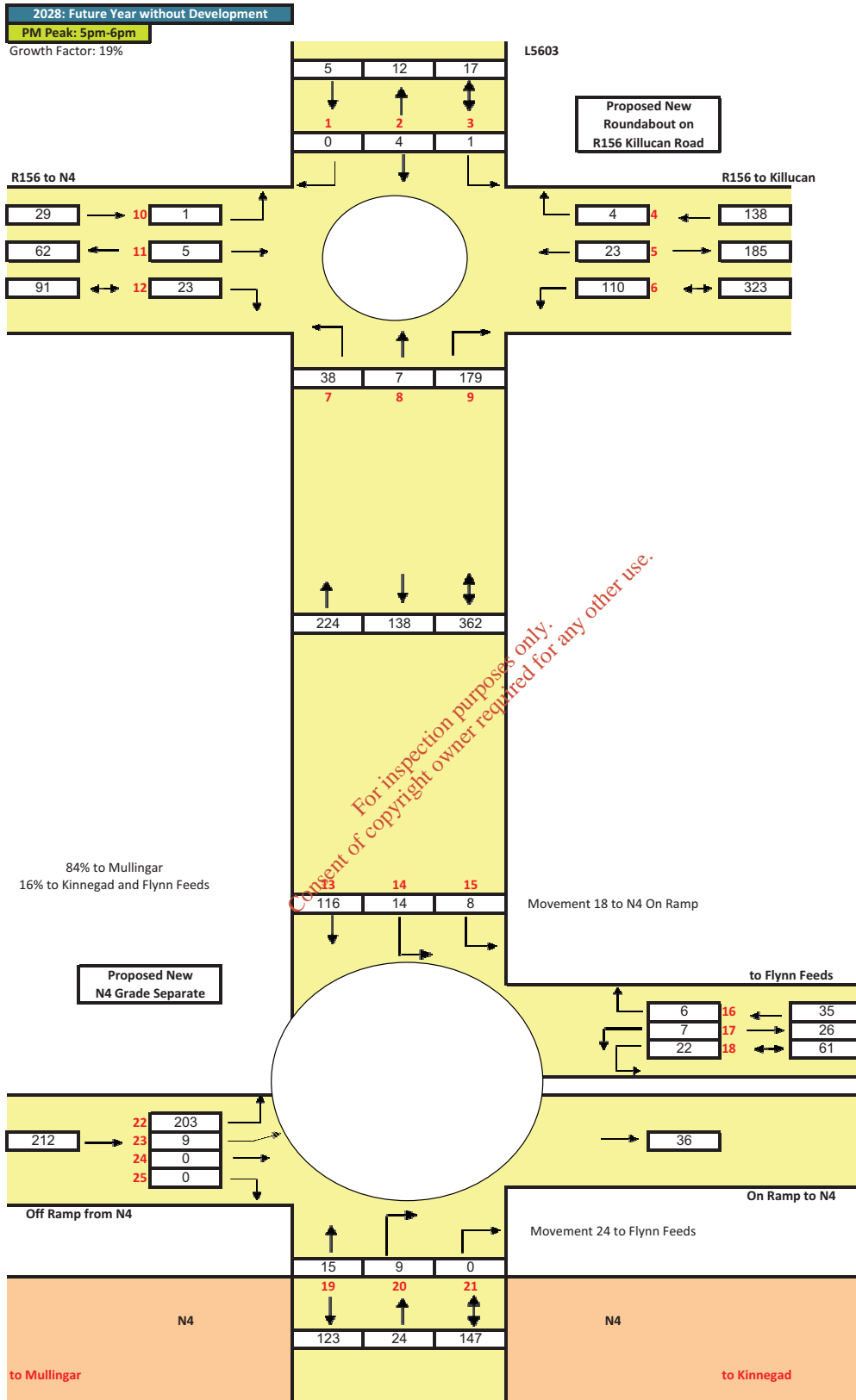








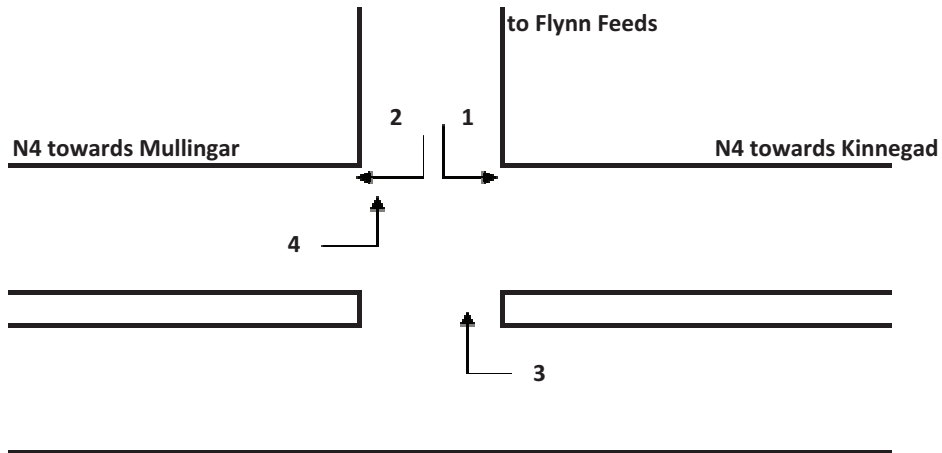




Manual Classified Traffic Count

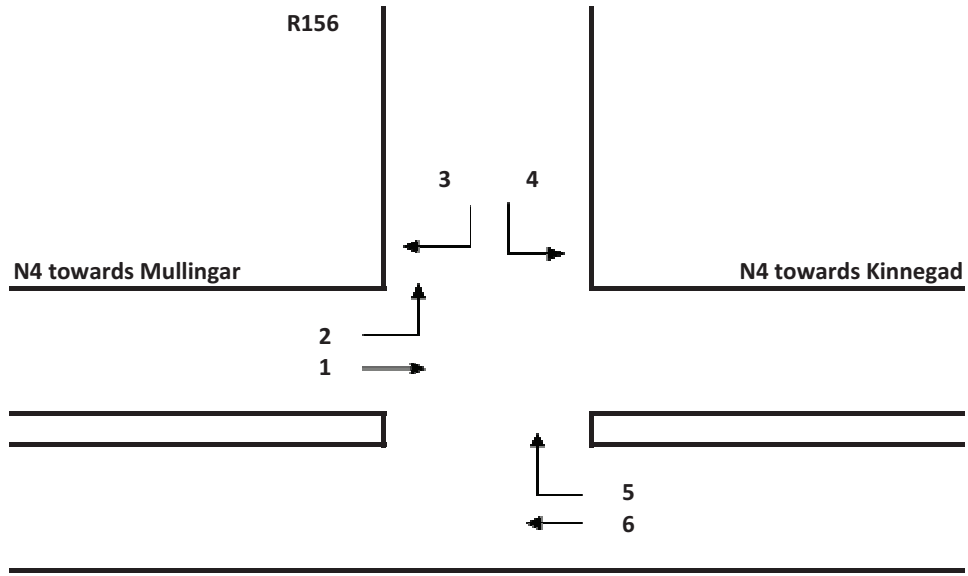
Location: Junction at N4/Flynn Feeds, The Downs, Mullingar.

Date: 11th March 2011



Time	Movement 1				Movement 2				Movement 3				Movement 4			
	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total	Car	LGV	HGV	Total
08:00	1	0	0	1	0	0	0	0	1	0	0	1	1	2	0	3
08:15	0	0	0	0	2	0	0	2	0	0	0	0	0	1	0	1
08:30	1	0	0	1	3	3	2	8	4	1	0	5	4	1	0	5
08:45	3	0	1	4	2	0	0	2	3	0	0	3	7	0	1	8
Total	5	0	1	6	7	3	2	12	8	1	0	9	12	4	1	17
17:00	5	0	0	5	3	0	0	3	4	0	0	4	5	0	0	5
17:15	4	0	0	4	3	0	0	3	0	0	0	0	6	0	0	6
17:30	7	0	0	7	5	0	0	5	2	0	1	3	5	0	0	5
17:45	6	0	0	6	2	0	0	2	2	0	0	2	1	0	0	1
Total	22	0	0	22	13	0	0	13	8	0	1	9	17	0	0	17

Junction at N4/R156, The Downs, Mullingar.



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**ORS CONSULTING ENGINEERS
N4 THE DOWNS
TRAFFIC SURVEY**

**SURVEY REPORT
MARCH 2011**

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PROJECT NO.	1172
CHECKED	P. MURRAY
DATE	08/03/2011
CONTACT	A.CHAMBERS
REVISION	

CONTENTS

Introduction

Junction Turning Count

Diagram 1172-01

Drawing 1172-01

Appendix A – Vehicle Categories

Appendix B – Survey Results - Junction Turning Count

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INTRODUCTION

Nationwide Data Collection (NDC) was instructed by ORS Consulting Engineers to undertake a Junction Turning Count in Co. Westmeath.

A general location plan is given in Diagram 1172-01

JUNCTION TURNING COUNT

A Junction Turning Count was undertaken at the following site:

Site No.	Location.	Day / Date
1	R156 / N4(NW) / N4(SE)	Friday 4 th March 2011

The site was surveyed using a telescopically mounted video camera from which the information was subsequently extracted. Details of the observed movements are given in Drawing 1172-01

The survey was carried out with survey hours of 07:00 to 19:00. All information was collected in 15 minute intervals and has been tabulated with both hourly and period totals.

Vehicles were classified into the following categories:

- Light Vehicles (**LV**),
- Heavy Vehicles (**HV**),

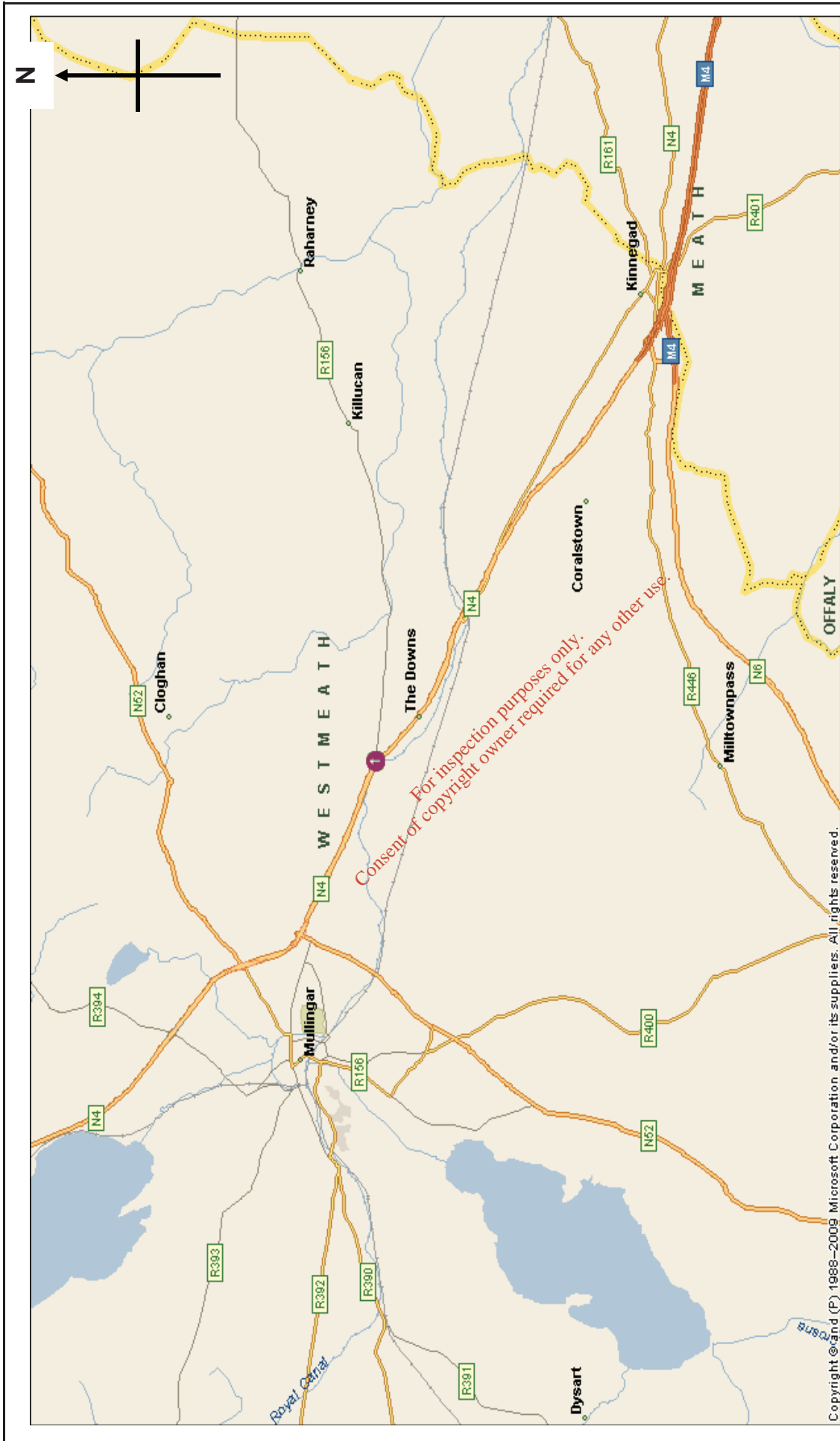
A detailed description of the vehicles included in each category is provided in Appendix A.


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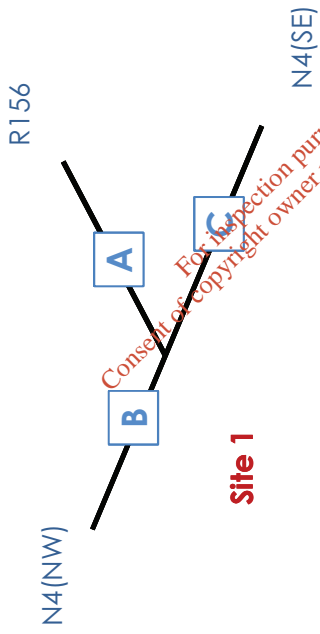
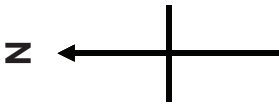
SITE REPORT

Weather	Friday 4 th March 2011 – Overcast and Foggy in the morning but some sunny spells in the afternoon.
Accidents	None.
Roadworks	None.
Queues	Not recorded.
Pedestrians	Not recorded.


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	Site / Location: 1 / N4 The Downs	Project No: 1172	Diagram No: 1172-01	Drawn By: AC
	Survey Date: Friday 4th March 2011	Project Name: N4 THE DOWNS		
	Survey Times: 07:00 to 19:00	Diagram Title: General Location Plan		



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	Site / Location: 1 / N4 The Downs		Project No: 1172	Drawing No: 1172-01	Drawn By: AC
	Survey Date: Friday 4th March 2011		Project Name: N4 THE DOWNS		
	Survey Times: 07:00 to 19:00		Drawing Title: Site Layout and Observed Movements		

APPENDIX A

VEHICLE CATEGORIES

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VEHICLE CATEGORIES

LIGHT VEHICLES (LV)	 SALOON  ESTATE
	 PEOPLE CARRIER  CAR TOWING CARAVAN / TRAILER
	 VAN  >3.5 TONNES – single rear tyres  PICK-UP
HEAVY VEHICLES (HV)	 > 3.5 TONNES – twin rear tyres  2-AXLES RIGID
	 2-AXLES RIGID  3 AXLES-RIGID
	 4 OR MORE AXLES RIGID  3-AXLES ARTIC
	 4 OR MORE AXLES ARTIC  OTHER GOODS VEHICLE WITH TRAILER
	 DOUBLE DECK BUS  SINGLE DECK BUS OR COACH

VEHICLE CATEGORIES

Definition of Categories

The various components of traffic have different characteristics in terms of operating costs, growth and occupancy. For the purpose of this survey vehicles types are defined as follows:

Cars and Light Goods Vehicles are grouped together as Light Vehicles (**LV**). All other Goods Vehicles, Buses and Coaches are defined as Heavy Vehicles (**HV**).

Cars (CARS)

Including taxis, estate cars, 'people carriers' and other passenger vehicles (for example, minibuses and camper vans) with a gross vehicle weight of less than 3.5 tonnes, normally ones which can accommodate not more than 15 seats. Three-wheeled cars, motor invalid carriages, Land Rovers, Range Rovers and Jeeps and smaller ambulances are included. Cars towing caravans or trailers are counted as one vehicle unless included as a separate class.

Light Goods Vehicles (LGV)

Includes all goods vehicles up to 3.5 tonnes gross vehicle weight (goods vehicles over 3.5 tonnes have sideguards fitted between axles), including those towing a trailer or caravan. This includes all car delivery vans and those of the next larger carrying capacity such as transit vans. Included here are small pickup vans, three-wheeled goods vehicles, milk floats and pedestrian controlled motor vehicles. Most of this group is delivery vans of one type or another.

Other Goods Vehicles (OGV 1)

Includes all rigid vehicles over 3.5 tonnes gross vehicle weight with two or three axles. Includes larger ambulances, tractors (without trailers), road rollers for tarmac pressing, box vans and similar large vans. A two or three axle motor tractive unit without a trailer is also included.

Other Goods Vehicles (OGV 2)

This category includes all rigid vehicles with four or more axles and all articulated vehicles. Also included in this class are OGV1 goods vehicles towing a caravan or trailer.

Buses and Coaches (PSV)

Includes all public service vehicles and works buses with a gross vehicle weight of 3.5 tonnes or more, usually vehicles with more than 16 seats.

APPENDIX B

SURVEY RESULTS

JUNCTION TURNING COUNT

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Site No. 1
 Location R156 / N4(NW) / N4(SE)
 Date Friday 04 March 2011

Time	A to C - R156 to N4(SE)		Veh. Total	A to B - R156 to N4(NW)		Veh. Total
	LV	HV		LV	HV	
07:00	0	0	0	4	1	5
07:15	1	1	2	3	0	3
07:30	1	0	1	23	0	23
07:45	2	0	2	28	4	32
Hour	4	1	5	58	5	63
08:00	3	0	3	33	2	35
08:15	2	0	2	36	3	39
08:30	3	0	3	45	0	45
08:45	10	0	10	56	1	57
Hour	18	0	18	170	6	176
09:00	8	1	9	44	3	47
09:15	2	0	2	31	0	31
09:30	1	1	2	48	1	49
09:45	3	0	3	41	1	42
Hour	14	2	16	164	5	169
10:00	5	1	6	35	1	36
10:15	2	0	2	29	2	31
10:30	0	0	0	28	3	31
10:45	2	1	3	24	0	24
Hour	9	2	11	116	6	122
11:00	0	1	1	28	3	31
11:15	4	0	4	27	1	28
11:30	2	0	2	24	3	27
11:45	4	0	4	23	3	26
Hour	10	1	11	102	10	112
12:00	1	1	2	19	0	19
12:15	1	0	1	18	1	19
12:30	5	0	5	29	1	30
12:45	1	0	1	31	1	32
Hour	8	1	9	97	3	100
13:00	0	1	1	18	1	19
13:15	5	1	6	27	1	28
13:30	6	0	6	38	0	38
13:45	10	0	10	37	1	38
Hour	21	2	23	120	3	123
14:00	1	0	1	37	2	39
14:15	5	0	5	27	0	27
14:30	5	0	5	29	3	32
14:45	14	1	15	53	4	57
Hour	25	1	26	146	9	155
15:00	9	0	9	23	3	26
15:15	2	0	2	38	2	40
15:30	5	0	5	36	1	37
15:45	2	1	3	35	0	35
Hour	18	1	19	132	6	138
16:00	1	0	1	32	1	33
16:15	3	1	4	32	3	35
16:30	5	1	6	24	0	24
16:45	9	2	11	25	0	25
Hour	18	4	22	113	4	117
17:00	4	1	5	20	0	20
17:15	5	0	5	22	1	23
17:30	2	0	2	26	1	27
17:45	5	1	6	28	0	28
Hour	16	2	18	96	2	98
18:00	5	0	5	30	0	30
18:15	5	0	5	28	0	28
18:30	1	0	1	21	0	21
18:45	5	0	5	32	0	32
Hour	16	0	16	111	0	111
Total	177	17	194	1425	59	1484

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Site No. 1
Location R156 / N4(NW) / N4(SE)
Date Friday 04 March 2011

Time	B to A - N4(NW) to R156		Veh. Total	B to C - N4(NW) to N4(SE)		Veh. Total
	LV	HV		LV	HV	
07:00	7	0	7	123	11	134
07:15	9	0	9	142	14	156
07:30	13	0	13	127	15	142
07:45	11	1	12	139	14	153
Hour	40	1	41	531	54	585
08:00	10	1	11	128	14	142
08:15	24	0	24	149	9	158
08:30	19	3	22	123	3	126
08:45	38	0	38	127	9	136
Hour	91	4	95	527	35	562
09:00	31	0	31	129	11	140
09:15	21	1	22	108	19	127
09:30	15	1	16	90	8	98
09:45	15	0	15	108	18	126
Hour	82	2	84	435	56	491
10:00	17	6	23	88	16	104
10:15	21	2	23	99	13	112
10:30	18	0	18	98	14	112
10:45	19	1	20	102	16	118
Hour	75	9	84	387	59	446
11:00	25	1	26	94	18	112
11:15	22	1	23	80	15	95
11:30	32	1	33	95	16	111
11:45	27	2	29	126	13	139
Hour	106	5	111	395	62	457
12:00	23	0	23	96	20	116
12:15	34	2	36	116	22	138
12:30	24	0	24	124	18	142
12:45	24	1	25	115	19	134
Hour	105	3	108	451	79	530
13:00	39	0	39	121	24	145
13:15	31	3	34	109	15	124
13:30	38	2	40	112	12	124
13:45	34	1	35	99	15	114
Hour	142	6	148	441	66	507
14:00	34		35	103	17	120
14:15	33	3	36	135	11	146
14:30	37	1	38	113	13	126
14:45	43	6	49	142	16	158
Hour	147	11	158	493	57	550
15:00	32	3	35	158	21	179
15:15	35	7	42	119	14	133
15:30	32	0	32	133	14	147
15:45	45	1	46	171	15	186
Hour	144	11	155	581	64	645
16:00	41	2	43	149	15	164
16:15	37	1	38	172	12	184
16:30	30	3	33	154	9	163
16:45	29	0	29	127	11	138
Hour	137	6	143	602	47	649
17:00	46	0	46	186	19	205
17:15	42	1	43	153	6	159
17:30	35	1	36	177	7	184
17:45	43	3	46	174	6	180
Hour	166	5	171	690	38	728
18:00	39	0	39	143	14	157
18:15	34	0	34	147	9	156
18:30	16	11	27	123	3	126
18:45	33	1	34	123	12	135
Hour	122	12	134	536	38	574
Total	1357	75	1432	6069	655	6724

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Site No. 1
 Location R156 / N4(NW) / N4(SE)
 Date Friday 04 March 2011

Time	C to B - N4(SE) to N4(NW)		Veh. Total	C to A - N4(SE) to R156		Veh. Total
	LV	HV		LV	HV	
07:00	32	12	44	1	0	1
07:15	43	17	60	0	0	0
07:30	65	10	75	2	0	2
07:45	92	14	106	2	0	2
Hour	232	53	285	5	0	5
08:00	101	22	123	1	2	3
08:15	138	14	152	1	0	1
08:30	130	12	142	4	1	5
08:45	128	15	143	9	1	10
Hour	497	63	560	15	4	19
09:00	105	15	120	6	0	6
09:15	106	16	122	1	1	2
09:30	111	19	130	2	1	3
09:45	125	8	133	2	0	2
Hour	447	58	505	11	2	13
10:00	100	15	115	2	1	3
10:15	119	21	140	2	1	3
10:30	98	13	111	2	2	4
10:45	104	15	119	3	0	3
Hour	421	64	485	9	4	13
11:00	106	17	123	2	2	4
11:15	115	11	126	1	0	1
11:30	144	13	157	2	0	2
11:45	116	16	132	1	1	2
Hour	481	57	538	6	3	9
12:00	125	14	139	3	1	4
12:15	97	17	114	3	1	4
12:30	130	13	143	4	1	5
12:45	118	18	136	4	0	4
Hour	470	62	532	14	3	17
13:00	143	6	149	3	0	3
13:15	154	14	168	3	0	3
13:30	138	14	152	6	0	6
13:45	175	16	191	7	0	7
Hour	610	50	660	19	0	19
14:00	154	10	168	5	0	5
14:15	206	10	216	5	0	5
14:30	183	13	196	8	0	8
14:45	191	11	202	1	1	2
Hour	734	48	782	19	1	20
15:00	192	11	203	4	0	4
15:15	218	14	232	2	0	2
15:30	189	8	197	3	0	3
15:45	237	9	246	7	0	7
Hour	836	42	878	16	0	16
16:00	246	16	262	6	0	6
16:15	255	9	264	2	0	2
16:30	258	15	273	4	0	4
16:45	285	9	294	6	1	7
Hour	1044	49	1093	18	1	19
17:00	304	18	322	4	1	5
17:15	296	10	306	4	0	4
17:30	255	9	264	5	0	5
17:45	283	5	288	2	1	3
Hour	1138	42	1180	15	2	17
18:00	302	10	312	2	0	2
18:15	248	6	254	2	1	3
18:30	242	8	250	8	1	9
18:45	226	13	239	2	0	2
Hour	1018	37	1055	14	2	16
Total	7928	625	8553	161	22	183

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Site No. 1
 Location R156 / N4(NW) / N4(SE)
 Date Friday 04 March 2011

Time	To Arm A - R156		Veh. Total	From Arm A - R156		Veh. Total
	LV	HV		LV	HV	
07:00	8	0	8	4	1	5
07:15	9	0	9	4	1	5
07:30	15	0	15	24	0	24
07:45	13	1	14	30	4	34
Hour	45	1	46	62	6	68
08:00	11	3	14	36	2	38
08:15	25	0	25	38	3	41
08:30	23	4	27	48	0	48
08:45	47	1	48	66	1	67
Hour	106	8	114	188	6	194
09:00	37	0	37	52	4	56
09:15	22	2	24	33	0	33
09:30	17	2	19	49	2	51
09:45	17	0	17	44	1	45
Hour	93	4	97	178	7	185
10:00	19	7	26	40	2	42
10:15	23	3	26	31	2	33
10:30	20	2	22	28	3	31
10:45	22	1	23	26	1	27
Hour	84	13	97	125	8	133
11:00	27	3	30	28	4	32
11:15	23	1	24	26	1	27
11:30	34	1	35	26	3	29
11:45	28	3	31	27	3	30
Hour	112	8	120	112	11	123
12:00	26	1	27	20	1	21
12:15	37	3	40	19	1	20
12:30	28	1	29	34	1	35
12:45	28	1	29	32	1	33
Hour	119	6	125	105	4	109
13:00	42	0	42	18	2	20
13:15	34	3	37	32	2	34
13:30	44	2	46	44	0	44
13:45	41	1	42	47	1	48
Hour	161	6	167	141	5	146
14:00	39		40	38	2	40
14:15	38	3	41	32	0	32
14:30	45	1	46	34	3	37
14:45	44	7	51	67	5	72
Hour	166	12	178	171	10	181
15:00	36	3	39	32	3	35
15:15	37	7	44	40	2	42
15:30	35	0	35	41	1	42
15:45	52	1	53	37	1	38
Hour	160	11	171	150	7	157
16:00	47	2	49	33	1	34
16:15	39	1	40	35	4	39
16:30	34	3	37	29	1	30
16:45	35	1	36	34	2	36
Hour	155	7	162	131	8	139
17:00	50	1	51	24	1	25
17:15	46	1	47	27	1	28
17:30	40	1	41	28	1	29
17:45	45	4	49	33	1	34
Hour	181	7	188	112	4	116
18:00	41	0	41	35	0	35
18:15	36	1	37	33	0	33
18:30	24	12	36	22	0	22
18:45	35	1	36	37	0	37
Hour	136	14	150	127	0	127
Total	1518	97	1615	1602	76	1678

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Site No. 1
 Location R156 / N4(NW) / N4(SE)
 Date Friday 04 March 2011

Time	To Arm B - N4(NW)		Veh. Total	From Arm B - N4(NW)		Veh. Total
	LV	HV		LV	HV	
07:00	36	13	49	130	11	141
07:15	46	17	63	151	14	165
07:30	88	10	98	140	15	155
07:45	120	18	138	150	15	165
Hour	290	58	348	571	55	626
08:00	134	24	158	138	15	153
08:15	174	17	191	173	9	182
08:30	175	12	187	142	6	148
08:45	184	16	200	165	9	174
Hour	667	69	736	618	39	657
09:00	149	18	167	160	11	171
09:15	137	16	153	129	20	149
09:30	159	20	179	105	9	114
09:45	166	9	175	123	18	141
Hour	611	63	674	517	58	575
10:00	135	16	151	105	22	127
10:15	148	23	171	120	15	135
10:30	126	16	142	116	14	130
10:45	128	15	143	121	17	138
Hour	537	70	607	462	68	530
11:00	134	20	154	119	19	138
11:15	142	12	154	102	16	118
11:30	168	16	184	127	17	144
11:45	139	19	158	153	15	168
Hour	583	67	650	501	67	568
12:00	144	14	158	119	20	139
12:15	115	18	133	150	24	174
12:30	159	14	173	148	18	166
12:45	149	19	168	139	20	159
Hour	567	65	632	556	82	638
13:00	161	7	168	160	24	184
13:15	181	15	196	140	18	158
13:30	176	14	190	150	14	164
13:45	212	17	229	133	16	149
Hour	730	53	783	583	72	655
14:00	191	16	207	137	18	155
14:15	233	10	243	168	14	182
14:30	212	16	228	150	14	164
14:45	244	15	259	185	22	207
Hour	880	57	937	640	68	708
15:00	215	14	229	190	24	214
15:15	256	16	272	154	21	175
15:30	225	9	234	165	14	179
15:45	272	9	281	216	16	232
Hour	968	48	1016	725	75	800
16:00	278	17	295	190	17	207
16:15	287	12	299	209	13	222
16:30	282	15	297	184	12	196
16:45	310	9	319	156	11	167
Hour	1157	53	1210	739	53	792
17:00	324	18	342	232	19	251
17:15	318	11	329	195	7	202
17:30	281	10	291	212	8	220
17:45	311	5	316	217	9	226
Hour	1234	44	1278	856	43	899
18:00	332	10	342	182	14	196
18:15	276	6	282	181	9	190
18:30	263	8	271	139	14	153
18:45	258	13	271	156	13	169
Hour	1129	37	1166	658	50	708
Total	9353	684	10037	7426	730	8156

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Site No. 1
Location R156 / N4(NW) / N4(SE)
Date Friday 04 March 2011

Time	To Arm C - N4(SE)		Veh. Total	From Arm C - N4(SE)		Veh. Total
	LV	HV		LV	HV	
07:00	123	11	134	33	12	45
07:15	143	15	158	43	17	60
07:30	128	15	143	67	10	77
07:45	141	14	155	94	14	108
Hour	535	55	590	237	53	290
08:00	131	14	145	102	24	126
08:15	151	9	160	139	14	153
08:30	126	3	129	134	13	147
08:45	137	9	146	137	16	153
Hour	545	35	580	512	67	579
09:00	137	12	149	111	15	126
09:15	110	19	129	107	17	124
09:30	91	9	100	113	20	133
09:45	111	18	129	127	8	135
Hour	449	58	507	458	60	518
10:00	93	17	110	102	16	118
10:15	101	13	114	121	22	143
10:30	98	14	112	100	15	115
10:45	104	17	121	107	15	122
Hour	396	61	457	430	68	498
11:00	94	19	113	108	19	127
11:15	84	15	99	111	11	122
11:30	97	16	113	146	13	159
11:45	130	13	143	117	17	134
Hour	405	63	468	487	60	547
12:00	97	21	118	128	15	143
12:15	117	22	139	100	18	118
12:30	129	18	147	134	14	148
12:45	116	19	135	122	18	140
Hour	459	80	539	484	65	549
13:00	121	25	146	146	6	152
13:15	114	16	130	157	14	171
13:30	118	12	130	144	14	158
13:45	109	15	124	182	16	198
Hour	462	68	530	629	50	679
14:00	104	12	121	159	14	173
14:15	140	11	151	211	10	221
14:30	118	13	131	191	13	204
14:45	156	17	173	192	12	204
Hour	518	58	576	753	49	802
15:00	167	21	188	196	11	207
15:15	121	14	135	220	14	234
15:30	138	14	152	192	8	200
15:45	173	16	189	244	9	253
Hour	599	65	664	852	42	894
16:00	150	15	165	252	16	268
16:15	175	13	188	257	9	266
16:30	159	10	169	262	15	277
16:45	136	13	149	291	10	301
Hour	620	51	671	1062	50	1112
17:00	190	20	210	308	19	327
17:15	158	6	164	300	10	310
17:30	179	7	186	260	9	269
17:45	179	7	186	285	6	291
Hour	706	40	746	1153	44	1197
18:00	148	14	162	304	10	314
18:15	152	9	161	250	7	257
18:30	124	3	127	250	9	259
18:45	128	12	140	228	13	241
Hour	552	38	590	1032	39	1071
Total	6246	672	6918	8089	647	8736

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